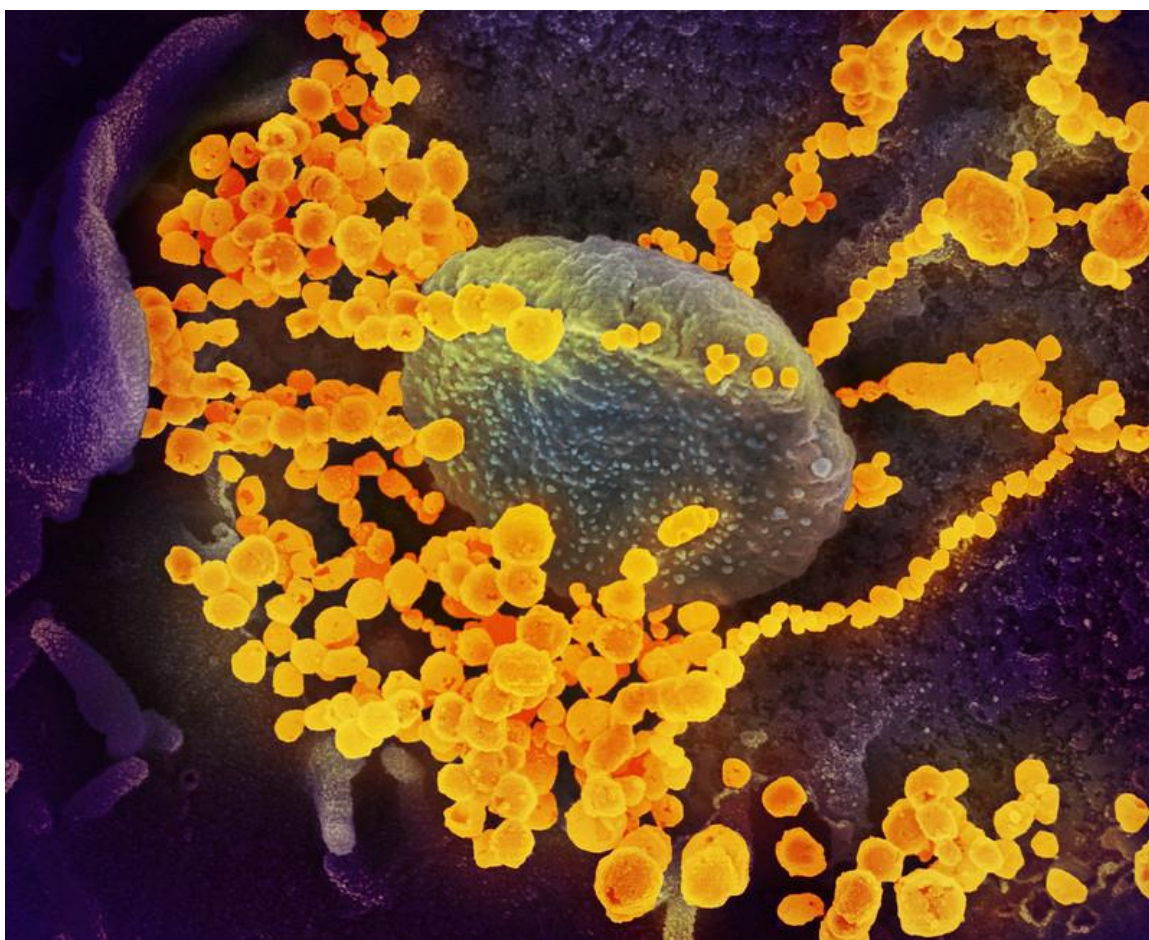


# Irish Chemical News

A Journal of the Institute of Chemistry of Ireland



This scanning electron microscope image shows SARS-CoV-2 (round gold objects) emerging from the surface of cells cultured in the lab. SARS-CoV-2, also known as 2019-nCoV, is the virus that causes COVID-19. The virus shown was isolated from a patient in the U.S. Credit: NIAID-RML



# Institiúid Ceimice na hÉireann The Institute of Chemistry of Ireland

**ICI Centenary 1922-2022**

*Patron: Michael D. Higgins, President of Ireland*

The Professional Body Representing Chemists in Ireland

Ravensdale Road, Dublin D03 CY66.

Web: [www.instituteofchemistry.org](http://www.instituteofchemistry.org)

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## A Message from the President

Dear Fellows, Members, Graduates and Associates,

It has been just over three months since the publication of the last issue of Irish Chemical News and what an exceptionally challenging time it has been for us all in the face of Covid-19 since then, both personally and professionally. I sincerely hope that you and your families are all keeping safe and well.

The Covid pandemic has impacted us all in so many different ways. It is now more important than ever that we heed the public health advice of government in a community-wide attempt to prevent the resurgence of this incredibly virulent disease.

In terms of the impact of Covid-19 on the Institute of Chemistry of Ireland, regrettably, we had to postpone our **AGM and our annual ICI award ceremony** which were due to take place in RCSI in April, 2020. We are reviewing the feasibility of hosting a virtual AGM in the near future and we will send details to you all just as soon as we have them. The **45<sup>th</sup> ICI Congress**, which was due to take place in University College Cork in September of this year, has also been deferred to 2021.

The **72<sup>nd</sup> Irish Universities Chemistry Colloquium**, which is run under the aegis of the ICI, was scheduled to take place in the University of Limerick in June 2020. It likewise has had to be deferred to 2021. However, I am pleased to say that, in consultation with the UL organizers, the ICI are planning to host a **virtual ICI Postgraduate Research Day 2020** in lieu of the Colloquium this year. The goal is to provide postgraduate students across the island of Ireland with an opportunity to share and discuss their latest research findings and to afford them with an opportunity to present their research nationally. They will also be exposed to new research both within and outside their fields of study, expanding both their knowledge and professional development. The vision for this event is that the program will be designed by, and made up of postgraduate speakers, representing the diverse and excellent range of research being conducted in Ireland. Heads of Schools and Departments of Chemistry have already been contacted by email seeking postgraduate nominations for the organizing committee. Dr Joseph Byrne (NUIG) and Dr Mark Kelada, the Institute's ICI Young Chemist Representative and ICI Council member, are leading this initiative. Further details about this exciting student-led event will be forthcoming via the ICI website and other channels (including email and social media) in the near future. In the interim, if you have any queries, please feel free to contact Dr Kelada by email (keladamark@gmail.com).

Our plans to host the **EuChemS Congress in Dublin** in 2022 have also been regrettably impacted. Following numerous virtual meetings with members from the EuChemS Executive and subsequent Executive Board approval, it has been agreed to postpone the Dublin Congress to 2024 given that the Congress which was due to take place in Lisbon, Portugal in August/September of this year has likewise had to be deferred. On behalf of the ICI, I wish the Portuguese Chemical Society (SPQ), with the support of the Portuguese Electrochemical Society (SPE), every success in their preparations to host the Congress in 2022 and urge our Irish research community to show their support and to try to attend if at all possible. Details in relation to this Congress may be found on their website: <https://euchems2022.eu>

On a positive note, I am delighted to let you know that we have **redesigned and updated our ICI website**. Please take a moment to review it and to provide your feedback (<http://www.chemistryireland.org>). We plan to post regular updates so please feel free to contact our secretary, Ms. Mary Mullaghy (info@instituteofchemistry.org), if you have any posts which you feel

would be of relevance to our community. We are also seeking website sponsors so we would be very grateful if you could let me know directly of any sponsors who you think may be interested in sponsoring our website.

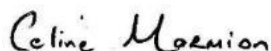
I wish to highlight that the Institute, together with a number of other national Chemical Societies, have endorsed a recently issued statement by the Royal Society of Chemistry **on inclusion and diversity in the chemical sciences** (<https://www.rsc.org/news-events/articles/2020/jun/id-joint-societies-statement>). There is no place for sexism, racism, discrimination or any other forms of inequality in our societies and our places of work. You will find the Institute's logo, together with those of the other Societies, under this statement on the RSC website as evidence of our endorsements.

As we witness the re-opening of our country, may I take this opportunity, on behalf of the Institute, to wish primary and secondary school teachers and pupils and third level lecturers and students every success as they transition back to their schools and third level institutions in September. It will be yet another challenging year for our students, especially final year degree students, leaving and junior certificate students and PhD students coming close to the end of their scholarships. Lecturers, teachers and PhD supervisors are to be commended for all that they are doing during these challenging times. The pharma industry and research funding agencies are also to be commended in this regard.

May I thank this opportunity to thank Patrick Hobbs on publishing yet another excellent edition of the Irish Chemical News. May I encourage you please to submit articles of interest or indeed notifications that you feel may be of interest to our members for inclusion in future editions.

Finally, on behalf of Council, may I wish all our Fellows, Members, Graduates and Associates continued good health and happiness.

Yours sincerely,



Professor Celine J. Marmion PhD FRSC FICI  
President, Institute of Chemistry of Ireland  
24<sup>th</sup> July, 2020





## Editorial

In the last Issue of ICN we were in exponential growth phase of Covid-19 and now for the moment we have a good level of control. I have not heard of any Institute member contracting it and hopefully none have. Best way to stay safe is to follow the scientific advice on hand washing, social distancing, face masks and no unessential travel. There is hope for a vaccine and some Phase 3 trials are looking hopeful but it's a tall order to have one before the end of the year.

I have been reading and scanning hundreds of papers and reports and have included a whole section on the SARS CoV-2 virus with Irish and International links. Due to copyright issues I can't republish most of these so I have provided active links to summaries and original papers which provide many hours of reading.

There is, however some more bad news and that is the postponement of the European Chemistry Society (EuChemS) Congress in Dublin in 2022. This is due to this year's cancellation of ECC8 in Lisbon, Portugal due to the Covid-19 crisis. Our Congress has been rescheduled to 2024. Personally this is a huge disappointment to me as I have been involved in discussions with the Dublin Convention Centre and with Keynote PCO, Dr Noel Mitchell since 2013 while I was President and initially with Dr Brian Murray while he, was President preceding me. I took a lot of persuading before I was convinced we could do this and bring the proposal to Council and eventually win the bid.

However life will eventually return to normal and we all should support the Portuguese Chemical Society by planning to attend in 2022 which is not all that long away. Let's have a big contingent from Ireland and make this biannual EuChemS Congress a world chemistry event.

There are also good news stories of chemistry happening in Ireland. In this Issue I have an academic paper by a female academic from UL, three reports from NUI Galway including The Dillon Centenary Symposium and a contribution from UCC. From QUB Belfast this year's winner of the RIA Kathleen Lonsdale Chemistry Prize and, in this time of crisis, a link to the award ceremony which was by Zoom. The Irish Mass Spectrometry Society, IMSS, Annual Conference 2019 is also covered.

I have been very impressed by some the graphical molecular modelling of SARS CoV-2 virus and its mechanism of action and there is an Irish contribution from a young Irish animator and data scientist Eoin Winston of Nexu and Jason McLellan from the University of Texas.

The contribution of women to chemistry is covered in this Issue with a report on the SFI President of Ireland Future Research Leaders and in acknowledgment of International Women's Day 2020 SFI asked some of the recent SFI President of Ireland Future Research Leaders to tell us about their experiences as women working in STEM which is reported in this issue.

There are links to some interesting Silicon Republic reports and industry news from SFI, IDA and Industry & Business.

One last bit of good news is that our new updated website has just gone live. It includes a number of ICN Issues which have not been posted on the old site for some time: <http://www.chemistryireland.org/news-publications/#icn>

**Note: SFI Alerts pages 10 and 85-87**

Comments and Responses are welcome and can be sent to: - [info@instituteofchemistry.org](mailto:info@instituteofchemistry.org)

**Patrick Hobbs MSc, FICI, CChem, CSci, MRSC.  
Editor**



SFI Alert: 30 June 2020

## COVID-19 Rapid Response Funding Call

SFI are pleased to announce the reopening of the [COVID-19 Rapid Response Call](#). The second phase of this call will fund projects up to 14 months in duration that build scientific knowledge and develop novel solutions that have the potential to impact society and the economy in the short/medium term.

Applications will be accepted in the following thematic areas:

- **Infection Prevention & Control**
- **Understanding the Virus & Host Response**
- **STEM-led Solutions for Stimulating & Sustaining Rapid Economic Recovery**

To support all-Ireland collaborative research initiatives, SFI has entered into partnership with the Department of the Economy (Northern Ireland), facilitating researchers in Northern Ireland to apply for funding as part of joint proposals.

The deadline for submission of applications to this call is **26 August 2020**.

For more information on this opportunity visit [www.sfi.ie](http://www.sfi.ie)

**Tel:** +353 (0) 1 6073200

**Email:** [info@sfi.ie](mailto:info@sfi.ie)

[www.sfi.ie](http://www.sfi.ie)

The **Institute** has been asked to circulate information from the **Editor of European Pharmaceutical Review** re Covid-19:

To promote scientific collaboration and openness during these unprecedented times, *European Pharmaceutical Review's* sister title *Drug Target Review* has launched a [COVID-19 research hub](#).

Including news, articles and a forum for discussion, the hub allows you to discover and share your thoughts on the latest pre-clinical coronavirus treatment and vaccine developments.

The hub is also a platform to share COVID-19 drug discovery findings; you can use our submission box to send in any coronavirus-related research you would like to publish:

### [SHARE YOUR RESEARCH](#)

I look forward to reading your thoughts and research.

Kind regards,

**Nikki Withers**

Editor | European Pharmaceutical Review **European Pharmaceutical Review**



Website: <https://www.europeanpharmaceuticalreview.com>

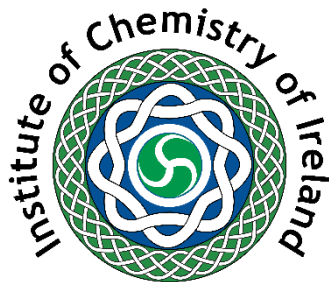
European Pharmaceutical Review is the leading publication for up-to-the-minute information on all aspects of drug analysis, formulation, delivery, manufacturing and regulation. Published bi-monthly, each issue delivers high-level technical and business contributions from the world's leading pharmaceutical scientists and business experts, coupled with a variety of features including interviews, updates and profiles.



Website: <https://drugtargetreview.com>

From the industry experts and publishing team behind [European Pharmaceutical Review](#), Drug Target Review provides a voice for the drug discovery industry, promoting the latest research and developments, funding projects, and cutting-edge technological developments.

Drug Target Review's quarterly journal, website and annual events programme provides high quality content with peer-written articles that are submitted exclusively by the world's most respected scientists in their field. 88% of our readers would recommend Drug Target Review to a friend or colleague.



## The Institute of Chemistry of Ireland Awards

### The ICI Boyle Higgins Gold Medal and Lecture Award The ICI Annual Award for Chemistry (Eva Philbin Public Lecture Series) The ICI Postgraduate Award

#### The Boyle Higgins Gold Medal and Lecture Award

The Boyle Higgins Gold Medal and Lecture Award, instituted in 1985, is an award for research work carried out in chemistry under the headings: (a) Pure Chemistry, (b) Applied and Industrial Chemistry or (c) Chemical Education. The award recognizes a chemist **of any nationality working in Ireland or a chemist who is an Irish citizen working overseas** who has made **an outstanding and internationally recognised research contribution to the advancement of chemistry**. A person nominated for this award must be a member of the Institute at the time of nomination or upon receipt of the award.

*Nomination process: The nominator shall indicate in writing to the President of the Institute the category which applies to their nominee and they shall submit by email one electronic copy which will include a brief statement outlining the reasons for the nomination, together with a CV (maximum 3 pages) of the nominee. Nominations will be externally reviewed by two independent referees, who are recognised experts in the category and who are not nominators.*

#### The ICI Annual Award for Chemistry (Eva Philbin Public Lecture Series)

This award is for a practising chemist, who has made a significant contribution to the advancement of chemistry and has considerably raised the profile of chemistry through both the excellence of their work and their ability to communicate in an effective and lucid manner. **The recipient, who may be an Irish or international chemist of repute**, will present lectures in three locations in Ireland (including Dublin), which will be open to the public. A person nominated for this award must be a member of the Institute at the time of nomination or upon receipt of the award.

*Nomination process: The nominator shall send one electronic copy of their nomination by email to the President of the Institute, which will include a cover letter providing a brief statement outlining the reasons for the nomination, together with a CV (maximum 3 pages) of the nominee. Nominations for this award will be externally reviewed.*

#### The ICI Postgraduate Award

The nominee must be a **registered PhD student in any Chemistry discipline working in an Irish Higher Education Institution**. They must have demonstrated excellence in research through publications. They must also have demonstrated a commitment to supporting and promoting Chemistry within their Institution (e.g. through active participation in public engagement initiatives). A person nominated for this award must be a member of the Institute at the time of nomination or upon receipt of the award.

*Nomination Process: The nominator, who must be the student's PhD supervisor, shall send one electronic copy of their nomination by email to the President of the Institute, which will include a cover letter providing a brief resume of the reasons for the nomination, together with a CV (maximum 2 pages) of the nominee.*

ICI website: <http://www.chemistryireland.org>

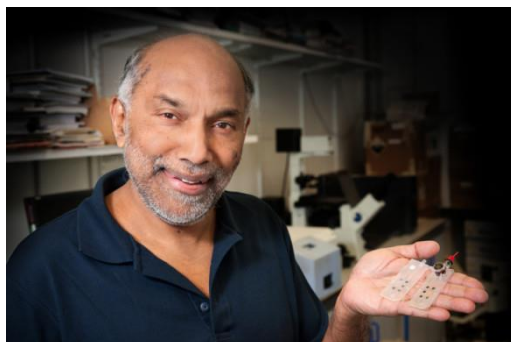
Nominations to be sent to the ICI President at: [president@instituteofchemistry.org](mailto:president@instituteofchemistry.org)

[Details in relation to other ICI Awards are available on the ICI website](#)

## ICI Award Winners 2020

**Postponed due to current Covid-19 crisis until further notice**

### Boyle Higgins Gold Medal Lecture Award 2020



Professor A.P. De Silva, QUB

### The ICI Annual Award for Chemistry (Eva Philbin Public Lecture Series) 2019



Professor Declan McCormack from TU Dublin

### The ICI Postgraduate Award 2019



Ms Saoirse Dervin (Sligo IT).

# NUI Galway School of Chemistry

## ONLINE SEMINAR SERIES 2020



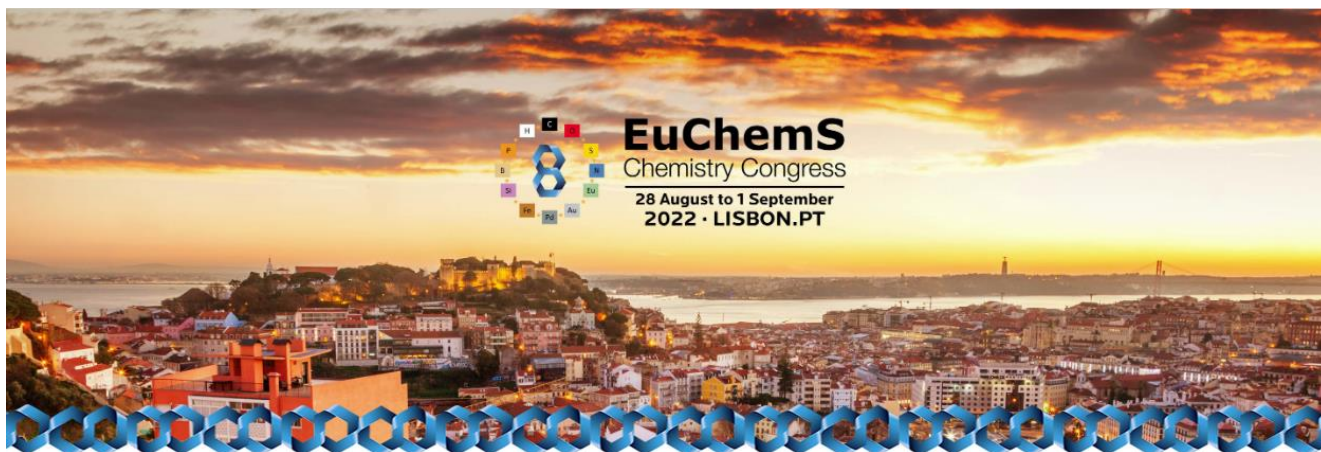
You are invited to attend our weekly seminars, taking place on **Fridays at 12 noon** (Irish time), unless otherwise specified

Seminars are hosted via a Microsoft Teams group at NUI Galway, and some may be accessed by external guests. Links, where possible, will be shared on Twitter @chemistrynuig, or at <http://nuigalway.ie/chemistry/events>.

### PROGRAMME OF SPEAKERS (currently confirmed)

<i>Date</i>	<i>Time</i>	<i>Speaker</i>	<i>Affiliation</i>
22 May	12:00	<b>Chris Hawes</b>	Keele University (UK)
29 May	15:00*	<b>Grace Morgan*</b>	UCD Dublin (IE)
5 June	12:00	<b>Syma Khalid</b>	University of Southampton (UK)
12 June	12:00	<b>Kurt Hoogewijs</b>	NUI Galway (IE)
19 June	12:00	<b>Carmen Galan</b>	University of Bristol (UK)
26 June	16:00*	<b>Keary Engle*</b>	Scripps Institute (USA)
3 July	12:00	<b>Jelena Stojadinovic</b>	Membrasenz (CH)
10 July	12:00	<b>Jean-Louis Reymond</b>	University of Berne (CH)
17 July	12:00	<b>Nathalie Weickgenannt</b>	Angewandte Chemie

Please contact [joseph.byrne@nuigalway.ie](mailto:joseph.byrne@nuigalway.ie) for more information.



## Postponed to August 28, 2022

“The COVID-19 pandemic that so deeply affects our lives and countries is not expected to end soon, and its consequences will be felt for a long time. In particular, satisfactory conditions for international scientific conferences to take place will certainly not be fulfilled in the next months. We are thus forced to postpone the 8<sup>th</sup> EuChemS Chemistry Congress. On the 3<sup>rd</sup> of May, 2020 the Executive Board of EuChemS, in consultation with the Scientific and Organizing Committee in Portugal were able to settle on a new date for the 8<sup>th</sup> EuChemS Chemistry Congress.

This was no easy decision but was a necessary one, and the only appropriate option, given the enormous material and immaterial compromise already assumed by the local organization. We praise our supporters and all the body of EuChemS, in particular the organizers of the forthcoming event on the series, for joining the Portuguese Chemical Society (SPQ), with the support of the Portuguese Electrochemical Society (SPE), in the announcement of the new date of 8<sup>th</sup> EuChemS Chemistry Congress (ECC8), to be held in **Lisbon, Portugal, from August 28 to September 1, 2022**”.



## Congress Program

Loyal to the initial theme, the 8<sup>th</sup> EuChemS Chemistry Congress will be built under the unifying theme of **Chemistry the Central Science**. The focus will remain on the central role of chemistry at the interfaces with biology, material and environmental sciences, both for the progress of humankind and for the solution of fundamental problems of modern societies. Some changes will be indeed introduced since nothing remains the same after the enormous test we are all being submitted. For the time being, we are still working on an exciting scientific program led by world-class experts, that will develop around the main scientific previously selected.

**All previously submitted contributions will not be processed without notice to the 2022 ECC8 program.** An opportunity for updating your contributions will be announced in due time. We will keep your pre-registration in our files so that we may send you further information in due time. If you

do not agree, please let us know (by a simple e-mail to [euchems2020@chemistry.pt](mailto:euchems2020@chemistry.pt)) and we will delete your full record. Nevertheless, we hope to see you all in Lisbon in 2022, for celebrating the continuation of this regular series of EuChemS Chemistry Congresses.



### **Cancellation Procedure and Refund policy**

Registrations completed before congress postponement, will remain valid for the 2022, 8<sup>th</sup> EuChemS Chemistry Congress, if desired. Participants who want a refund, **must cancel their participation by June 30** addressing their request to [euchems2020@chemistry.pt](mailto:euchems2020@chemistry.pt). Refunds will be handled promptly with no charges.

Registration is temporarily suspended and will reopen during **2021**.

<https://euchems2022.eu>





## 9th EuChemS European Chemistry Congress to be held in 2022 in Dublin, Ireland, deferred to 2024

At the meeting of its Executive Council, The European Chemical Society (EuChemS) executive awarded the 9<sup>th</sup> EuChemS European Chemistry Congress to Dublin. This prestigious congress is held every two years and brings together the leading researchers and industry partners in all chemistry disciplines from across Europe and the wider international arena.



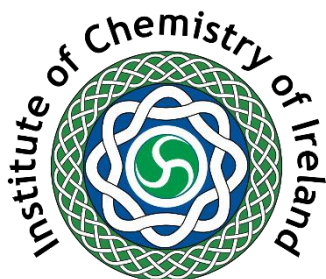
Ireland Section

The organisers expect over 1,500 delegates from around the globe to attend the event in The Convention Centre Dublin, in 2024. The five-day programme will consist of plenary and parallel lectures, poster sessions, symposia, networking events, and an industrial exhibition.

**The European Chemical Society**, was official announced at ECC7 in Liverpool, August 2018. Formerly (2004–2018) the European Association for Chemical and Molecular Sciences (EuCheMS) and before that (1970–2004) the Federation of European Chemical Societies (FECS).

The European Chemical Society (EuChemS) coordinates the work of almost all the European Chemical Societies. As an organization, it provides an independent and authoritative voice on all matters relating to chemistry, and places chemistry at the heart of policy in Europe. Furthermore, EuChemS seeks to develop its members through various activities, workshops and awards.

Under the new EuChemS the next Congress, ECC8 will be hosted by **The Portuguese Chemical Society (SPQ)**, with the support of the **Portuguese Electrochemical Society (SPE)**, invites you to attend this must go to series of European chemistry conferences, the **8th EuChemS Chemistry Congress (8ECC)**, to be held in Lisbon, Portugal, from 28th August to 1st September, 2022.



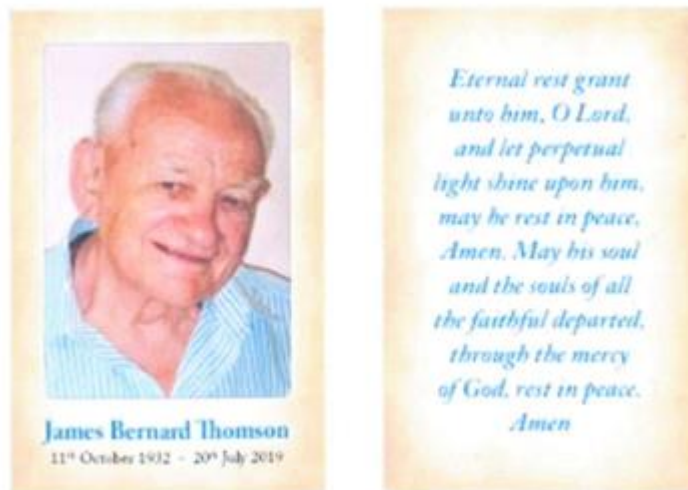
The Institute of Chemistry of Ireland

The professional body representing chemists in Ireland

<http://www.chemistryireland.org>

## Obituary Notice

### Dr James Bernard Thomson (UCD)



Dr James Bernard Thomson (Dr Jim Thomson), a lecturer in UCD Department of Chemistry between 1957 and 1992, passed away in his native Scotland, on the 20<sup>th</sup> July 2020 after a short illness.

Graduating with his degrees from the University of Strathclyde where Peter Pauson has made his ground-breaking work on ferrocene, he was appointed first as an ICI Fellow in the Department of Chemistry at UCD.

He was the pioneer in the field of planar chiral ferrocene derivatives and published the first paper in this area in *Tetrahedron Letters* in 1959 (Issue no. 6, 26) with Dublin, U.K. as the address!

He was a valued colleague in the UCD Department of Chemistry and a distinguished lecturer in organic chemistry for generations of students.

## Salt matters: why the nature of the electrolytes needs to be taken into account in biochemical systems

Cristina Carucci (University of Limerick, Ireland)



Cristina Carucci was born in Cagliari, Italy, in 1990. She graduated in Chemistry at University of Cagliari, Italy (M.Sc.) in 2014. Her work focused on the effect of electrolytes on the faradaic response of glucose oxidase biosensors. From 2014 to

2018 she studied at the University of Limerick under the supervision of Prof. Edmond Magner and she was part of the SFI research centre, Synthesis and Solid State Pharmaceutical Centre (SSPC). In 2018 she was awarded a PhD and she was recruited as PostDoc at the Université de Bordeaux (France) working between the “NanoSystèmes Analytiques” and the “Centre de Recherche Paul Pascal” in Bordeaux. Her research interests focus on biophysical chemistry, Hofmeister phenomena and salts interactions, enzyme immobilization, support materials such as ordered macroporous gold electrodes and nanomaterials design for drug delivery.

### Introduction

Over 130 years ago the pharmacologist Franz Hofmeister studied the effect of salts on the precipitation of egg white proteins.<sup>[1]</sup> Despite the commonly perceived opinions that electrolytes behave equally in solution, his study demonstrated that protein precipitation was influenced by the nature of the salt in solution. He systematically examined a wide range of anions and cations and arranged them in a sequence that reflected their ability to precipitate the protein. Since then the series has been known as the “Hofmeister series”. At that time no theoretical studies on the electrolytes had been made. The work of Debye and Hückel on the theory of electrolytes came many years later in 1933. In

particular, the Poisson-Boltzmann equation (which arises in the Debye Hückel theory) describes the potential in solution when ions are in contact with a charged surface. The Poisson-Boltzmann equation is widely used for ions in contact with charged biomolecules such as proteins, enzymes, cells and so forth.

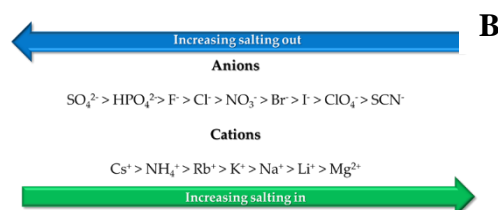


Figure 1: A)

Commemorative plaque to Franz Hofmeister at the Charles University in Prague B) anionic and cationic Hofmeister series with ions ordered on the basis of their ability to precipitate (salt out) or solubilise (salt in) ovoalbumin

The Poisson-Boltzmann equation describes the electric potential as a function of several parameters such as ionic strength and temperature (equation 1) but does not take into account non-Coulombic (dispersion) interactions.

$$\nabla^2 \psi = -\frac{1}{\epsilon_r \epsilon_0} \sum_i n_i z_i e \exp\left(-\frac{z_i e \psi}{kT}\right)$$

Equation 1: Poisson-Boltzmann equation,  $\psi$  = electric potential,  $\epsilon_r$  = dielectric constant of the solvent,  $\epsilon_0$  = dielectric constant of vacuum,  $n_i$  = number of ions per  $\text{cm}^3$ ,  $z_i$  = valence,  $e$  = charge of electron  $1.602 \cdot 10^{-19}$  C,  $k$  = Boltzmann constant,  $T$  = temperature (Kelvin).

In addition, the theory considers ions as individual point charges. In reality, ions cannot be treated as rigid spheres with a uniform charge and finite

radius. Derjaguin, Landau, Verwey and Overbeek developed a theory (DLVO theory) which better describes the forces involved between a charged surface and a liquid medium. The DLVO theory combines van der Waals attractive forces and repulsive electrostatic interactions by treating them separately. It is considered a milestone in the treatment of colloid dispersion forces in aqueous medium (e.g. proteins in solution). Nevertheless, one of the major limitations of the DLVO theory is the use of the Poisson-Boltzmann equation. DLVO theory is valid only at low ionic strength (usually less than 0.05 M).<sup>[2]</sup> In comparison, the concentration of electrolytes in serum is over 0.15 M.<sup>[3]</sup> From both the Poisson Boltzmann equation and DLVO theory, ions such as Na<sup>+</sup> or K<sup>+</sup> should interact with a protein or an enzyme in the same manner and the interaction should be independent of the nature of the ion. As originally described by Hofmeister and in a large number of subsequent studies, ions in solution do not behave in a similar manner in the presence of biomolecules. Properties such as protein aggregation, enzymatic activity, solubility, electrophoretic mobility etc. may change significantly depending on the electrolyte. A number of theories have been developed to rationalise this effect.

### Attempts to explain the Hofmeister effect

In order to explain the Hofmeister effect, Collins developed a set of empirical rules known as the "law of matching water affinities" in which ion pairs can be formed only if ions of opposite charge have a similar affinity for water. Water affinity is

quantified in terms of hydration enthalpy. The hypothesis of "matching water affinity" states that "oppositely charged ions in free solution form inner sphere ion pairs spontaneously only when they have equal water affinity."<sup>[4]</sup> This hypothesis can explain some ion specific phenomena but for instance, can not explain why the order of the Hofmeister series is reversed in some cases.<sup>[5]</sup>

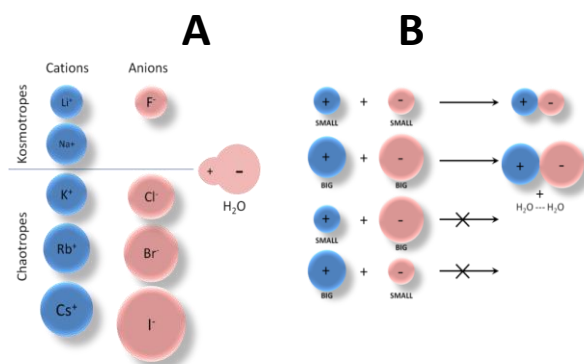


Figure 2: A) Classification of kosmotropic and chaotropic ion B) schematic description of matching water affinity

In the same year, Ninham proposed an improvement to the Poisson-Boltzmann equation by adding a term ( $U_i$ ) to take dispersion forces into consideration. The term describing the contribution of attractive dispersion forces is directly dependent on the ionic polarizability of each ion. Ninham's theory can describe both direct and reversed Hofmeister trends.

$$\nabla^2 \psi(x) = -\frac{1}{\epsilon_r \epsilon_0} \sum_i z_i c_{oi} e \exp\left(-\frac{z_i e \psi(x) + U_i(x)}{k_B T}\right)$$

$$U_i(x) \approx \frac{(n_w^2 - n_{prot}^2) \alpha}{x^3} f(a)$$

Equation 2: Poisson-Boltzmann equation modified by Ninham.  $U_i(x)$  = contribution of dispersion forces,  $\alpha$  = ionic polarizability,  $f(a)$  = function of the ionic radius,  $n_w$  = refractive index of water,  $n_{prot}$  = refractive index of enzyme

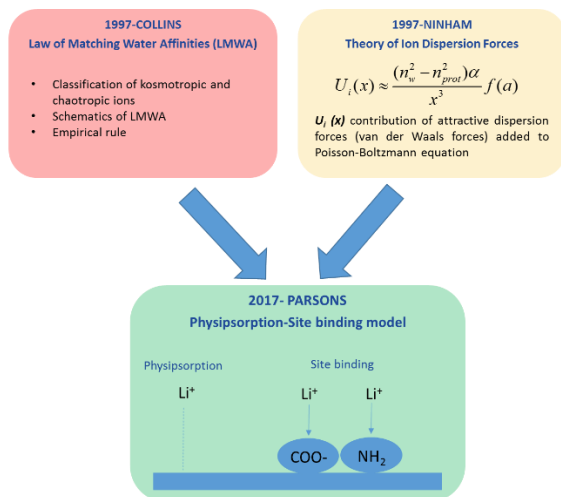


Figure 3: Schematic representations of the three approaches used to explain the Hofmeister effect.

Collins' and Ninham's approaches were considered to be opposed to each other. Parsons and Salis demonstrated that both approaches must be considered in a comprehensive theory of Hofmeister effects.[6] This approach is based on two main types of interactions that occur at protein surfaces: physisorption and specific ion binding. The model is based on the assumption that the Hofmeister effect is not controlled just by a single property of the ion such as ion size, polarizability and hydration. Ions may also affect the protein surface by non-electrostatic physisorption or by binding charged amino acid residues. In the case of non-electrostatic physisorption, depending on the properties of the protein (hydrophobic or hydrophilic), the direct or reverse series is expected. In the case of ion binding, cations may compete with hydrogen to bind to carboxylate or amine sites thus modifying the protein effective charge structure. Physisorption and site binding affect each protein in a specific way that is dependent on several

factors such as protein environment, pH and ionic strength. While theoretical models have improved the understanding of the Hofmeister effect, many forces are involved and to date there is still no comprehensive explanation of how electrolytes alter the properties of biomolecules.

### Recent examples of ion specific effects: electrochemical glucose biosensors

One of the most effective methods to quantify the presence of glucose utilises the enzyme glucose oxidase to oxidise glucose to D-gluconic acid. The oxidation of glucose can be followed electrochemically and the Faradaic current associated with the oxidation then related to the concentration of glucose. Electrochemical measurement requires the use of a supporting electrolyte to conduct the current and to avoid phenomena such as migration and convection at the electrode. In the vast majority of studies this electrolyte is chosen randomly because it is believed that it does not influence the reaction in the electrochemical cell.

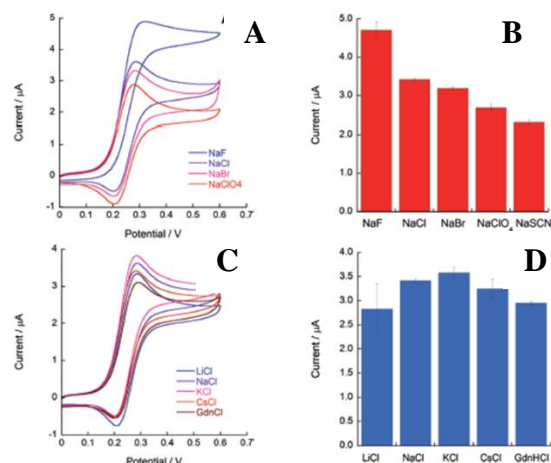


Figure 3: A) Specific anion and cation B) effects on cyclic voltammograms. C) Plot of peak current of ferrocene-

MeOH/GOx/glucose system in the presence of a range of anions D) and cations.

In fact, many reports demonstrated that the choice of electrolyte should be carefully considered to obtain the optimal response. The current response as a function of salt is shown In Figure 3. While anions affect the response by following the Hofmeister series (Figure 3 A-C), the cations show a bell shaped trend which has been reported in a number of studies (Figure 3 B-D). The hypothesis in this work is

that amino acids residues such as Lys, Arg, His, which are considered chaotropic interact with chaotropic ions. Amino acids residues such as Glu and Asp are kosmotropic and interact with kosmotropic ions. Binding of ions to the amino acid residues could be responsible for the observed changes in Faradaic current. It has been demonstrated that the glucose oxidation by glucose oxidase is modulated by the nature of the salt by affecting the faradaic current.<sup>[7]</sup> Similarly the oxidation of NADH by the mediator ABTS<sup>[8]</sup> in solution and the electrochemical properties of the model redox protein cytochrome c<sup>[9]</sup> are influenced by the choice of salt. While the effects of electrolytes in bio-electrochemistry are clearly observed, a detailed explanation of the effect remains unknown. Further theoretical and quantitative studies are needed.

### Ion specific effects and enzymatic activity

Lipases are one of the most intensively studied enzymes and are involved in a wide range of reactions, such as hydrolysis, esterification, alcoholysis, acidolysis and aminolysis.<sup>[10]</sup> They

are used in the food, pharmaceutical and cosmetic industries for the synthesis of enantiopure compounds. The catalytic activity of lipases can be affected by the nature of the salt used. This effect was observed when the activity of *Candida rugosa* lipase was examined in the presence of ions such as Na<sub>2</sub>SO<sub>4</sub>, NaSCN and NaCl.<sup>[11]</sup>

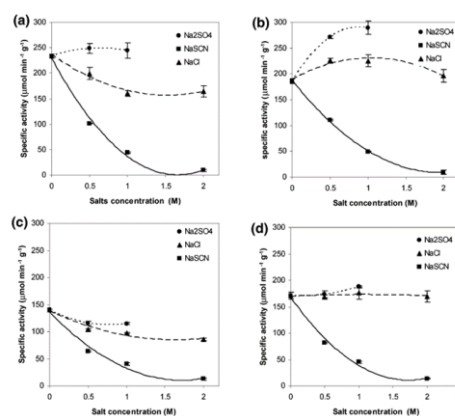


Figure 4: A)

Enzymatic activity vs salt concentration in sodium phosphate buffer 5 mM B) in sodium phosphate buffer 200 mM C) Tris-HCl 5 mM and D) and Tris-HCl 200 mM.

The activity of lipase depended on the nature of ion, the buffer and the buffer concentration. In Figure 4A the activity of lipase increased by 67% on changing from Na<sub>2</sub>SO<sub>4</sub> to NaSCN (1 M) in the presence of phosphate buffer (5 mM). On increasing the buffer concentration to 200 mM, the gap in activity between Na<sub>2</sub>SO<sub>4</sub> and NaSCN (1 M) increased by up to 84% (Figure 4B). When the activity was analysed in Tris-HCl (5 mM and 200 mM) the difference between Na<sub>2</sub>SO<sub>4</sub> and NaSCN (1 M) decreased to 40% and 50% respectively indicating that composition, ionic strength of electrolyte and buffer are strongly influenced the lipase activity.

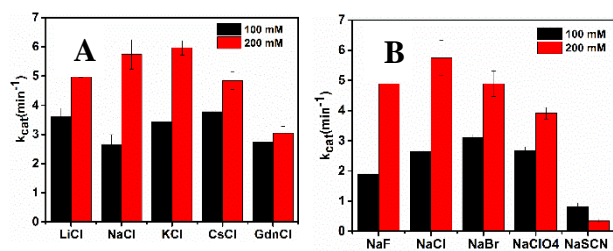


Figure 5: A) Plot of  $k_{cat}$  of ADH in 10 mM Tris-HCl buffer in presence of a wide range of cations B) Plot of  $k_{cat}$  of ADH in 10 mM Tris-HCl buffer in presence of a wide range of anions

Preliminary studies on the kinetic properties of *Saccharomyces cerevisiae* alcohol dehydrogenase on the conversion of ethanol to acetaldehyde have been performed.<sup>[12]</sup> The kinetic properties of the enzyme can be affected by the nature and the concentration of ions in solution. The  $k_{cat}$  values obtained varied depending on the ion in solution, at 200 mM concentration cations follow a bell shaped trend (Figure 5A). In the presence of anions when comparing NaF and NaSCN at a concentration of 200 mM (Figure 5B) there was a difference of 80% in  $k_{cat}$ . The amino acid residues in the active site of alcohol dehydrogenase (Cys and His) could interact with the cofactor  $NAD^+$  and with  $Zn^{2+}$  to promote or to inhibit the conversion of alcohol.

### Prediction of ion specific phenomena

Salts can significantly affect the properties of biomolecules. When performing studies on the enzyme based systems the nature of the salt or buffer used needs to be carefully considered and in particular when comparing the results from one study with another study. While there has been significant progress in developing a theoretical

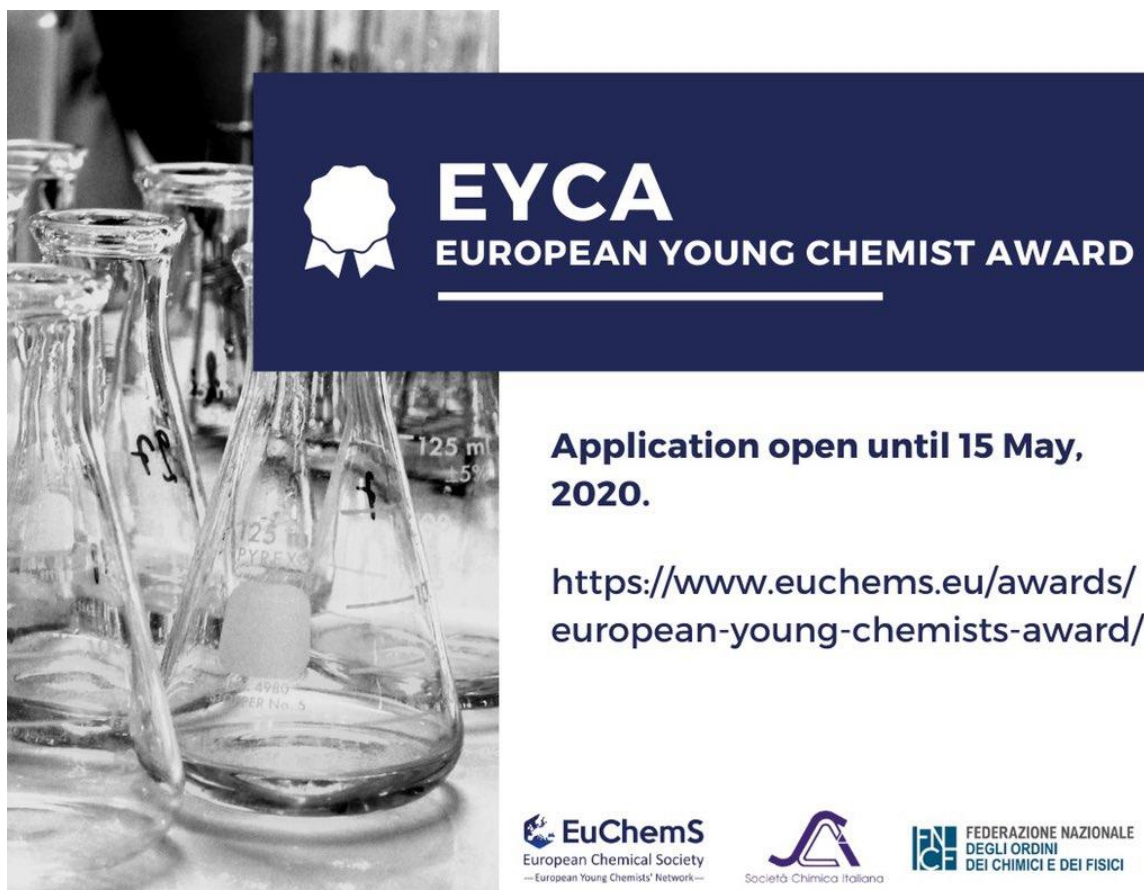
framework to understand the basis of the Hofmeister effect, predicting ion specific effects is still not possible and remains a significant challenge.


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## European Young Chemist Award 2020


Applications for this award call is now closed. Results have not been announced yet. You can read more about past winners at <https://chemistry-europe.onlinelibrary.wiley.com/doi/10.1002/chem.201804984>. The next opportunity to apply will be in 2022.





 **EYCA**  
EUROPEAN YOUNG CHEMIST AWARD

**Application open until 15 May, 2020.**

<https://www.euchems.eu/awards/european-young-chemists-award/>

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European Chemical Society  
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<https://twitter.com/YoungChemists/status/1231951917011566593>

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**EYCA European Young Chemist Award is a prestigious award for any young chemist in Europe but they usually there is a low level of participation Young Chemists from Ireland. You can change this!**

**Please discuss with your colleagues and considering nominating outstanding young chemists and circulate this information as much as you can.**





To mark its 50th anniversary since the foundation of the **Federation of European Chemical Societies (FECS)** in 1970, **EuChemS, the European Chemical Society,**

 [#50yeareseuchems](#)

## EuChemS celebrated 50th anniversary online!

On Friday, 3 July 2020, at 10:00 CEST, people from all around the world gathered to celebrate the 50<sup>th</sup> birthday of EuChemS. The programme of the online celebration can be found [HERE](#).

If you were not able to join our celebration live, we invite you to look at the recording on the [EuChemS YouTube channel](#) and subscribe for more clips from this event that will be coming soon!

<https://youtu.be/JMrs2WX23zE>

You can also watch EuChemS first video on YouTube:

<https://www.youtube.com/watch?v=o-405XcYKIE&amp;t=35s>



## Report on 15th Delegates' Assembly of the European Young Chemists Network by Dr Mark Kelada

Sitges, Spain



During January 2020, the convenor of the Young Chemists Group of the ICI, Dr Mark Kelada, attended the 15th Delegates Assembly (DA) of the European Young Chemists Network (EYCN), held at Sitges, Spain to represent the young chemists' division of the ICI. Delegates from over 25 European countries were present at this assembly.

The DA began on Sunday evening with a symposium and a poster session. This was followed by a guided tour around the beautiful city of Sitges where delegates discovered the historical sites and touristic areas. Early Monday morning comprised of the official opening of the DA by welcome talks by Professor Charles Bo, President of the Catalan Society of Chemistry, Professor Pilar Goya, President of EuChemS, Professor Javier Garcia-Martinez, President-Elect of IUPAC, and Dr Antonio Rodriguez, Chair of EYCN. This warm welcome was closely followed by activity reports of the steering committee of the EYCN where they presented the administrative and financial reports over the past year.



Afterwards, each of the teams of EYCN presented their projects over the year. The teams consisted of the membership team, networks team, communication team, science team, and global connections team. EuChemS and its activity was presented by its president, Professor Pilar Goya. The chair of the Young Scientists Network of the European Federation of Medicinal Chemistry, Dr Kristina Gonacharenko, gave a presentation about her network via Skype. Professor Artur Silva, President of the Portuguese Chemical Society, was also in attendance and gave a presentation about the EuChemS Chemistry Congress in Lisbon 2020.



The President-Elect of the International Union of Pure and Applied Chemistry (IUPAC), Professor Javier Garcia-Martinez, gave a very interesting and thought-provoking talk about the “The New Chemist” and what he hopes to achieve over the next few years as president of IUPAC. It was then time for each delegate to give a presentation about their own society from their respective countries. Mark gave a presentation about the ICI and the activities and awards over the past year, concluding his talk by inviting everybody to the EuChemS’ congress in Dublin in 2022. The day was concluded by an interactive session consisting of three discussions around EU policy, student wellbeing, and expectations to journals and editors.

The final day of the DA began with presentations of the International Younger Chemists Network (IYCN), Chemistry Across Europe, Young European Catalysis Network and the Pint of Chemistry. This was followed by a team discussion where the delegates chose which team they would like to join and planned projects for the upcoming year. Mark joined the Membership team and was selected to host a European Chemistry Podcast in the near future. He was also nominated to be a member of a Chemistry panel for the European Parliament to discuss important topics. Afterwards, Professor David Cole-Hamilton gave a virtual presentation about the Wilkinson Charitable Foundation and the International Year of the Periodic Table. This was followed by a talk by Professor Floris Rutjes, president-elect of EuChemS, on the future of EuChemS and thoughts and ideas from the young delegates. A session was then held on the European Chemistry Congress to be held in Lisbon in August of this year and the Young Chemists Program which will be held in parallel to the main program. This program will involve workshops, panel discussions and speakers, as well as a company challenge.



Shortly after, a talk about Scientometrics was delivered by Editor-in-Chief of the Chemistry in Europe Journal, Dr Haymo Ross, discussing citations and their value. Federico Bella, assistant professor from Italy, then gave a presentation and ideas about how to publish in a top tier journal. This was followed by the Royal Society of Chemistry Representative, Dr Aurora Walshe, who informed the delegates about Support from the RSC to the early career chemists. A representative of the American Chemical Society, Dr God'spower Onyenanu, also joined virtually to present about the Younger Chemists Committee of the ACS. Two positions of the steering committee of the EYCN had been vacated so a voting process decided which candidates were chosen for these roles.



After the pros and deltas of the DA were discussed, the meeting was concluded. Overall, it was a pleasant and beneficial experience for Mark.



## NUI GALWAY RESEARCHERS TO REPRESENT IRELAND AT LINDAU NOBEL LAUREATE MEETING



**Dr Adele Gabba (inaugural ICI postgraduate award recipient) and Dr Joseph Byrne from NUI Galway, who were selected to represent Ireland at the 70th Lindau Nobel Laureates Meeting. (Adele was the winner of the 2018 inaugural ICI Postgraduate.**

**Photo: Francesco Civati.**

24/4/2020

Two researchers from NUI Galway's School of Chemistry, Dr Joseph Byrne and Dr Adele Gabba, have been selected to attend the prestigious meeting of Nobel Laureates and emerging scientists from around the world in 2021. The pair will represent Ireland at the 70<sup>th</sup> Lindau Nobel Laureate Meeting on the island of Lindau in Germany.

Dr Byrne and Dr Gabba will join a selected group of 660 outstanding early-career scientists from 101 countries, who will meet with 68 Nobel Prize winners in the fields of chemistry, medicine and physiology, and physics. Selection to attend this week-long meeting offers a once-in-a-career opportunity to share their research and ideas with Nobel laureates and a wide network of future scientific leaders.

Dr Adele Gabba recently graduated with a PhD in Chemistry and currently works as a research assistant in the group of Professor Paul Murphy, School of Chemistry at NUI Galway. She will begin a prestigious Marie Skłodowska-Curie Individual Fellowship in MIT in the coming months.

Dr Joseph Byrne is an Honorary Research Lecturer in the School of Chemistry, who is in the first year of a Science Foundation Ireland Starting Investigator Research Grant project, developing luminescent glycoconjugate materials for detection of bacterial infections.

Dr Gabba and Dr Byrne were among six scientists nominated by the Irish Research Council (IRC), before going through a rigorous international selection process, through which only half of nominees were ultimately invited to attend. They will receive a grant from the Irish Research Council to enable them to attend the meeting, which takes place from 27 June-2 July 2021. The meeting was scheduled for this summer, but due to the outbreak of COVID-19, it has been postponed until 2021, while an interactive online programme of events will take place this year to fulfil the Lindau Foundation's mission 'Educate. Inspire. Connect.'

Dr Byrne said: "This meeting is unique in putting the most ground-breaking scientists of recent decades and early-career researchers around the same tables for a week. With little-to-no distraction from the outside world, it is ideal for transferring ideas and sharing challenges between generations and countries as well as different disciplines. I am looking forward to building new relationships with other chemists, but also biochemists, physicists, medical scientists, who I could collaborate with to tackle challenging scientific questions of international relevance in the future."

Dr Gabba said: "Being selected to attend a Nobel Laureate Meeting is a small life dream come true! I have been certainly looking forward with immense excitement for June, so I have to confess the news of the postponement for COVID-19 came along with a bit of disappointment. Despite my childlike eagerness, I think the organising committee took the right decision. I am sure all attendees will see that waiting and, most of all, the reason behind it, as an opportunity to reflect deeply on the importance of bringing together researchers with a different background in an interdisciplinary meeting. Problems that impact our society are mostly extremely complex, we will succeed in solving them only if we put our brains and best efforts together."

## Breakthrough led by Cork scientists joins efforts to address COVID-19 testing shortage



Lysis buffer formation developed by a team of scientists led by UCC and CIT.

### Research and industry combine to formulate key chemical reagent.

Irish scientists have joined forces to formulate the chemical reagent needed to test for COVID-19.

As billions of people are forced into lockdown with the global spread of COVID-19, the WHO mantra has been to “Test, Test, Test” for the virus.

The best way to detect and diagnose COVID-19 infection is using a test called RT-PCR\*. This test looks for the unique RNA nucleic acid, signature of the virus.

However, this increased need for testing has resulted in a worldwide shortage of chemical reagents, in particular those associated with the “lysis buffer” required to isolate the viral RNA. This shortage has limited the ability of testing labs all around the world to carry out sufficient testing.

To address this shortage a team of hospital, university & biopharma scientists from University College Cork, Cork University Hospital, Cork Institute of Technology, Teagasc, APC Microbiome Ireland SFI Research Centre, University of Limerick and Eli Lilly Kinsale have come together to formulate a lysis buffer which will allow the country’s laboratories to continue to “Test, Test, Test” for COVID-19.

The team formulated and validated a lysis buffer in the space of a week which can be used in the hospital testing Labs. Working remotely the scientists reached out to each other and devised varying formulations to test on the hospital RT-PCR system. The researchers in Microbiology and APC Microbiome Ireland in UCC, Teagasc and UL quickly made up the formulations and medical scientists in Microbiology; CUH evaluated each of them for efficacy using known positive and negative virus samples. This then allowed the team in Eli Lilly to provide assistance to produce the most suitable formulation which can now be distributed to Hospital testing labs throughout the country.

“This buffer will ease the burden on hospital labs in their heroic efforts to screen and deliver diagnostic data” said Dr Martina Scallan, School of Microbiology, UCC, who spearheaded this initiative with Dr Brigid Lucey, CIT, President of The Academy of Clinical Science and Laboratory Medicine (ACSLM).

“Hopefully these efforts can help protect all the frontline medical, scientific and support staff in this battle to fight COVID-19,” Dr Lucey said.

The team who developed, tested and validated the lysis buffer formula included Dr Lucey (CIT), Dr Scallan (UCC), Catherine Dempsey and Isabelle O’Callaghan (CUH), Dr John MacSharry (UCC), Prof Paul Cotter and Paula O’Connor (Teagasc), Dr Sarah Hudson and Dr Edel Durack (UL) as well as Dr Conor Horgan and Dr Humphrey Moynihan (Lilly).

The scientists are keen to share the detail with as many others as possible. Full details of the protocol have been made available by Dr John MacSharry at this link:

<https://docs.google.com/document/d/1XdTh6iAtpC39nipQ6URkN75Rh11VGJHPc4gSgMukrtU/edit?usp=sharing>

\* RT-PCR - Reverse transcription polymerase chain reaction (RT-PCR):

[https://en.wikipedia.org/wiki/Reverse\\_transcription\\_polymerase\\_chain\\_reaction](https://en.wikipedia.org/wiki/Reverse_transcription_polymerase_chain_reaction)

<https://www.iaea.org/newscenter/news/how-is-the-covid-19-virus-detected-using-real-time-rt-pcr>





# CHEMISTRY in Europe

Newsletter for European Chemistry, published by EuChemS

## Editorial: Prof Dr Floris Rutjes, EuChemS President-Elect



“Did you know that you are part of EuChemS? Through the membership of a national chemistry association, you are also part of the European Chemical Society, which represents 51 member societies and organisations and 160,000 individual chemists. Although in size comparable to the American Chemical Society, EuChemS is less well-known among its members. This is something I would like to change.

Since the beginning of this year, I have the honour to serve as President-Elect of the European Chemical Society. It marks the start of a six-year term in the EuChemS Executive Board and I very much looking forward to being a member of this team. I see clear opportunities to increase the impact of EuChemS and contribute to improving the visibility of the chemical societies in Europe.....”

To read the rest of the Newsletter editorial follow the link:

<https://www.euchems.eu/newsletters/chemistry-in-europe-2020-1>

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The journal has a broad scope which includes spectroscopy, dynamics, kinetics, statistical mechanics, thermodynamics, electrochemistry, catalysis, surface science, quantum mechanics and theoretical developments play an important part in the journal. Interdisciplinary research areas such as polymers and soft matter, materials, nanoscience, surfaces/interfaces, and biophysical chemistry are especially welcomed whenever they include a physico-chemical approach.

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# The Irish Mass Spectrometry Society

O'Brien Science Centre UCD, Dublin, Ireland

<https://www.imss.ie>

The Irish Mass Spectrometry Society, IMSS, is a voluntary society with the aim of providing a forum for practitioners of Mass Spectrometry in Ireland. The Society is run by a committee elected every two years and aims to hold one full-day scientific meeting in May each year.

The first meeting of Irish mass spectrometry users was in 1987 when a very successful meeting was held on May 28<sup>th</sup> in UCD, Belfield. In September 1993, an MS users' group was set up. An inaugural meeting was held in May 1994, a Society was formed, and a committee put in place. The name "The Irish Mass Spectrometry Society" was adopted at the 1996 AGM.

The Society was re-activated in 2007 following a few years of dormancy after the AGM of 2003. The Society is an Institutional Affiliate of the International Mass Spectrometry Foundation, organisers of the biennial IMSC meeting.

The Annual Conference scheduled for May 14<sup>th</sup> this year has been deferred due to the current Covid-19 situation. The Committee will monitor the situation over the next few weeks to months and will provide an update on or before May 14<sup>th</sup> as they gauge the level of risk from Covid-19. The goal is to have the rescheduled meeting later in the year.

Due to this postponement, IMSS has extended the poster and student/postdoc speaker competition deadline until May 14<sup>th</sup>. Any new entrants will be added to any abstracts already received.

If you have any questions, please contact us on this email:

[imssconference@gmail.com](mailto:imssconference@gmail.com)

<https://www.imss.ie>

**Biographies of 2019 Keynote and Invited Speakers are available on the IMSS website**

Abstracts of invited Student Speakers – 2019 Conference are presented below:



## Alvaro Lopez Gallardo Research Assistant University College Cork

B.Sc. in Industrial Chemical Engineering from the University of Seville. I joined Dr. Susan Joyce's research group within APC Microbiome Ireland at UCC in 2015 working towards a Ph.D. My current projects include determining potential biomarkers in IBD patients and gut metabolite alterations by psychotropic drugs.

### Diagnostics of gut disease by mass spectrometry detection of precursor molecule $7\alpha$ -Hydroxy-4-cholesten-3-one (C4)

Álvaro López-Gallardo<sup>1</sup>, Carolyn Murray<sup>2</sup>, Daniel O'Driscoll<sup>1</sup>, Carthage Moran<sup>1,3</sup>, Marcus Claesson<sup>1,4</sup>, Fergus Shanahan<sup>1,3</sup>, Susan A. Joyce<sup>1,2</sup>

<sup>1</sup>APC Microbiome Ireland, <sup>2</sup>School of Biochemistry and Cell Biology, <sup>3</sup>School of Medicine, <sup>4</sup>School of Microbiology, University College Cork, Cork, Ireland

The GI tract is recognised as a super organ where a coevolved mutualistic relationship benefits both the microbial residents and human health. For instance, while the liver is responsible for bile acid synthesis and conjugation, the gut microbiota is responsible for the diversity of bile moieties. Bile moieties are more than just emulsifiers of lipid and liberators of vitamins from dietary components. They act as signalling molecules that can exert their effects both locally and systemically, the most potent signalling molecules are those generated through microbial conversion.

Alterations in bile metabolism have been previously shown in different disease states. We have identified increased levels of key bile acids associated with bile acid malabsorption (BAM) among patients diagnosed with chronic, inflammatory bowel disease called Crohn's disease. Our data indicates misdiagnosis in the Crohn's disease cohort. The only clinical available method to analyse BAM, in Europe, is through tracking radiolabelled bile acids. Here we propose an alternative method for identifying and diagnosing BAM sufferers presenting with symptoms of Crohn's disease, through bile acid precursor molecule  $7\alpha$ -Hydroxy-4-cholesten-3-one (C4), in circulation. This approach has significant outcomes for treatment strategies.

This presentation describes our validation of methodology to detect and quantify  $7\alpha$ -Hydroxy-4-cholesten-3-one (C4) in circulation (plasma/serum). This method is simple, fast and accurate and could allow rapid screening using a routine blood test, decreasing the level of misdiagnosis of Crohn's disease.



**Anthony Grey**  
**Ph.D. Student**  
**Dublin City University**

My research involves the extraction and analysis of organic matter from a range of environmental samples. The main objectives of these studies include (i) investigating natural cycling of organic matter, (ii) tracing the fate of organic matter, and (iii) investigating the contribution of microbes to carbon cycling in soil.

**Occurrence and diversity of bacterial Polyhydroxyalkanoates (PHA) in a salt marsh environment:  
 A syntrophic role in wetland carbon cycling?**

Anthony Grey<sup>1</sup>, Ricardo Costeira<sup>2</sup>, Margaret McCaul<sup>1</sup>, Brian Kelleher<sup>1</sup>

<sup>1</sup> National Centre for Sensor Research, Dublin City University, Glasnevin, Dublin 9, Ireland.

<sup>2</sup> School of Biological Sciences, Queens University, Belfast, Northern Ireland.

Polyhydroxyalkanoates (PHA's) are intracellular, polyester compounds produced by Bacteria in a variety of natural matrices including soils, sediments and water. The polymer accumulates in response to many environmental stresses including nutrient limitation and cell toxicity while in the presence of excess carbon substrate, also recognised as natural cyclic metabolic process (Narancic et al., 2016). PHA is a completely biodegradable and biocompatible biopolymer produced in specialised industrial bioreactors as a realistic alternative to petrochemical plastics. PHA is accumulated as a storage compound for carbon and energy during times of stress by minimising cell division and redirecting substrate to alternative metabolic pathways (Kadouri et al., 2005). These processes give PHA producers a competitive advantage over other microbes. Increased concentrations of PHA have been used to demonstrate stress factors in soils/sediments affecting microbial communities (Green and Scow, 2000; White et al., 1997). More recent research has implicated PHA intracellular depolymerisation for use as protectant against heat and cold shock denaturation of enzymes (Obruca et al., 2016b, 2016a). It is imperative that understanding all aspects of and contributions to the cycling of carbon and nutrients in soil are enhanced to educate people about optimum management strategies and development of technologies. Identifying key driving factors influencing these processes such as specific microbes, enables feedback to industries interested in carbon capture technologies e.g. bioplastic production. In this study we used a suite of analytical techniques to investigate the influence of soil and sediment characteristics on the in situ concentrations and composition of bacterial PHA. The study focused on a salt marsh and tidal lagoon at Bull Island, situated in Dublin Bay, Ireland (53.3705° N, 6.1440° W). Bull Island is approximately 5km Long and 800m wide. This coastal sand spit formed after the construction of 'Bull Wall' in the mid 1800's, causing diversion of riverine silt from the rivers Liffey and Tolka into Dublin Bay. A combination of coastal dynamics, anthropogenic, terrestrial and marine inputs facilitated the accretion of Bull Island's diverse habitat.

For this study, 13 soil/sediment samples were collected at separate locations along the length of the salt marsh and tidal lagoon areas of the Island. Samples were extracted using organic solvent systems to isolate

and fractionate microbial lipids into classes of phospholipid fatty acids (PLFAs) and PHAs. Gas chromatography mass spectrometry (GCMS) was used to determine the monomeric composition and respective concentrations of PHA across the study site. 16s Alumina sequencing was used to profile the relative abundance of bacterial communities in salt marsh soil and tidal lagoon samples. Chemical and physical soil characteristics were investigated and quantified data was collectively processed across all samples to explore potential relationships between PHA, soil characteristics and microbial community structure in this dynamic environment. We will use this baseline study to develop future experimental approaches to assess the level of contribution the PHA metabolic processes may provide in the broader scope of carbon dynamics in soil systems.

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Anthony Grey

Dublin City University

PhD research student

Supervisor: Dr. Brian Kelleher



**Emma Leacy**  
**Ph.D. Student**  
**Trinity College Dublin**

I am currently a Ph.D. Student in the Department of Clinical Medicine at TCD. I'm based in the Translational Medicine Institute where my research is supervised by Prof. Mark Little and Dr. Gareth Brady. I aim to uncover the metabolomic changes in monocytes in ANCA-Associated Vasculitis (AAV) using LC-MS.

## **Sample Preparation Optimisation in Primary Immune Cells for Untargeted Metabolomics**

**Emma Leacy<sup>1</sup>, Hania Khouri<sup>2</sup>, Gareth Brady<sup>1</sup>, Mark Little<sup>1</sup>**

1. Trinity Health Kidney Centre, Trinity Translational Medicine Institute, Trinity College Dublin, Ireland
2. Agilent Technologies, Cheshire, UK

**Background:** Immunometabolism is a burgeoning new field which investigates the links between immune functions and metabolic processes. Metabolomic profiling has identified multiple pathways and intermediates involved in inflammation. Sample preparation protocols for LC-MS metabolomics require careful consideration to maximise metabolome coverage, particularly when using diverse cell or tissue samples. Here we aimed to optimise sample preparation of monocytes for untargeted metabolomic profiling by LC-MS.

**Methods:** Healthy monocytes were isolated by CD14<sup>+</sup> isolation and 5x10<sup>6</sup> cells per condition were quenched on dry ice (n=3). Cells were resuspended in 1ml of acetonitrile (ACN), methanol (MeOH), or a 2:2:1 blend of ACN:MeOH:H<sub>2</sub>O (AMH) and lysed by either ice bath sonication (SON), freeze-thaw cycling (FT), or vortexing (VTX). Cells were analysed using an Agilent 1290 Infinity II LC System coupled to a 6545 Q-TOF MS using complimentary methods on C18 and peek-lined HILIC-Z (p-HILIC-Z) columns, and analysed by recursive feature extraction (RFE).

**Results:** More metabolite features were detected overall in MeOH-extracted samples, however ACN-extracted samples performed better in this aspect with the p-HILIC-Z method. There were significant differences in peak areas between extraction protocols. ACN samples had consistently lower peak areas than MeOH- or AMH-extracted samples. There were limited differences in peak detection, area, or CVs between lysis methods, although vortexed samples did slightly outperform others.

**Conclusions:** The optimal method in terms of recovery, versatility and variability is a methanol-based extraction incorporating a vortex lysis protocol. These methods will be validated and applied to future metabolomics profiling investigations in primary immune cells.

Photos from Irish Mass Spectrometry Society Annual Conference held at The National Institute for Bioprocessing Research and Training (NIBRT), Foster's Ave, Mount Merrion, Blackrock, Co. Dublin, Ireland on the 16th May 2019.



Keynote Speaker Dr. Michael Boyne  
Vice President, Product Development  
Cour Pharmaceuticals



Dr John Keegan, ICI Honorary Treasurer  
Public Analysts Laboratory, Dublin





Dr. Olivier Chevallier  
Manager of Mass Spectrometry Core Unit  
Queen's University Belfast



Dr. Noemi Dorival-Garcia  
Research Fellow  
NIBRT - Dublin



Dr. Sanja Trajkovic  
Head of Proteomics & Analytical Science  
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Dr. Paula Meleady Associate Director  
Associate Director National Institute for  
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Dr. Sara Carillo, Applications Development Team Leader, NIBRT



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## NUI GALWAY SPIN-OUT AQUILA AND IRISH DEFENCE FORCES DEVELOP NOVEL DECONTAMINATION WIPE TO PREVENT SPREAD OF COVID-19



Aquila Bioscience, a pioneering Irish company, based at NUI Galway and the Irish Defence Forces have announced a collaboration with to provide Irish Defence Forces soldiers with its ground breaking Anti-Bioagent wipe called ABD (Anti Bioagent Decontamination). Aquila Bioscience and the Irish Defence Forces have been collaborating on this technology for over four years, with the Ordnance Corps actively engaged in the concept & product trials.

Working with the Irish Defence Forces, the Department of Defence and the European Defence Agency Aquila Bioscience has developed a novel, safe, effective and environmentally friendly technology to decontaminate surfaces from bacterial, viral and biotoxin threats. ABD technology serves as a decontamination wipe for first-responders, healthcare workers and for civilians to significantly reduce and prevent pathogen transmission from person-to-person and therefore reducing the spread, panic and impact of the pathogen, as is the case with coronavirus COVID-19.

Aquila Bioscience's ABD contains components that bind to and decontaminate the surface, taking advantage of the virus's own attack mechanism (in this case, carbohydrates and proteins). Because ABD contains no harmful ingredients, it can also be used on skin and sensitive mucosal areas such as eyes, nose

and mouth (main portal for virus infection). Most existing decontamination solutions contain chemicals that are harmful to the skin, health of the user and to the environment.

ABD technology was developed to safely and effectively decontaminate multiple bio-threat agents (including viruses), and its use will significantly reduce the spread of COVID19 and will help ensure that first responders and emergency workers are kept safe to allow them to react when called upon.



Professor Lokesh Joshi

Speaking today, Professor Lokesh Joshi, co-founder and director of Aquila Bioscience, and Vice-President for Research and Innovation at NUI Galway said: “The concept for this technology was driven by the Irish Defence Forces and an identified capability need in the Chemical, Biological, Radiological & Nuclear (CBRN) protection measures. The innovative concept resulted in European Defence Agency supported research & development by Aquila Bioscience at NUI Galway and is just now ready for mass manufacture and could be a valuable technology in the fight against the Coronavirus. This unprecedented situation requires unprecedented measures and the DF have committed to the purchase of a consignment of the AB wipes for troop force protection measures.”

At this time of global urgency and unknown impact on human lives and economy because of the COVID-19 pandemic, ABD technology will serve as an essential tool in the arsenal against coronavirus to stem its spread and to save lives.

The development of this technology was funded by the European Defence Agency and was conducted in collaboration with the Defence Forces and the Czech University of Defence.

For more details see [www.aquilabioscience.com](http://www.aquilabioscience.com) or contact [info@aquilabioscience.com](mailto:info@aquilabioscience.com)  
A video outlining the ABD technology: <https://youtu.be/YpjiFgnlepo>



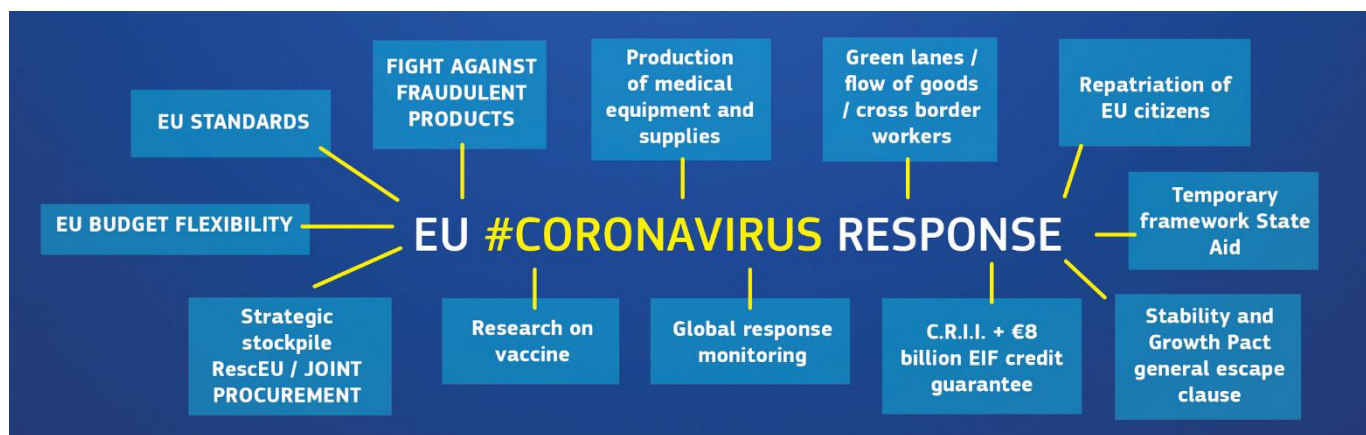
## Summary of the European Commission's response to Corona virus (COVID-19) crisis to date. REPRESENTATION IN IRELAND

The European Commission is **coordinating a common European response** to the COVID-19 crisis and is supporting the member states in tackling the pandemic. While member states are on the frontline, the Commission has proposed an unprecedented set of measures to reinforce and facilitate their efforts.

It covers Research and other areas

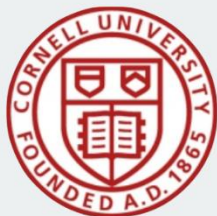
The European Commission selected for support 18 new projects focused on urgently needed research and innovation into the coronavirus. On **31 March** the Commission added **an Irish project called *HG nCoV19 test* coordinated by the Irish company HiberGene Diagnostics** to the list of supported projects. It will develop and validate a rapid molecular diagnostic test for the coronavirus in cooperation with partners in China, Italy and the UK. **The total budget for all 18 supported projects is €48,5 million from Horizon 2020**, the EU research and innovation programme

Furthermore, on **16 March**, the Commission made available **financial support to CureVac** (up to € 80 million from Horizon 2020), a global leader in this effort, to scale up development, production and deployment of a vaccine against Coronavirus....



The full article is available at:

[https://ec.europa.eu/ireland/news/summary-of-the-european-commission-s-response-to-corona-virus-covid-19-crisis-to-date\\_en#research](https://ec.europa.eu/ireland/news/summary-of-the-european-commission-s-response-to-corona-virus-covid-19-crisis-to-date_en#research)



# Cornell University

TM ®

## Chemists create faster-degrading plastic for marine uses

By [Blaine Friedlander](#), April 16, 2020

To address the plastic environmental crisis, Cornell chemists have developed a new polymer with ample strength in a marine setting that is poised to degrade by ultraviolet radiation, according to research published March 30 in the [Journal of the American Chemical Society](#).

“We have created a new plastic that has the mechanical properties required by commercial fishing gear. If it eventually gets lost in the aquatic environment, this material can degrade on a realistic time scale,” said lead researcher [Bryce Lipinski](#), a doctoral candidate in the laboratory of [Geoff Coates](#), the Tisch University Professor in the Department of Chemistry and Chemical Biology, in the College of Arts and Sciences. “This material could reduce persistent plastic accumulation in the environment.”

Commercial fishing contributes to about half of all floating plastic waste that ends up in the oceans, Lipinski said. Fishing nets and ropes are primarily made from three kinds of polymers: isotactic polypropylene, high-density polyethylene, and nylon-6,6, none of which readily degrade.

“While research of degradable plastics has received much attention in recent years,” he said, “obtaining a material with the mechanical strength comparable to commercial plastic remains a difficult challenge.”

Coates and his research team have spent the past 15 years developing this plastic called isotactic polypropylene oxide, or iPPO. While its original discovery was in 1949, the mechanical strength and photodegradation of this material was unknown before this recent work. The high isotacticity (enchainment regularity) and polymer chain length of their material makes it distinct from its historic predecessor and provides its mechanical strength.

Lipinski noted that while iPPO is stable in ordinary use, it eventually breaks down when exposed to UV light. The change in the plastic’s composition is evident in the laboratory, but “visually, it may not appear to have changed much during the process,” he said.

The rate of degradation is light intensity-dependent, but under their laboratory conditions, he said, the polymer chain lengths degraded to a quarter of their original length after 30 days of exposure.

Ultimately, Lipinski and other scientists want to leave no trace of the polymer in the environment. He notes there is literature precedent for the biodegradation of small chains of iPPO which could effectively make it disappear, but ongoing efforts aim to prove this.

Joining Lipinski and Coates on the paper, “[Isotactic Poly\(propylene oxide\): A Photodegradable Polymer with Strain Hardening Properties](#),” were Lilliana S. Morris, Ph.D. ’19, assistant professor of

chemistry at the College of Wooster, Ohio; and [Meredith N. Silberstein](#), associate professor in the Sibley School of Mechanical and Aerospace Engineering.

This research was supported by the National Science Foundation's Center for Sustainable Polymers, the NSF-supported [NMR Facility](#) at Cornell, and the [Cornell Center for Materials Research](#).

### **Media Contact**

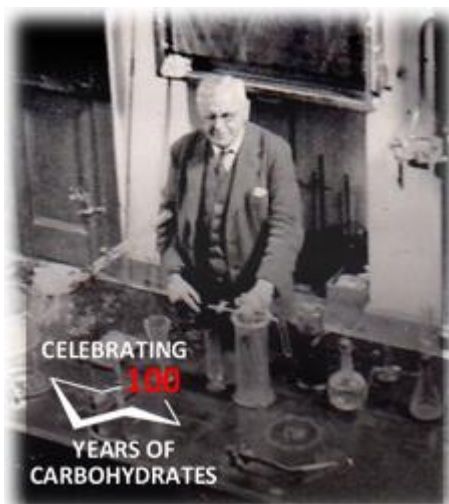
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## The Dillon Centenary Symposium at NUI Galway

### Centenary Celebration of Chemist, Revolutionary and Academic – Professor Thomas P. Dillon



**Photo 3. Prof. Thomas Dillon.jpg** Prof Thomas P Dillon (photo: Honor O Brolchain)

NUI Galway's School of Chemistry and CÚRAM, the Science Foundation Ireland Research Centre for Medical Devices, hosted a celebration of the centenary of Professor Thomas Dillon on Wednesday, 2 October 2019 with more than 150 attendees from all over Ireland, and beyond at the ILAS Building in NUI Galway.

Professor Thomas P. Dillon, a former revolutionary, was appointed Professor of Chemistry at the then University College Galway (UCG) in 1919. A century later, and the scientific topics he started exploring, such as the study of carbohydrates and sugars, as well as research into Ireland's seaweeds, are still relevant in today's cutting-edge research that was discussed throughout the day at the Thomas Dillon Centenary Symposium. The programme also included a lecture from Dillon's grandson, Professor Niall Dillon of Imperial College London, a renowned molecular biologist who is carrying out research on stem cells and early mammalian development and its relevance to cancer.

Other speakers on the day included Zoe Popper, Maria Tuohy and Michelle Kilcoyne (NUI Galway), Eoin Scanlan and Stephen Dooley (Trinity College Dublin), Trinidad Velasco-Torrijos (Maynooth University), Marguerite Clyne (UCD), Mary O'Connell Motherway (UCC) and international speakers Rob Woods (CCRC, Athens, Georgia, USA) and Beat Ernst (Basel University). The speakers all highlighted aspects of carbohydrate and glycosciences across a range of disciplines from botany to chemistry to energy.



In an evening of celebration, featuring stories, science and dance, the scientist was joined by members of the public, including many from Prof Dillon's extended family. This included a "Threesis" challenge, where research students presented their thesis succinctly and engagingly in only three minutes aimed especially for a lay public audience (won by Liam Fitzgerald, of the O'Duill Research Group), and a ballet piece performed by Youth Ballet West inspired by Dillon's description of the "benzene ring" and choreographed by Ester O Brolchain. A historical lecture by Professor Dillon's granddaughter, the author Honor O Brolchain told the story of "The 'remarkable' Thomas P. Dillon: chemist, revolutionary and professor".

Thomas P. Dillon, born in Co. Sligo, was working as assistant to Professor Hugh Ryan at UCD in 1912 when he met his future-wife Geraldine Plunkett, and through her Dillon met her brother Joseph Mary Plunkett and many others involved in revolutionary activities at this turbulent time in Ireland's history. He was a member of the Irish Volunteers and acted as Chemical Advisor in the 1916 Rising. He and Geraldine were married on Easter Sunday 1916, and watched the Rising start from their window in the Imperial Hotel, O'Connell Street, where they were honeymooning. For his role working for republican candidates in the 1918 elections, Dillon was jailed in Gloucester for nearly a year.

Upon his release from jail, Dillon went straight to Galway for a job interview, keen to continue his scientific career and he was appointed Professor of Chemistry in 1919, a post he held for 35 years. He was an enthusiastic teacher and wrote the first chemistry textbook in Irish. He believed Ireland should be exploiting its natural resources, and his pioneering research in the fields of alginates (polysaccharides from seaweed) gained him an international reputation. Under his stewardship, the School of Chemistry became a magnet for students, including two of the first women professors of chemistry in Ireland. When he retired in 1954, he was succeeded by his former student Proinsias S. O'Colla, establishing a tradition of research in carbohydrate and glyco-sciences, which continues at NUI Galway to this day.

As well as in the School of Chemistry and School of Natural Sciences, research into the role of sugars in biological processes and health is also a key component of various investigations taking place in CÚRAM, the Science Foundation Ireland Research Centre for Medical Devices. This includes development of medical devices based on polysaccharides, very much in the spirit envisaged by Dillon himself. The med-tech industry is a major employer in the Galway region, and R&D in medical devices as well as carbohydrates as renewable natural resources has and will have a large part to play in the regional economy.

**Paul Murphy, Established Professor of Chemistry of NUI Galway's School of Chemistry said:**

"Dillon's foresight in trying to develop useful products from carbohydrates is just as relevant, if not even more relevant today. Aside from the relevance to health, carbohydrates are highly renewable carbon stores and will certainly have roles to play in generating chemical feedstocks for making drugs or for the production of smart materials in future years. This is potentially very important for the future of the West of Ireland given our proximity to the sea and importance of agriculture to the region."

**Honor O Brolchain, author and family historian said of her grandfather:** "Referred to as 'remarkable' by diverse people, he was the kind of man you could, and would, ask to do anything, and he did – running an organisation, setting up a canteen, starting an Aid Fund and, in the case of Galway, enhancing and expanding a Chemistry Department, while fending off the violent extremes of the Black-and-Tans, and representing the University in 1935 in a debate on the uniting of Ireland. He was an interesting, complex and generous man."

Dozens of delegates were also able to join the Symposium remotely, as it was live-streamed on YouTube. Details of the programme, including a link to a YouTube video of the specially-commissioned ballet, historical lecture and “Thresis” talks can be found on [www.dillonsymposium.wordpress.com/live](http://www.dillonsymposium.wordpress.com/live).

The event was supported by CÚRAM, The Royal Society of Chemistry Republic of Ireland Local Section and Science Foundation Ireland.

The organising committee were: Professor Paul Murphy, Dr Styliana Mirallai, Dr Joseph Byrne, Dr Michelle Kilcoyne, Professor Lokesh Joshi and Professor Abhay Pandit.



**Photo 1. Group photo.jpg** Caption: Symposium speakers and members of the organising committee: L-R Trinidad Velasco-Torrijos (MU), Maria Tuohy (NUIG), Joseph Byrne (organising committee), Mary O’Connell Motherway (UCC), Eoin Scanlan (TCD), Beat Ernst (Basel), Abdullah Hassan (UCD), Paul Murphy (chair of the organising committee), Rob Woods (CCRC), Niall Dillon (ICL), Marguerite Clyne (UCD), Michelle Kilcoyne (organising committee), Styliana Mirallai (organising committee). (Photo: Francesco Civati)



**Photo 2. Honor O Brolchain.jpg** Caption: Honor O Brolchain delivering a historical lecture about her grandfather Prof Thomas Dillon (Photo: Joseph Byrne)



**Photo 3. Prof. Thomas Dillon.jpg** Prof Thomas P Dillon (photo: Honor O Brolchain)



**Photo 4. Crowd above.jpg** Caption: Attendees at the Dillon Centenary Symposium in NUI Galway (Photo: Joseph Byrne)



**Photo 5. Crowd.jpg** Caption: Attendees at the Dillon Centenary Symposium in NUI Galway (Photo: Ashis Dhara)



**Photo 6. Youth Ballet West.** Caption: Dancers from Youth Ballet West performing a chemical ballet at the Dillon Centenary Symposium in NUI Galway. (Photo: Youth Ballet West)



*Caption: Dancers from Youth Ballet West performing a chemical ballet at the Dillon Centenary Symposium in NUI Galway. Dancers: Aoife Clarke, Megan Dowd, Allyssa Laffey, Kate Nevin, Áine O'Neill, Ruby Quinn, Éabha Schukat, Clara Tobin (Photo: Neville Murphy)*



*Caption: Dancers from Youth Ballet West performing a chemical ballet at the Dillon Centenary Symposium in NUI Galway. Dancers: Aoife Clarke, Megan Dowd, Allyssa Laffey, Kate Nevin, Áine O'Neill, Ruby Quinn, Éabha Schukat, Clara Tobin (Photo: Joseph Byrne)*



## *Professor Steven Bell, Head of The School of Chemistry and Chemical Engineering QUB appointed to ICI Council*

**"These are clearly challenging times not just for Chemistry but for the whole of society and it is more important than ever that we have a strong voice to speak for our discipline within the island of Ireland and beyond"**

Prof Steven Bell, Head of the School of Chemistry and Chemical Engineering in QUB, has recently been appointed to the Council of the ICI. Prof Bell is a physical chemist whose research centres on optical spectroscopy, in particular Raman spectroscopy. He is also interested in development and applications of nanomaterials. These two strands of his work combine in his work on surface-enhanced Raman spectroscopy in which nanostructured noble metals are used amplify the Raman scattering signals for target analytes. His work has been used for applications as diverse as forensic examination of paint to analysis of mutations in DNA and detection of pathogenic bacteria. Although his work is rooted in fundamental science, he is also interested in moving the results of his research into the real world. He has held a Royal Society Industry Fellowship, participated in numerous Knowledge Transfer Partnerships and was founder/director of a highly successful spin-out company, Avalon Instruments, which manufactured high performance benchtop Raman spectrometers and was sold to a multinational scientific instrument company in 2006.

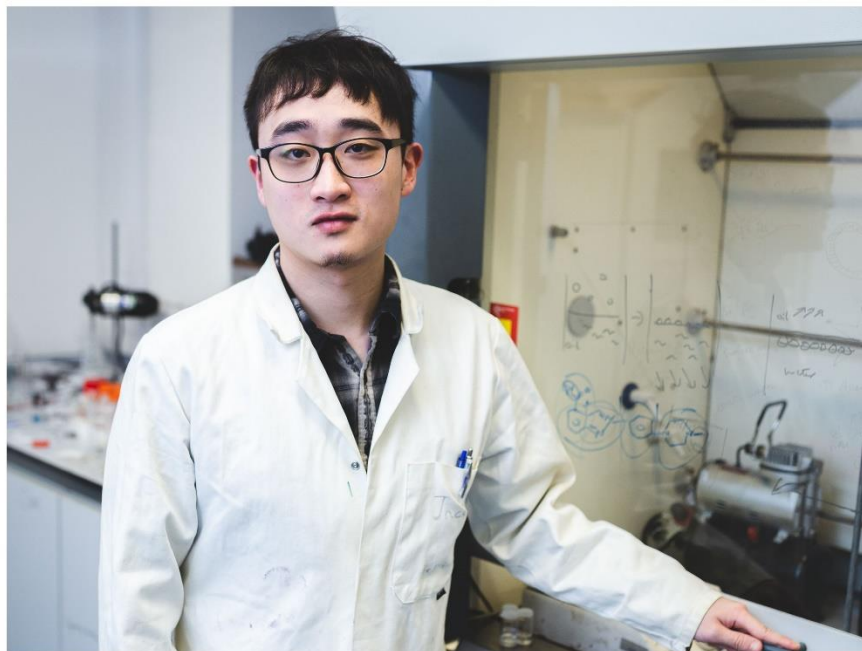
On hearing of his appointment, Professor Bell said, "I am of course very honoured to be asked to join the Council of the ICI. These are clearly challenging times not just for Chemistry but for the whole of society and it is more important than ever that we have a strong voice to speak for our discipline within the island of Ireland and beyond. In my own School we have a strong focus on two major research themes which are summed up in our tag line of "Building a Healthy and Sustainable Future". There surely cannot have been a time when the contributions that Chemistry can make to society have been more important. This can be not only by joining the efforts to combat Covid-19 but also by leading the post-Covid economic recovery. Again, there is a great opportunity for growth that is led by our need to develop new environmentally sustainable technologies, where chemists will again play a central role.

Of course, there are short term challenges in both the academia and industry but we have a great opportunity to demonstrate how important Chemistry is to Ireland and the contribution we can make as a discipline"



## QUB PhD Graduate Wins RIA Kathleen Lonsdale\* RIA Chemistry Prize

Belfast based PhD student recognised for his revolutionary work in nanomaterials science  
5 March, 2020



Dr Yikai Xu has won this year's Kathleen Lonsdale Chemistry Prize.

### QUB Professor Stephen Bell

Dr Yikai Xu, a recent PhD graduate from the School of Chemistry and Chemical Engineering, and current postdoctoral researcher, has been awarded the Royal Irish Academy's (RIA) Kathleen Lonsdale Prize for 2019. The prize, previously known as the RIA's Young Chemist Prize, has been awarded to Dr Xu because his doctoral thesis was judged by the RIA panel as the most outstanding Irish PhD thesis in the general area of the chemical sciences.

Dr Xu's prize includes an award of €2000, in addition to being put forward to represent the RIA's Chemical and Mathematical Sciences Committee within the 2020 IUPAC-SOLVAY International Award for Young Chemists. Dr Xu has also been invited to a prize-giving ceremony in Dublin, where he will be presented with his award.

### Speaking of his award, Dr Xu commented:

*"I am absolutely thrilled and feel extremely honoured to have won the 2019 Kathleen Lonsdale Prize."*

*Growing up, I have always been the most common kid on the block - I was satisfied with mediocre grades and was never the recipient of any major academic awards or scholarships coming out of university. At the start of my PhD I decided that I was going to work harder and have happily stuck to that plan! Therefore, this award means a little more to me because it is not only a testament to my efforts during my PhD, but more so a reminder to myself that it's never too late to put in the effort and to continue to develop and learn in the rest of my life.*

*My future goal is to stay in academic research and build on my PhD work to bring nanomaterials into our daily lives. Needless to say, the RIA Kathleen Lonsdale Prize is a huge boost to both my confidence and my future career."*

To date, Dr Xu's work has centred on areas including the development of approaches for surface-enhanced Raman scattering (SERS), and the development of nanoscale polymeric structures.

**Professor Steven Bell, Head of School, and Yikai's PhD Supervisor, added:**

*"Yikai's award is thoroughly deserved and comes as the result of a combination of hard work and talent which has allowed him to make the scientific progress that led to his outstanding thesis. The methods that he has developed are already underpinning our work in new generations of sensors and catalysts that we expect to make a difference in the real world. Within the School we aim to provide world class facilities and a supportive environment, and it is gratifying to see a young researcher take advantage of these opportunities to carry out work that is recognised as being exceptional. Yikai's recently awarded Leverhulme Early Career Fellowship will allow him to become an independent researcher and I am delighted that he has chosen to take up his Fellowship here at Queen's where undoubtedly he will continue to thrive."*

To find out more about Dr Xu's work, please visit his [research profile](#).

**RIA Press Release**





The Henkel sponsored prize is awarded each year by the Royal Irish Academy for the most outstanding Irish PhD thesis in the general area of the chemical sciences. As winner Dr Xu was also put forward by the Royal Irish Academy to represent Ireland in the prestigious IUPAC-Solvay International Award for Young Chemists competition.

Dr Xu is a recent PhD graduate of the School of Chemistry and Chemical Engineering at Queen's University Belfast. Yikai Xu's winning PhD research yielded two 'platform technologies' which is a huge step forward in bringing nanomaterials from the laboratory to having real-life applications. Nanomaterials are chemical substances or materials that are manufactured at an incredibly small scale – down to 10,000 times smaller than the diameter of a human hair.

The first platform technology he developed allows nano particles to be assembled at the interface between oil and water into a bulkier form which is therefore easier to see and manipulate.

*"We are using nano particles as building blocks, as lego basically, and we're assembling them together at a water and oil interface. What this does is it makes them into a big thing, but they are not all fused together, so it's a bulk but it's still nanomaterial. And by manipulating the morphology you can have it flat as a film or you can have it curled up into a ball, so it becomes a 3D structure."*

He went on to develop a way to anchor the bulk nanomaterial so that it can be handled and shaped.

*"Because right now it's at the liquid (oil and water) interface, so it's a liquid, so it's not that easy to manipulate, what we want is a bulk thing that you can have in your hands, that we can throw around, and so the next thing was to turn that into a polymer and nano material hybrid, so basically we were anchoring these particles that we have assembled at the interface onto a polymer support. And again this is a general process, so it works for different kinds of nanomaterials that we have."*

Such technologies give nanomaterials the potential for new applications such as detecting trace amounts of drugs or explosives on different surfaces such as people hands or finding and neutralising harmful or cancer-causing chemicals in water. By using different types of nanoparticles as building blocks, these bulk nanomaterials can be built into antimicrobial surfaces, flexible conducting devices and supercapacitors. Dr Xu described his surprise at being selected for the Kathleen Lonsdale RIA Chemistry Prize:

*"I first heard of the prize in my second year of my PhD and set myself a goal to work super hard and to see if I could actually get this. So, when I did it was like a dream come true."*

The prize includes an award of €2,000 which is generously supported by Henkel. Dr Hugh Fay of Henkel Ireland commented:

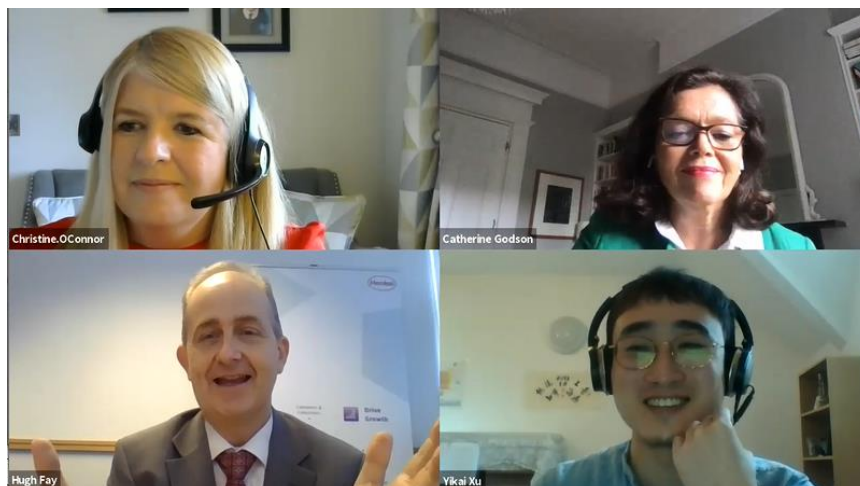
*"We in Henkel Ireland are delighted to continue our association with the Kathleen Lonsdale RIA Chemistry Prize. The Research environment in Ireland is very important to us and this is a meaningful way to give support and encouragement to young researchers."*

Yikai Xu is not the first winner of the prize to have come to Ireland from China. He said this recognition by the Royal Irish Academy is encouraging to international students who have come to Ireland:

*"It did mean a lot more to me, not just because it's a really great personal achievement, but also because it sets a really great example for us as international students coming over to Ireland and what we can achieve. It shows that as long as you actually put the work in and if you have the chemistry, your game will travel, and Ireland will recognise that, and I think that is really great."*

**ENDS**

Given the current Covid-19 crisis the Prize Giving was an online ceremony by Zoom on Friday July 3<sup>rd</sup>.



Christine O'Connor, RIA Science Committee; Catherine Godson, Science Secretary; Hugh Fay, Henkel; Dr Yikai Xu, Winner <https://www.ria.ie/news/physical-chemical-and-mathematical-sciences-committee-grants-and-awards/dr-yikai-xu-awarded> Video link to ceremony: <https://youtu.be/VmfxWIRKShk>

**Further Information:** Karen Muldowney, Communications and Public Affairs Manager  
**Phone:** 085 8074544 **Email:** k.muldowney@ria.ie

#### About the Royal Irish Academy (RIA)

- The Royal Irish Academy, founded in 1785, is Ireland's leading body of experts supporting and promoting the sciences and humanities. As an all-island independent forum of peer-elected experts we recognise world-class researchers and champion Irish academic research.
- We make a significant contribution to public debate and policy formation on issues in science, technology and culture. We bring together academia, government and industry to address issues of mutual interest by providing an independent forum.
- We lead important national research projects, particularly in areas relating to Ireland and its heritage. We represent the world of Irish learning internationally, have a unique globally recognised library and are a leading academic publisher.

#### About Kathleen Lonsdale RIA Chemistry Prize

Each year the Physical, Chemical and Mathematical Sciences Committee of the RIA selects a winner for a young chemistry prize, which is generously sponsored by Henkel. The prize (previously known as the Young Chemist Prize), is given for the most outstanding Irish PhD thesis in the general area of the chemical sciences as described in a 1000-word essay. The prize, kindly sponsored by Henkel, includes an award of €2,000. The winner is also nominated by the Royal Irish Academy to go forward for the **IUPAC-SOLVAY International Award for Young Chemists**

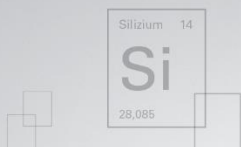
\***Dame Kathleen Lonsdale, DBE, FRS** (née **Yardley**; 28 January 1903 – 1 April 1971) was an Irish **pacifist**, **prison reformer** and **crystallographer**. She proved, in 1929, that the **benzene ring** is flat by using **X-ray diffraction** methods to elucidate the structure of **hexamethylbenzene**. She was the first to use **Fourier spectral methods** while solving the structure of **hexachlorobenzene** in 1931. During her career she attained several firsts for female scientists, including being one of the first two women elected a **Fellow of the Royal Society (FRS)** in 1945 (along with **Marjory Stephenson**), first woman tenured professor at **University College London**, first woman president of the **International Union of Crystallography**, and first woman president of the **British Association for the Advancement of Science**.

[https://en.wikipedia.org/wiki/Kathleen\\_Lonsdale](https://en.wikipedia.org/wiki/Kathleen_Lonsdale)

<https://biography.yourdictionary.com/kathleen-lonsdale>

<http://www.rsc.org/diversity/175-faces/all-faces/dame-kathleen-lonsdale-dbe-frs>

<https://www.chemistryworld.com/news/woman-of-substance-/3004326.article>



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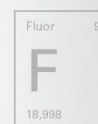


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30  
years

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## SARS CoV-2 Virus.

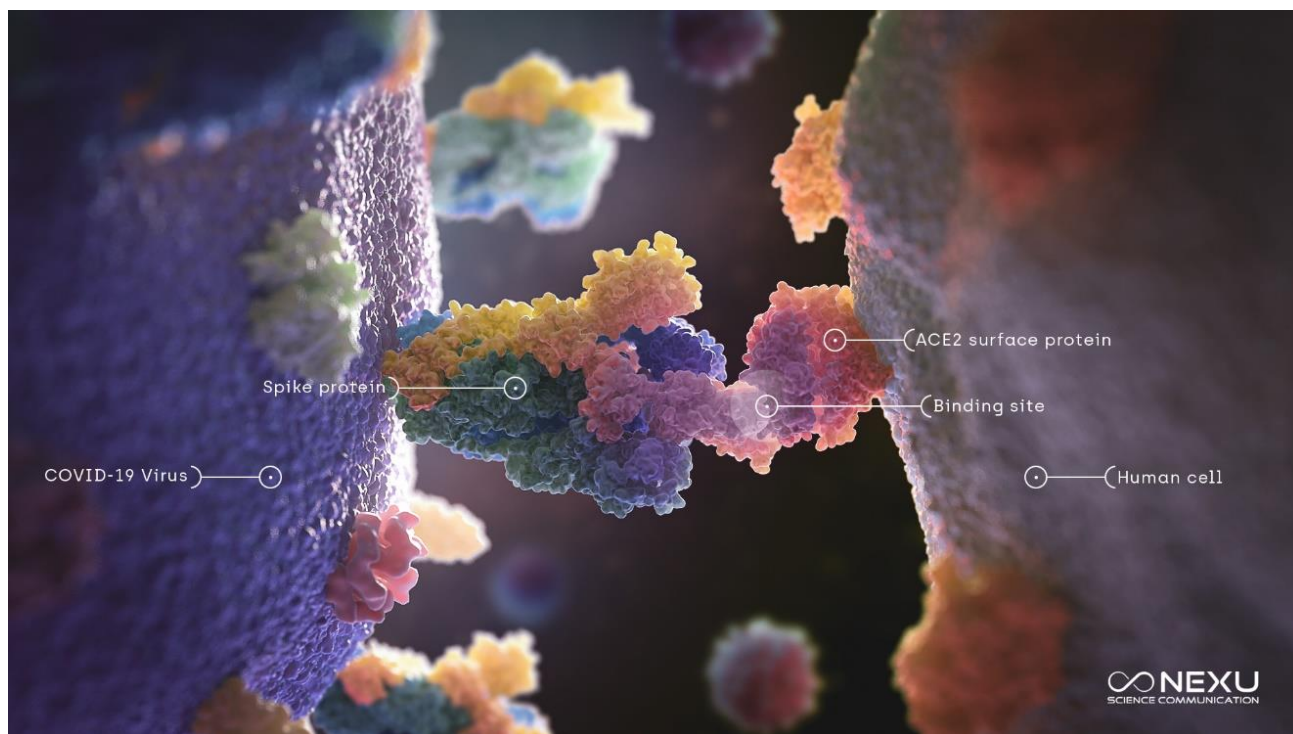
Ireland's contribution, collaborations and a tribute to chemists and biochemical scientists worldwide endeavouring to understand and find drugs and vaccines to beat this virus.

Many of you will have seen some of the beautiful images of this virus on nightly news programmes. I want to focus in a little more detail on the molecular structure and its infectivity mechanism. I have read many publications in reputable journals and provide below links to many of these publications. Copyright prevents me reproducing much of the content, so I use links to the original for you to read at your leisure. This is not a complete survey but basically a random selection of publications that got my attention. So, on the subject of images I will start with some Irish contributions and then move to the international scene.



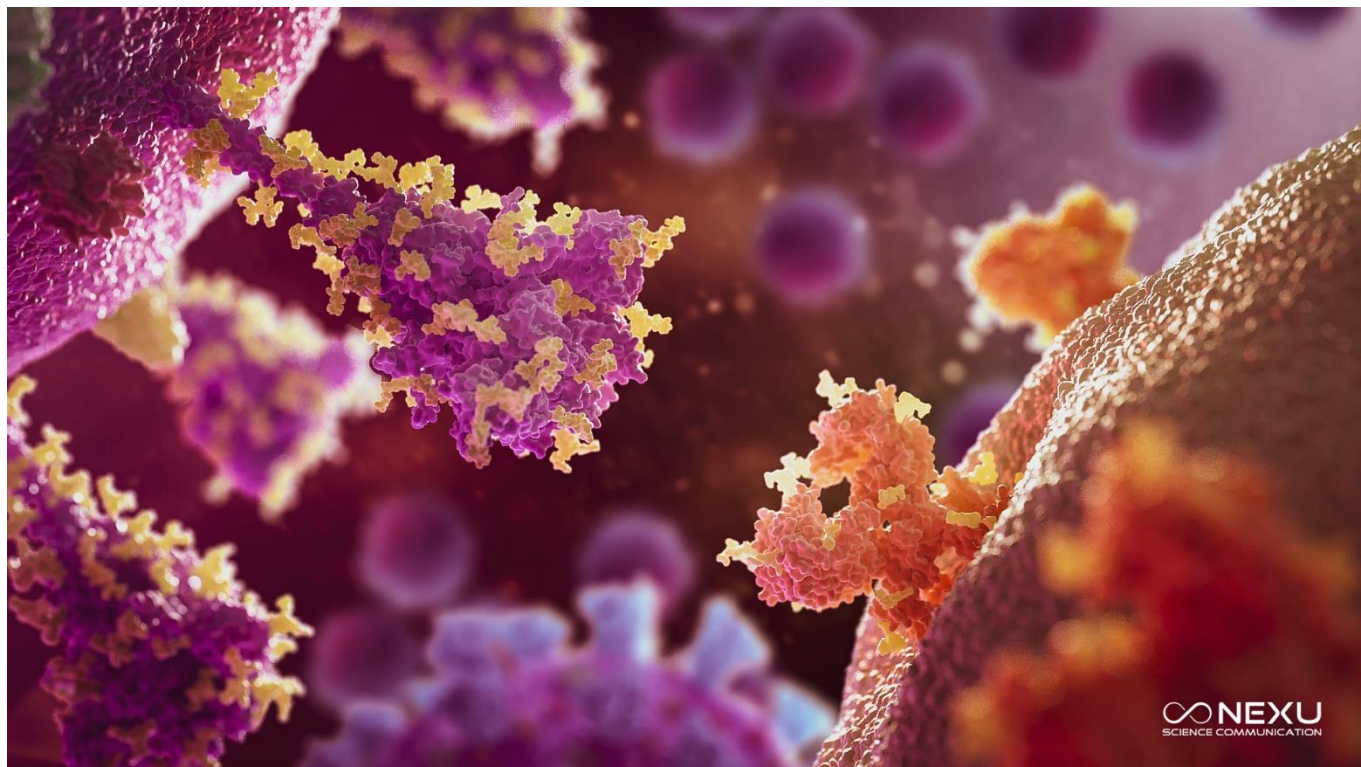
**Nexu Science Communication**

Eoin Winston, Co-founder & Head of Design at NEXU Science Communication. <https://nexucreative.com>

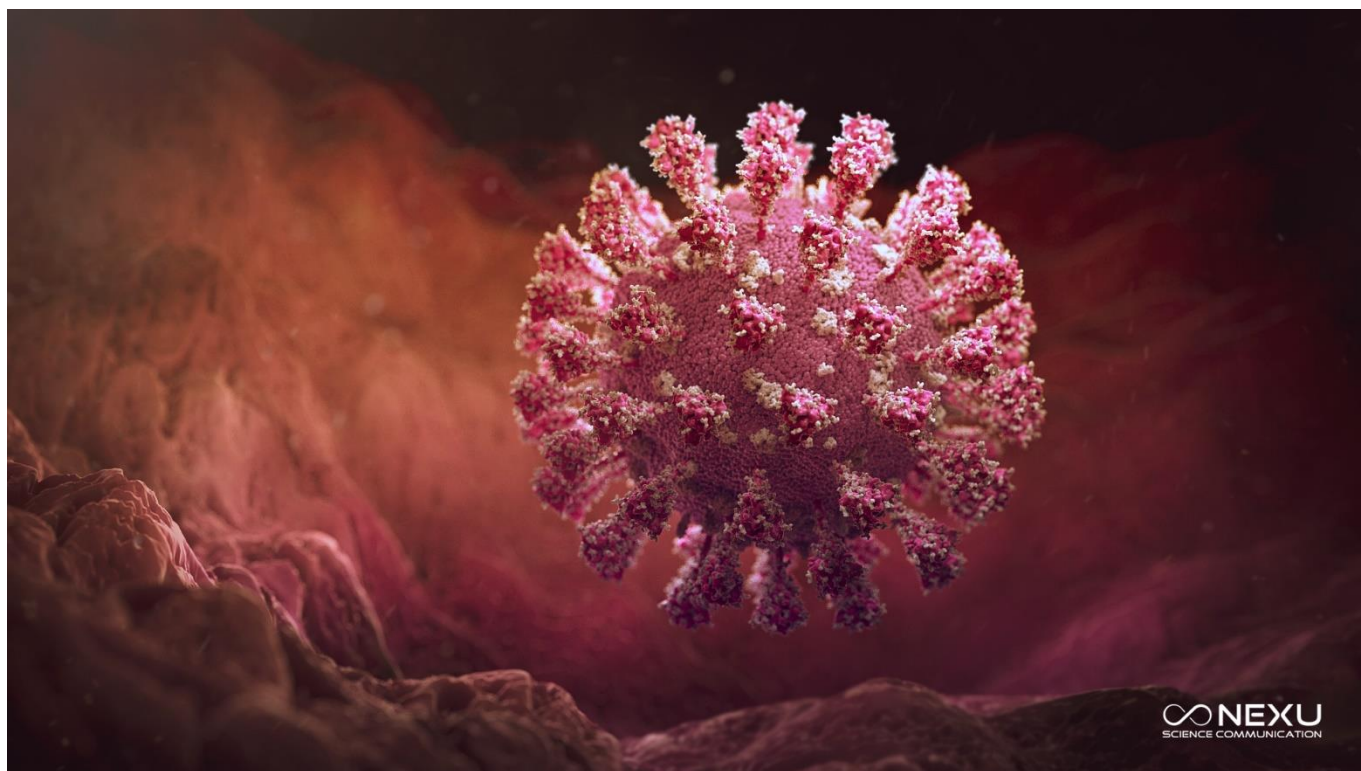


Coronavirus at the point of infection: the visual effect was created by Irish animator and data scientist **Eoin Winston** of Nexu and **Jason McLellan** from the University of Texas.

Eoin has written a short article on SARS CoV-2 posted on LinkedIn (May 7<sup>th</sup>) and his collaboration with Professor Max Crispin at The University of Southampton about how the virus is able to commandeer naturally occurring host sugars called glycans: <https://www.linkedin.com/pulse/sars-cov-2-camouflage-helps-mask-virus-from-immune-system-winston/?trackingId=alkDNH0rQM2UnjJmyc%2BF8A%3D%3D>



He has also worked with [Dr. Peter Bond](#) at the Bioinformatics Institute in Singapore who has built a full-length model of the glycosylated spike protein and with Jason McLellan from the University of Texas to create the image above. The LinkedIn post contains some beautiful images and animations.



The Irish Times carried an article April 9<sup>th</sup>:  
[Claire O'Connell](#)

<https://www.irishtimes.com/news/science/putting-the-new-coronavirus-firmly-in-the-picture-1.4216940>

## NEXU Science Communication

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Call us: [+353 1 6127039](tel:+35316127039)

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## Article in Chemistry World by Dublin based Anthony King March 2020

Potent coronavirus drug candidate designed using 3D structure of key viral enzyme

<https://www.chemistryworld.com/news/potent-coronavirus-drug-candidate-designed-using-3d-structure-of-key-viral-enzyme/4011411.article>

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Science steps up a gear as struggle to both understand and fight coronavirus intensifies

Anthony King BY ANTHONY KING 16 APRIL 2020

<https://www.chemistryworld.com/news/science-steps-up-a-gear-as-struggle-to-both-understand-and-fight-coronavirus-intensifies/4011531.article>

and

[https://d2cbg94ubxgspn.cloudfront.net/Pictures//web/t/n/r/3dstructure\\_246321.gif](https://d2cbg94ubxgspn.cloudfront.net/Pictures//web/t/n/r/3dstructure_246321.gif) (moving image)

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## International Perspectives

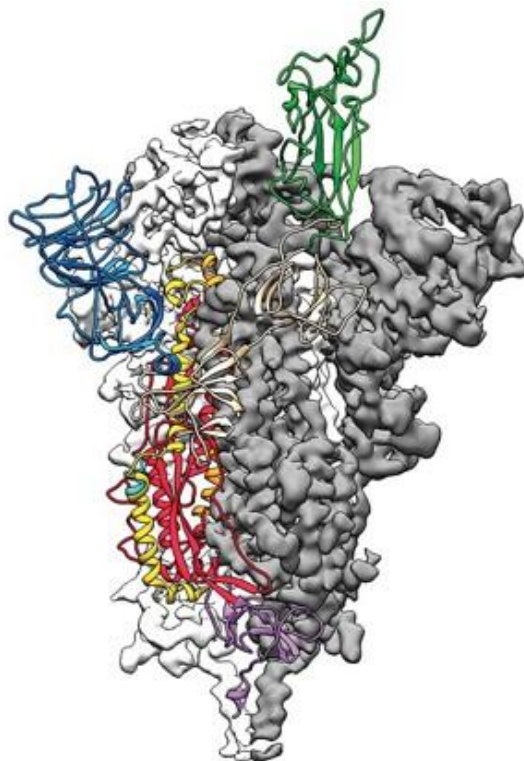
Interview with: Jason McLellan/University of Texas at Austin:

<https://www.texasexes.org/covid-19-jason-mclellan>

## SARS CoV-2 Virus Spike Structure

NIH Scientists Identify Atomic Structure of Novel Coronavirus Protein

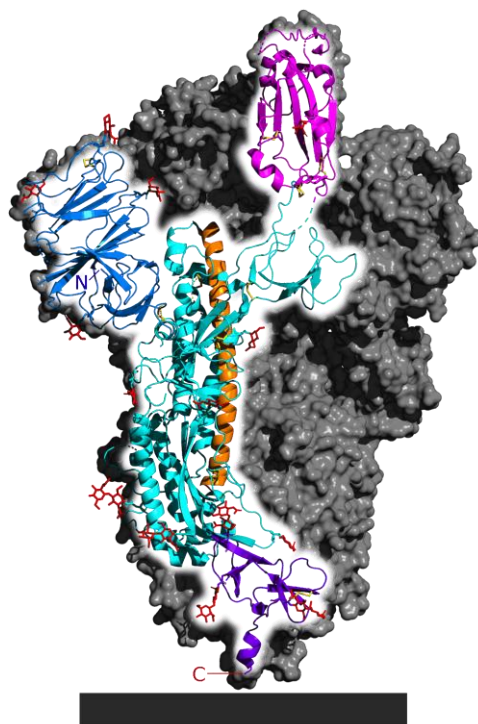
<https://www.niaid.nih.gov/news-events/atomic-structure-novel-coronavirus-protein>



Structure of 2019-nCoV spike protein in the prefusion conformation. This is a 3D atomic scale map, or molecular structure, of the 2019-nCoV spikeprotein. The protein takes on two different shapes, called conformations—one before it infects a host cell, and another during infection. This structure represents the protein before it infects a cell, called the prefusion conformation.

Credit: Jason McLellan/University of Texas at Austin

Side view of the SARS-CoV-2 spike protein with one receptor binding domain shown in coloured ribbons.



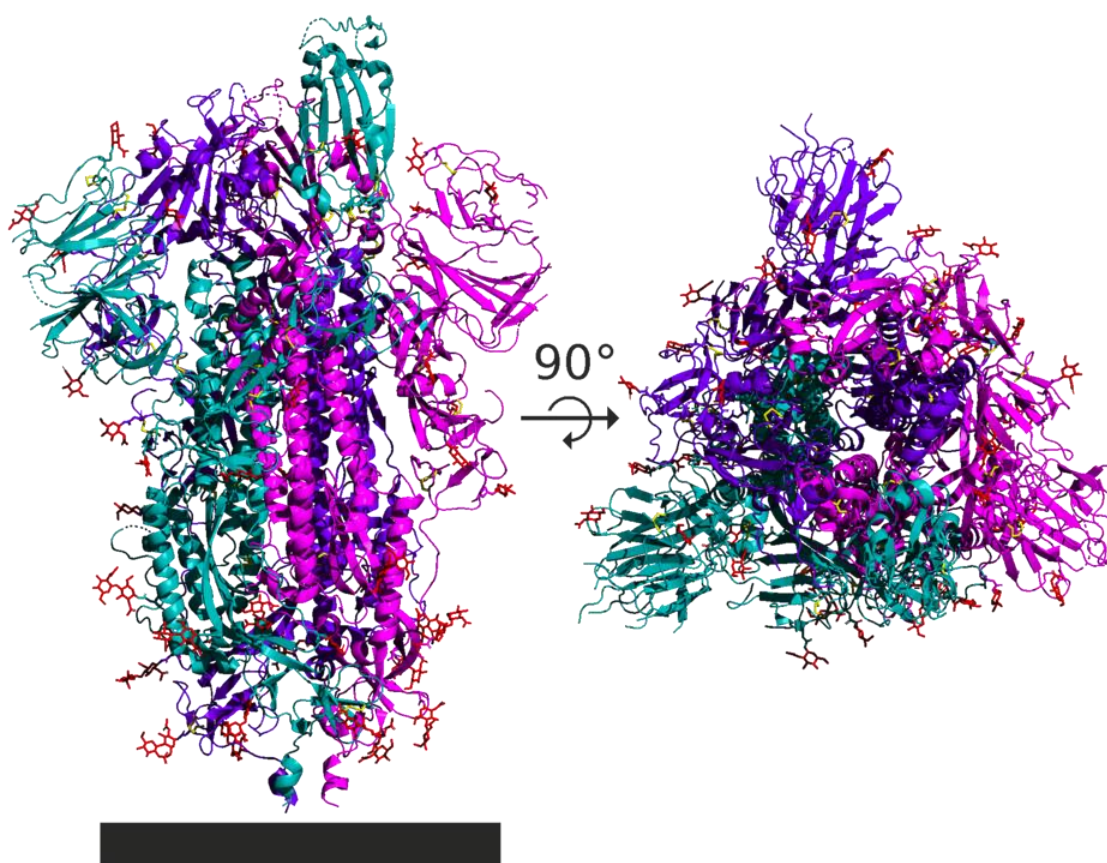
Spike glycoprotein from SARS-CoV-2. PDB: 6VSB. Only one monomer is highlighted. Whole protein is a homotrimer. Rest of the trimer is shown as a grey surface. Parts of the actual structure are not shown. The following are listed from N-terminal (letter N) to C-terminal (C): N-terminal domain (blue), ACE2 receptor binding domain (magenta) general structure (cyan), central helix (orange, faces inside of the homotrimer) and connector domain (purple, anchors the spike protein to virus lipid envelope). Yellow: disulfide bonds. Red: carbohydrates. Grey block: lipid membrane of the virus.

5-HT2AR - Own work

- CC0
- File:6VSB spike protein SARS-CoV-2 monomer in homotrimer.png
- Created: 27 March 2020

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[https://commons.wikimedia.org/wiki/File:6VSB\\_spike\\_protein\\_SARS-CoV-2\\_monomer\\_in\\_homotrimer.png](https://commons.wikimedia.org/wiki/File:6VSB_spike_protein_SARS-CoV-2_monomer_in_homotrimer.png)



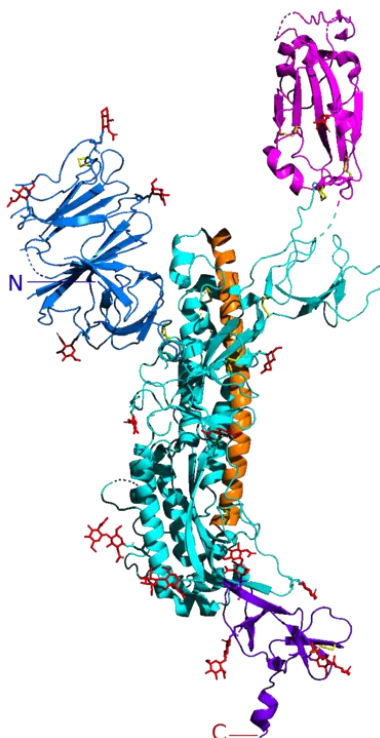
Spike glycoprotein from SARS-CoV-2 from 2 angles: side view and top view. Latter is rotated by 90 degrees. PDB: 6VSB. Homotrimer. Parts of the actual structure are not shown. Top of the protein (left) binds human ACE2 receptors through which SARS-CoV-2 binds to cells and infects them. Teal, magenta and purple: monomers. Yellow: disulfide bonds. Red: carbohydrates. Grey block: lipid membrane of the virus.

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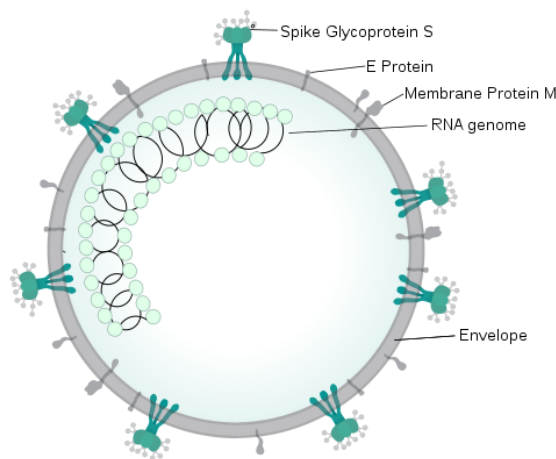
Spike glycoprotein from SARS-CoV-2. PDB: 6VSB. Only monomer is shown. Whole protein is a homotrimer. Parts of the actual structure are not shown. The following are listed from N-terminal (letter N) to C-terminal (C): N-terminal domain (blue), ACE2 receptor binding domain (magenta) general structure (cyan), central helix (orange, faces inside of the homotrimer) and connector domain (purple, anchors the spike protein to the lipid envelope of the virus). Yellow: disulfide bonds. Red: carbohydrates.

5-HT2AR - Own work

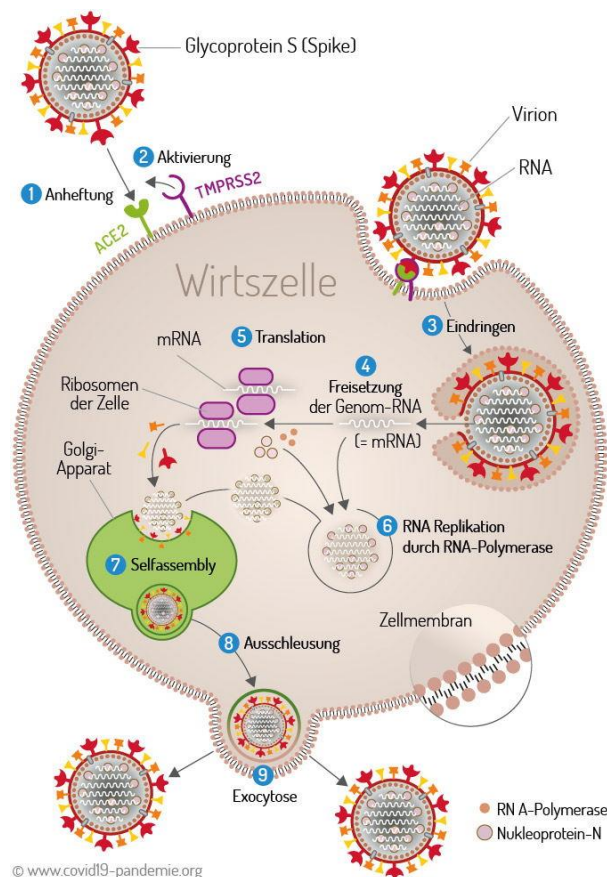
- CC0
- File:6VSB spike protein SARS-CoV-2 monomer.png
- Created: 27 March 2020

[https://commons.wikimedia.org/wiki/File:6VSB\\_spike\\_protein\\_SARS-CoV-2\\_monomer\\_in\\_homotrimer.png#/media/File:6VSB\\_spike\\_protein\\_SARS-CoV-2\\_monomer.png](https://commons.wikimedia.org/wiki/File:6VSB_spike_protein_SARS-CoV-2_monomer_in_homotrimer.png#/media/File:6VSB_spike_protein_SARS-CoV-2_monomer.png)

## Overview of the Virus and Infection



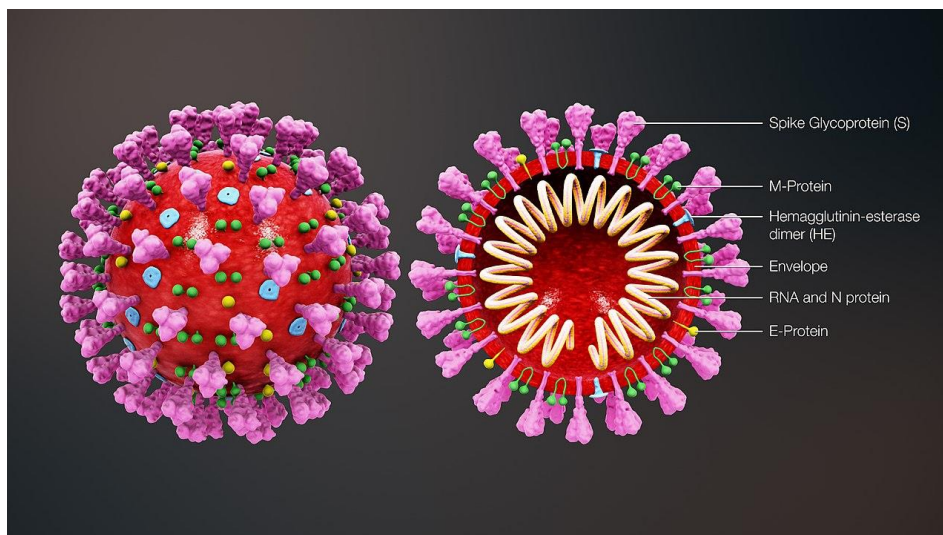
Schematic diagram of the Coronavirus particle. S, spike protein; M, membrane protein, E, envelope protein; N, nucleocapsid protein: structural proteins of coronavirus.



1. First, the virions attach to the surface of the host cells. This takes place specifically via certain surface features (receptors) of the host cell, in the case of SARS-COV-2 via the binding of the viral glycoprotein S to the ACE2 receptor. The ACE2 receptor of the host cells could therefore be a possible starting point for therapy.
2. The enzyme TMPRSS2 of the host cell activates further steps in the infection process that are necessary for the pathogen to penetrate into the host cell. TMPRSS2 is also a potential starting point for an effective drug.
3. In the next step, the pathogens penetrate into the host cell (simplified representation).
4. Before the virus multiplication begins, the genetic material (RNA) of the virus is released from the capsid (only one possible route is shown).
5. Now the actual propagation process follows, replication. Since SARS-COV-2 has RNA of positive polarity, the RNA can be used directly as “building instructions” (mRNA) for virus-specific proteins (translation). For the host cell, the viral RNA is practically indistinguishable from its own mRNA and the synthesis apparatus (ribosomes) of the host cell produces virus-specific proteins (S, M, E, N, RNA polymerase)
6. The genetic material (RNA) of the virus is in the host cell reproduced by copying (RNA replication). The enzymes of the host cell itself are not able to do this, this task is taken on by the viral RNA polymerase, which produces many copies of the entire virus RNA.
7. Are viral RNA copies and virus proteins produced in sufficient quantities by the host cell they are included in the endoplasmic reticulum (ER) and assemble into new viruses (self-assembly).
8. The finished virus particles are pinched off from the ER as Golgi vesicles (budding).
9. The virus gets out of the host cell through exocytosis.

[covid19-pandemie.org](http://covid19-pandemie.org) - Own work

<https://de.wikipedia.org/wiki/SARS-CoV-2>



<https://www.scientificanimations.com> - <https://www.scientificanimations.com/wiki-images>

3D medical animation still shot showing the structure of a coronavirus

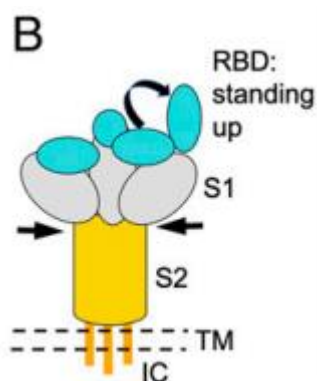
<https://www.scientificanimations.com/coronavirus-symptoms-and-prevention-explained-through-medical-animation>

## Cell entry mechanisms of SARS-CoV-2

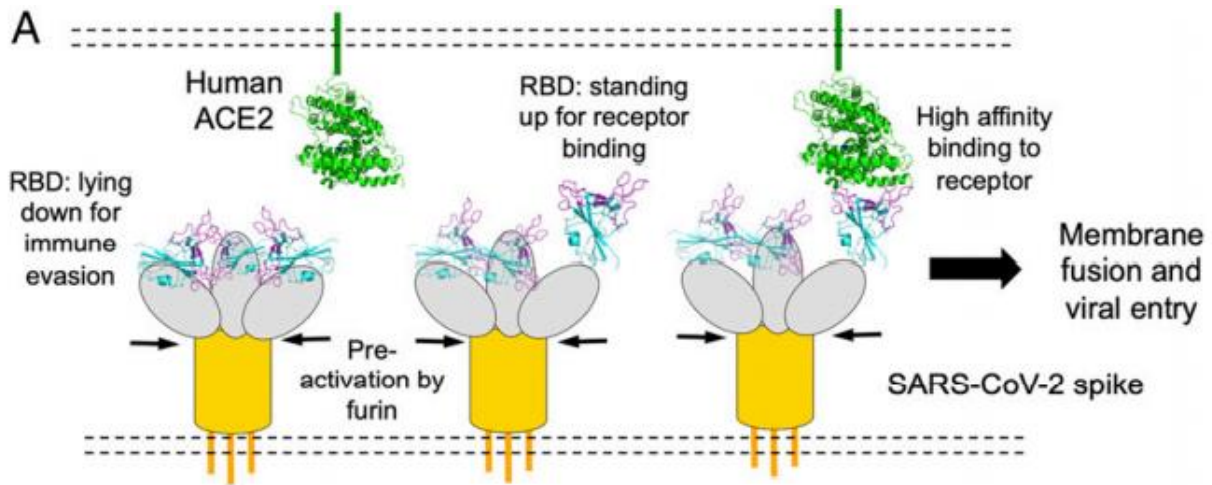
Sars-CoV2 surface spike protein mediates entry into cells. To fulfil its function, SARS-CoV-2 spike binds to its receptor human ACE2 (hACE2) through its receptor-binding domain (RBD) and is proteolytically activated by human proteases such as TMPRSS2.

<https://www.pnas.org/content/pnas/early/2020/05/05/2003138117.full.pdf>

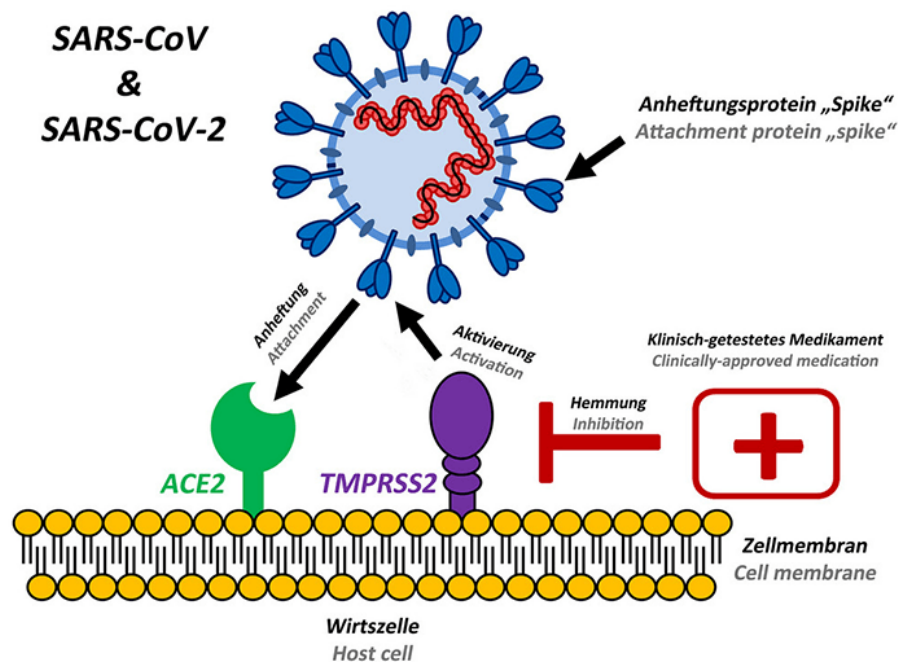
Fig B. Schematic drawing of the three-dimensional (3D) structure of coronavirus spike. S1, receptor-binding subunit; S2, membrane fusion subunit; TM, transmembrane anchor; IC, intracellular tail.



The authors (above link) have identified key cell entry mechanisms of SARS-CoV-2. First, SARS-CoV-2 RBD has higher hACE2 binding affinity than SARS-CoV RBD, supporting efficient cell entry. Second, paradoxically, the hACE2 binding affinity of the entire SARS-CoV-2 spike is comparable to or lower than that of SARS-CoV spike, suggesting that SARS-CoV-2 RBD, albeit more potent, is less exposed than SARS-CoV RBD. Third, unlike SARS-CoV, cell entry of SARS-CoV-2 is preactivated by proprotein convertase **furin**, reducing its dependence on target cell proteases for entry. The high hACE2 binding affinity of the RBD, **furin preactivation** of the spike, and hidden RBD in the spike potentially allow SARS-CoV-2 to maintain efficient cell entry while evading immune surveillance.



Summary of cell entry mechanisms of SARS-CoV-2. (A) A schematic view of three unique features of SARS-CoV-2 entry: hidden RBD in the spike for immune evasion, RBD's high hACE2 binding affinity for efficient entry, and furin preactivation of the spike for enhanced entry into some cells. [See link above for full explanation.](#) Also see [link below.](#)



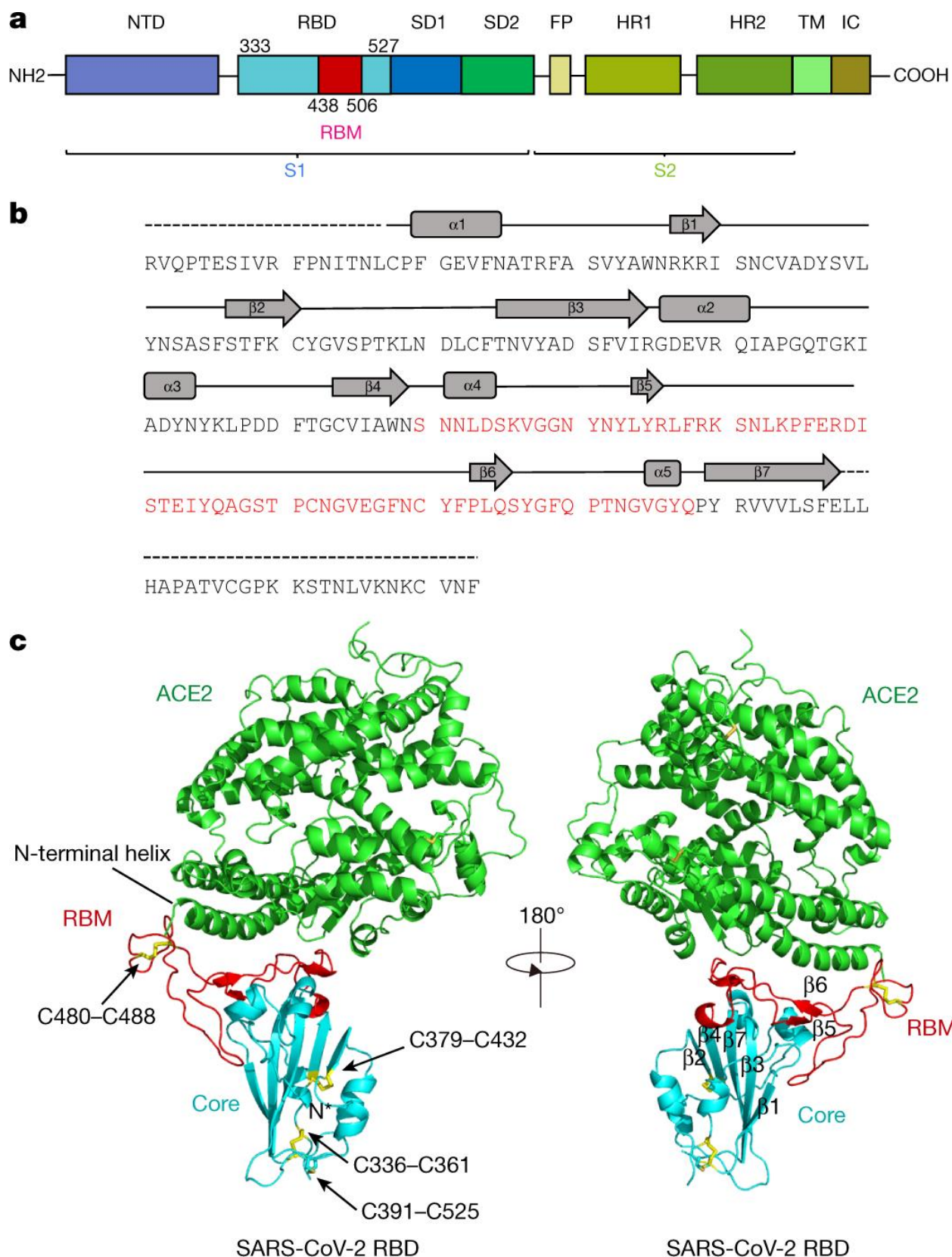
The viral spike protein of the SARS-CoV-2 uses cellular receptor (ACE2) and requires the cellular protease TMPRSS2 for its activation. Figure: Markus Hoffmann / German Primate Centre.

<https://www.biomol.com/resources/biomol-blog/ace2-the-sars-cov-2-receptor>

## Nature

Two papers published in nature follow:

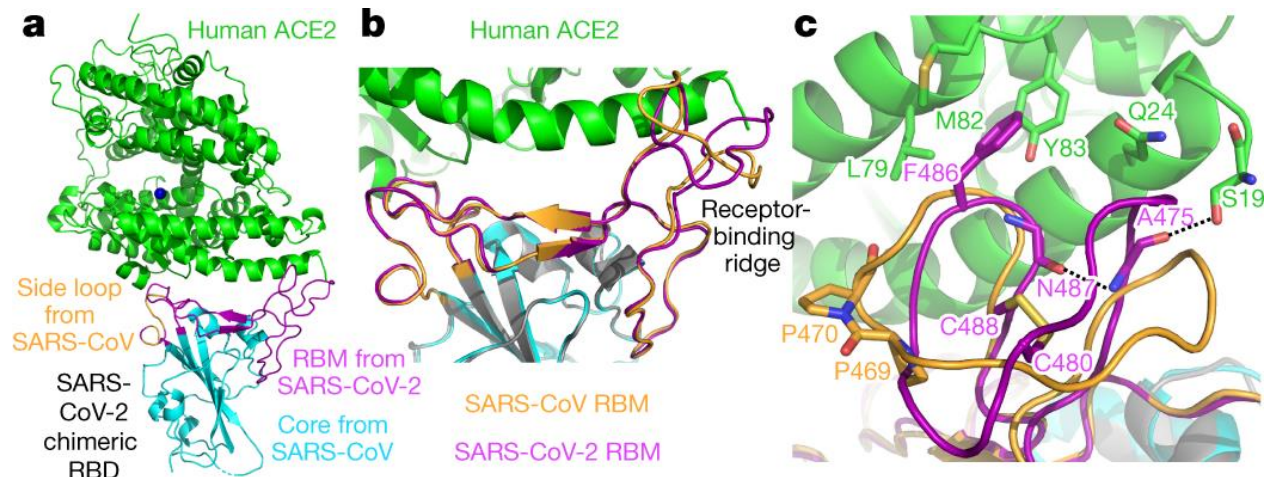
Nature: <https://www.nature.com/articles/s41586-020-2180-5/figures/1>



**a**, Overall topology of the SARS-CoV-2 spike monomer. FP, fusion peptide; HR1, heptad repeat 1; HR2, heptad repeat 2; IC, intracellular domain; NTD, N-terminal domain; SD1, subdomain 1; SD2, subdomain 2; TM, transmembrane region. **b**, Sequence and secondary structures of SARS-CoV-2 RBD. The RBM sequence is shown in red. **c**, Overall structure of the SARS-CoV-2 RBD bound to ACE2. ACE2 is shown in green. The SARS-CoV-2

RBD core is shown in cyan and RBM in red. Disulfide bonds in the SARS-CoV-2 RBD are shown as sticks and indicated by arrows. The N-terminal helix of ACE2 responsible for binding is labelled.

**Nature:** <https://www.nature.com/articles/s41586-020-2179-y/figures/1>



**a**, Crystal structure of the SARS-CoV-2 chimeric RBD complexed with ACE2. ACE2 is shown in green. The RBD core is shown in cyan. The RBM is shown in magenta. A side loop in RBM is shown in orange. A zinc ion in ACE2 is shown in blue. **b**, Comparison of the conformations of the ridge in SARS-CoV-2 RBM (magenta) and SARS-CoV RBM (orange). **c**, Comparison of the conformations of the ridge from another viewing angle. In the SARS-CoV RBM, a proline-proline-alanine motif is shown. In the SARS-CoV-2 RBM, a newly formed hydrogen bond, Phe486, and some of the interactions of the ridge with the N-terminal helix of ACE2 are shown.

How Furin and ACE2 Interact with the Spike Protein on SARS-CoV-2  
What is the Coronavirus Spike Protein?

<https://www.assaygenie.com/how-furin-and-ace2-interact-with-the-spike-on-sarscov2>

Angiotensin-converting enzyme 2 (ACE2) as a SARS-CoV-2 receptor: molecular mechanisms and potential therapeutic target.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7079879>



Imaging: Capturing Viral Shedding in Action

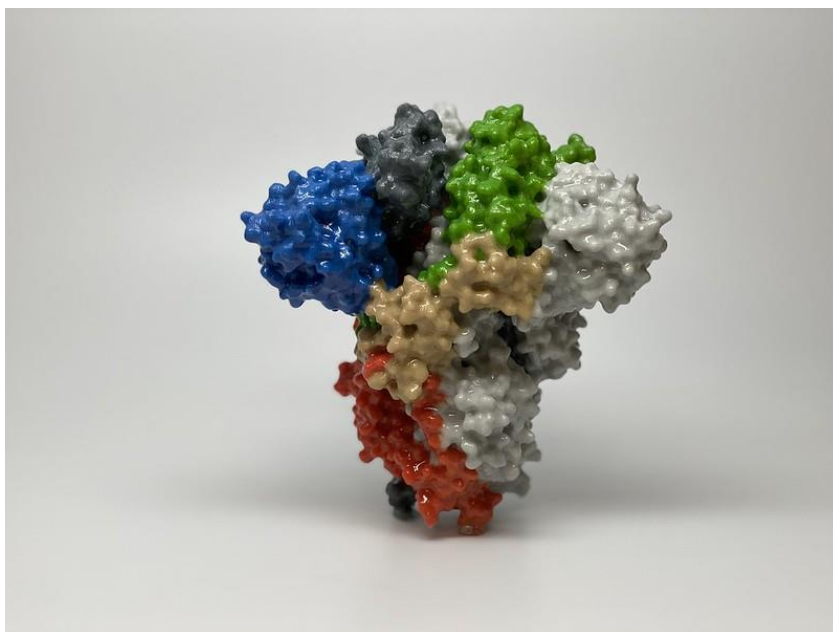
<https://directorsblog.nih.gov/tag/imaging/>

NIH Scientists Identify Atomic Structure of Novel Coronavirus Protein

<https://www.niaid.nih.gov/news-events/atomic-structure-novel-coronavirus-protein>

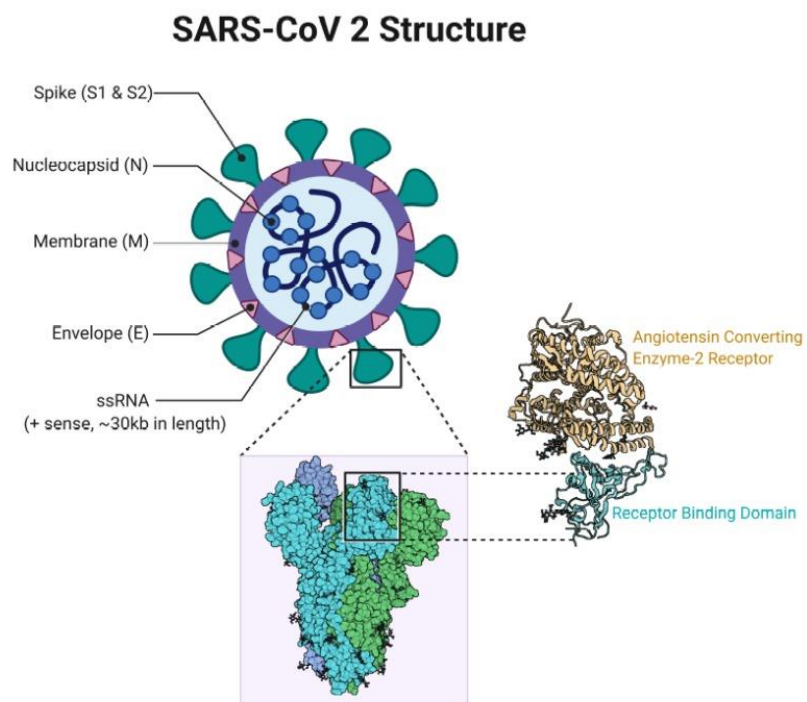
Structural Molecular Insights into SARS Coronavirus Cellular Attachment, Entry and Morphogenesis

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7176236>



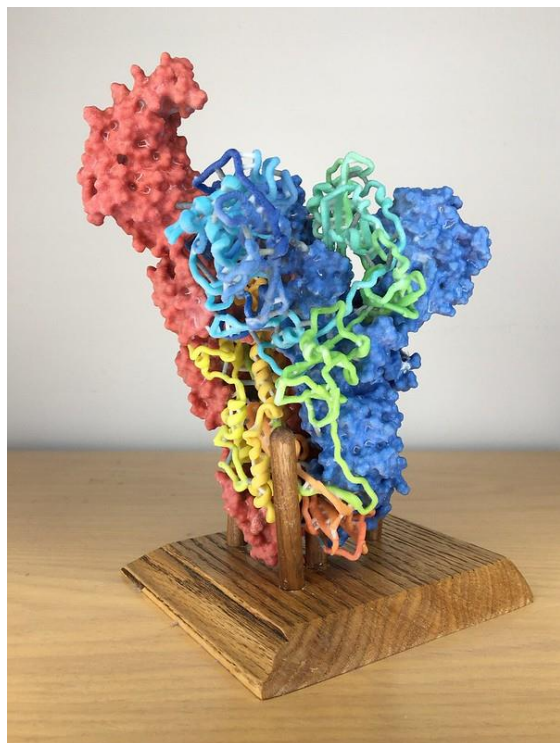
### Novel Coronavirus SARS-CoV-2 Spike Protein

3D print of a spike protein on the surface of SARS-CoV-2—also known as 2019-nCoV, the virus that causes COVID-19. Spike proteins cover the surface of SARS-CoV-2 and enable the virus to enter and infect human cells. [3dprint.nih.gov/](https://3dprint.nih.gov/) Credit: NIH



SARS- CoV 2 Structure. Contributed by Rohan Bir Singh, MD; Made with Biorender.com

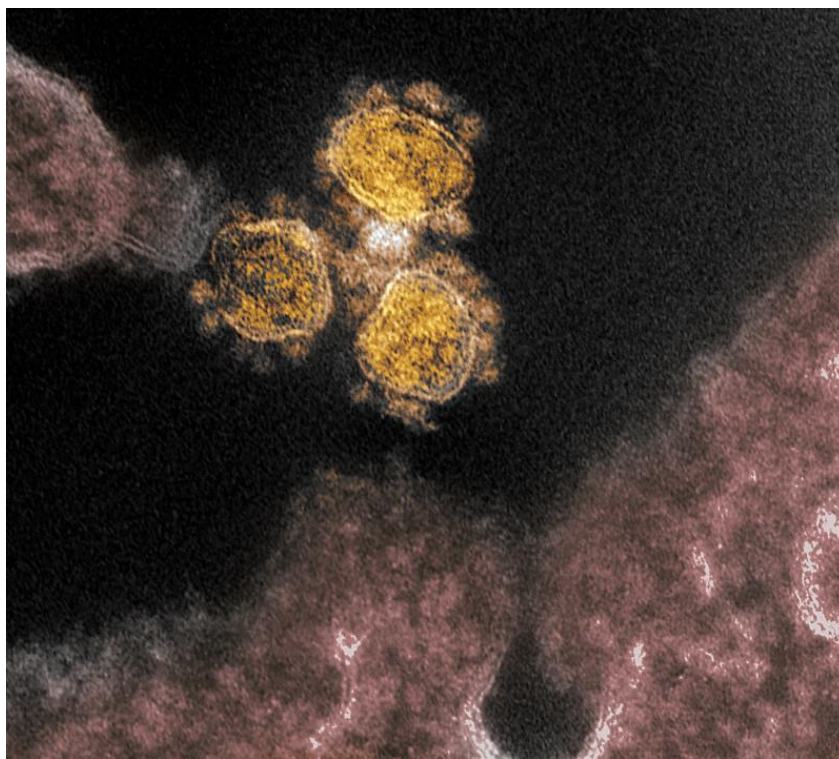
<https://www.ncbi.nlm.nih.gov/books/NBK554776>



### 3D Print of Coronavirus Spike

3D print of a coronavirus spike. The spike is a protein on the coronavirus surface that helps the virus enter and infect cells.

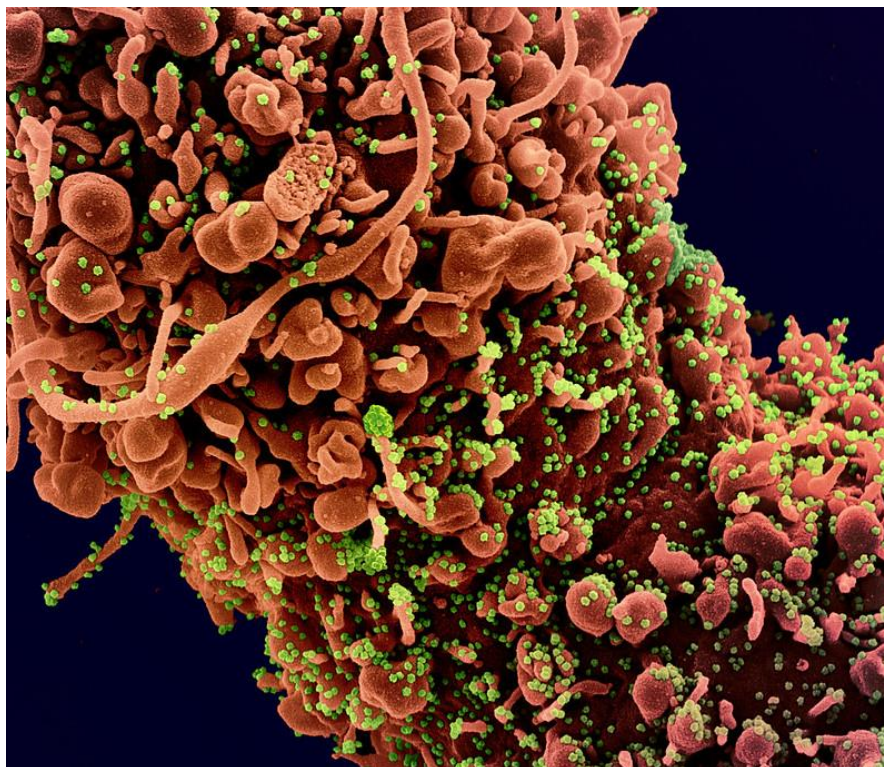
Credit: National Institute of Allergy and Infectious Diseases, NIH



### Novel Coronavirus SARS-CoV-2

This transmission electron microscope image shows SARS-CoV-2, the virus that causes COVID-19, isolated from a patient in the U.S. Virus particles (round gold objects) are shown emerging from the surface of cells cultured in the lab. The spikes on the outer edge of the virus particles give coronaviruses their name, crown-like. Credit: NIAID-RML





Colorized scanning electron micrograph of a cell showing morphological signs of apoptosis, infected with SARS-COV-2 virus particles (green), isolated from a patient sample. Image captured at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID/NIH

### **Coronavirus (COVID-19) Update: FDA Authorizes First Next Generation Sequence Test for Diagnosing COVID-19**

[https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-first-next-generation-sequence-test-diagnosing-covid-19?utm\\_campaign=20200617%20MCMi&utm\\_medium=email&utm\\_source=Eloqua](https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-first-next-generation-sequence-test-diagnosing-covid-19?utm_campaign=20200617%20MCMi&utm_medium=email&utm_source=Eloqua)

### **In Vitro Diagnostics EUAs (FDA)**

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### **Animation of the SARS-CoV-2 coronavirus**

12.05.2020

<https://visual-science.com/projects/sars-cov-2/animation/>

<https://visual-science.com/projects/sars-cov-2/3d-model>

## More General Articles & Papers

### Scientists May Have Found The Human Cell Types Most Vulnerable to The New Coronavirus 23

APRIL 2020

<https://www.sciencealert.com/the-cell-types-most-vulnerable-to-infection-by-coronavirus-may-have-been-identified>

### The COVID-19 Virus May Have Been in Humans For Years, Study Suggests

30 MARCH 2020. [May have this already](#)

<https://www.sciencealert.com/the-new-coronavirus-could-have-been-percolating-innocently-in-humans-for-years>

### Scientists Are Tired of Explaining Why The COVID-19 Virus Was Not Made in a Lab

20 APRIL 2020

<https://www.sciencealert.com/here-s-what-scientists-think-of-the-coronavirus-was-made-in-a-lab-rumour>

### There's Still 'No Evidence' People Who've Had COVID-19 Can't Get It Again, Warns WHO AFP

26 APRIL 2020

<https://www.sciencealert.com/there-s-still-no-evidence-people-who-ve-had-covid-19-can-t-get-it-again-warns-who>

### Which Strategies Are Most Likely to Defeat Coronavirus?

*A recent review study suggests that the development of certain antivirals and gene therapy are likely to progress quickest in the fight against dangerous coronaviruses such as SARS-CoV-2* April 24th, 2020

<https://www.labmanager.com/news/study-ids-most-promising-strategies-for-defeating-coronavirus-22470>

### European Commission issues guidelines for COVID-19 in vitro diagnostic tests and their performance

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### HIV-1 did not contribute to the 2019-nCoV genome

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7033698/>

### Cloaked similarity between HIV-1 and SARS-CoV suggests an anti-SARS strategy

October 2003 [BMC Microbiology](#) 3(1):20 DOI: [10.1186/1471-2180-3-20](https://doi.org/10.1186/1471-2180-3-20) [PubMed](#)

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### A virology expert answers key questions on COVID-19. (Good tables)

24 Mar 2020

<https://www.weforum.org/agenda/2020/03/covid-19-explained-virology-expert/>

### Scientists Compare Novel Coronavirus with SARS and MERS Viruses

Feb 11, 2020

<https://www.the-scientist.com/news-opinion/scientists-compare-novel-coronavirus-to-sars-and-mers-viruses-67088>

### **Bad News Wrapped in Protein: Inside the Coronavirus Genome**

By Jonathan Corum and Carl Zimmer April 3, 2020 New York Times

<https://www.nytimes.com/interactive/2020/04/03/science/coronavirus-genome-bad-news-wrapped-in-protein.html>

### **How Genetic Mutations Turned the Coronavirus Deadly**

*Tracing the path of a pandemic.* BY ROBERT BAZELL MARCH 26, 2020

Robert Bazell is adjunct professor of Molecular, Cellular, and Developmental Biology at Yale. For 38 years, he was chief science correspondent for NBC News.

<http://nautil.us/issue/83/intelligence/how-genetic-mutations-turned-the-coronavirus-deadly>

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29 Apr 2019 <https://doi.org/10.2217/fvl-2018-0144>

<https://www.futuremedicine.com/doi/10.2217/fvl-2018-0144>

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<https://www.healthline.com/health/what-is-a-retrovirus>

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<https://study.com/academy/answer/is-the-coronavirus-a-retrovirus.html>

### **Animal & human viruses** Good diagrams and explanation

<https://www.khanacademy.org/science/biology/biology-of-viruses/virus-biology/a/animal-viruses-hiv>

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April 27, 2020

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### **Scientists Tested 47 Existing Drugs And Found Potential New Ways to Fight Coronavirus**

2 MAY 2020

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### **A SARS-CoV-2 protein interaction map reveals targets for drug repurposing**

**Cite this article**

Gordon, D.E., Jang, G.M., Bouhaddou, M. *et al.* A SARS-CoV-2 protein interaction map reveals targets for drug repurposing. *Nature* (2020). <https://doi.org/10.1038/s41586-020-2286-9>

[Download citation](#)

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- Published 30 April 2020
- DOI <https://doi.org/10.1038/s41586-020-2286-9>

Share: <https://rdcu.be/b3Vfc>

## Abstract

The novel coronavirus SARS-CoV-2, the causative agent of COVID-19 respiratory disease, has infected over 2.3 million people, killed over 160,000, and caused worldwide social and economic disruption<sup>1,2</sup>. There are currently no antiviral drugs with proven clinical efficacy, nor are there vaccines for its prevention, and these efforts are hampered by limited knowledge of the molecular details of SARS-CoV-2 infection. To address this, we cloned, tagged and expressed 26 of the 29 SARS-CoV-2 proteins in human cells and identified the human proteins physically associated with each using affinity-purification mass spectrometry (AP-MS), identifying 332 high-confidence SARS-CoV-2-human protein-protein interactions (PPIs). Among these, we identify 66 drugable human proteins or host factors targeted by 69 compounds (29 FDA-approved drugs, 12 drugs in clinical trials, and 28 preclinical compounds). Screening a subset of these in multiple viral assays identified two sets of pharmacological agents that displayed antiviral activity: inhibitors of mRNA translation and predicted regulators of the Sigma1 and Sigma2 receptors. Further studies of these host factor targeting agents, including their combination with drugs that directly target viral enzymes, could lead to a therapeutic regimen to treat COVID-19.

## How Bats Carry Coronaviruses without Getting Sick Themselves

*Bat-virus adaptation may explain species spillover, researchers say*

May 7th, 2020

UNIVERSITY OF SASKATCHEWAN

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## The sprint to solve coronavirus protein structures — and disarm them with drugs

Nature May 18<sup>th</sup>

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May 19, 2020

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May 12, 2020

### Mylan and Gilead Sciences sign global collaboration agreement for the commercialization of remdesivir in 127 low- and middle-income countries

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### **Researchers in Brazil investigate mechanisms that trigger the inflammatory phase of COVID-19 June 10, 2020**

<http://agencia.fapesp.br/researchers-in-brazil-investigate-mechanisms-that-trigger-the-inflammatory-phase-of-covid-19/33356/>

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14 MAY 2020

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May 13, 2020

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May 14, 2020

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May 20, 2020

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**Drug manufacturers face supply-chain weaknesses and sourcing issues as they ramp up complex production processes to meet global demand.**

14/5/20

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18/5/20

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## **The sprint to solve coronavirus protein structures — and disarm them with drugs**

Stopping the pandemic could rely on breakneck efforts to visualize SARS-CoV-2 proteins and use them to design drugs and vaccines.

15/5/20

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[https://www.cell.com/cell/pdf/S0092-8674\(20\)30494-3.pdf?returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0092867420304943%3Fshowall%3Dtrue](https://www.cell.com/cell/pdf/S0092-8674(20)30494-3.pdf?returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0092867420304943%3Fshowall%3Dtrue)

## **Coronavirus: why we're using llamas to help fight the pandemic**

May 26, 2020

[https://theconversation.com/coronavirus-why-were-using-llamas-to-help-fight-the-pandemic-139070?utm\\_medium=email&utm\\_campaign=UK%20donations%20May%202020%20-%20health&utm\\_content=UK%20donations%20May%202020%20-%20health+CID\\_5f341273233195644e288b74ade98ee5&utm\\_source=campaign\\_monitor\\_uk&utm\\_term=Coronavirus%20why%20were%20using%20llamas%20to%20help%20fight%20the%20pandemic](https://theconversation.com/coronavirus-why-were-using-llamas-to-help-fight-the-pandemic-139070?utm_medium=email&utm_campaign=UK%20donations%20May%202020%20-%20health&utm_content=UK%20donations%20May%202020%20-%20health+CID_5f341273233195644e288b74ade98ee5&utm_source=campaign_monitor_uk&utm_term=Coronavirus%20why%20were%20using%20llamas%20to%20help%20fight%20the%20pandemic)

## **ACE2: the molecule that helps coronavirus invade your cells**

May 12, 2020

<https://theconversation.com/ace2-the-molecule-that-helps-coronavirus-invade-your-cells-138369>

## **A replaceable, more efficient filter for N95 masks**

“A Flexible Nano-porous Template for the Design and Development of Reusable Anti-COVID-19 Hydrophobic Face Mask”

*ACS Nano May 21<sup>st</sup>*

## **Remdesivir Shortens COVID-19 Recovery Time, NIH Trial Finds**

May 27, 2020

[https://www.genengnews.com/news/remdesivir-shortens-covid-19-recovery-time-nih-trial-finds/?utm\\_medium=newsletter&utm\\_source=GEN+Daily+News+Highlights&utm\\_content=01&utm\\_campaign=GEN+Daily+News+Highlights\\_20200527&oly\\_enc\\_id=3781B8250656B8W](https://www.genengnews.com/news/remdesivir-shortens-covid-19-recovery-time-nih-trial-finds/?utm_medium=newsletter&utm_source=GEN+Daily+News+Highlights&utm_content=01&utm_campaign=GEN+Daily+News+Highlights_20200527&oly_enc_id=3781B8250656B8W)

## **How to Draw the Coronavirus**

May 18, 2020

## **Scientific illustrators have made the SARS-CoV-2 virus visible, variously capturing its form, function and weaknesses. Nature Briefing**

[https://www.theparisreview.org/blog/2020/05/18/how-to-draw-the-coronavirus/?utm\\_source=Nature+Briefing&utm\\_campaign=e78775970c-briefing-dy-20200526\\_COPY\\_01&utm\\_medium=email&utm\\_term=0\\_c9dfd39373-e78775970c-45372434](https://www.theparisreview.org/blog/2020/05/18/how-to-draw-the-coronavirus/?utm_source=Nature+Briefing&utm_campaign=e78775970c-briefing-dy-20200526_COPY_01&utm_medium=email&utm_term=0_c9dfd39373-e78775970c-45372434)

## **Preventing ‘Cytokine Storm’ May Ease Severe COVID-19 Symptoms**

May 20<sup>th</sup>

A new clinical trial will test a treatment that targets this overactive immune response

<https://www.hhmi.org/news/preventing-cytokine-storm-may-ease-severe-covid-19-symptoms>

## **Russian company says it has ‘most promising’ new COVID-19 drug in the world**

Jun 02, 2020

[https://www.pharmamanufacturing.com/industrynews/2020/russian-company-says-it-has-most-promising-new-covid-19-drug-in-the-world/?utm\\_campaign=PHMDD\\_2020\\_Enews\\_Campaign&utm\\_medium=email&hsmi=88848837&hsenc=p2ANqtz-9CCjLGajEKQIAHiDyp1n4vhweE3P-V9wYKKS3zHeCJPYJRvrRGDW\\_SO-m90BGAehr81PjyV4RILbY8EHx1lBjnX51f7Q&utm\\_content=88848837&utm\\_source=hs\\_email](https://www.pharmamanufacturing.com/industrynews/2020/russian-company-says-it-has-most-promising-new-covid-19-drug-in-the-world/?utm_campaign=PHMDD_2020_Enews_Campaign&utm_medium=email&hsmi=88848837&hsenc=p2ANqtz-9CCjLGajEKQIAHiDyp1n4vhweE3P-V9wYKKS3zHeCJPYJRvrRGDW_SO-m90BGAehr81PjyV4RILbY8EHx1lBjnX51f7Q&utm_content=88848837&utm_source=hs_email)

## **A New Tool for Developing COVID-19 Treatments, Vaccines**

June 01 2020

A new tool is helping scientists better understand COVID-19

<https://newsroom.uvahealth.com/2020/06/01/new-tool-covid-19/>

## **Cincinnati Children’s HLH Research Points to Treatment for COVID-19 Cytokine Storms**

How Mice That Model Immune Disease’s Cytokine Storms May Point to Solution for Global Pandemic

May 28, 2020

<https://www.cincinnatichildrens.org/news/release/2020/treatment-covid-19>

## **Coronavirus: how T cells are involved and what it might mean for vaccine development**

June 11, 2020

[https://theconversation.com/coronavirus-how-t-cells-are-involved-and-what-it-might-mean-for-vaccine-development-140374?utm\\_medium=email&utm\\_campaign=UK%20donations%20May%202020%20-%20SK%20final&utm\\_content=UK%20donations%20May%202020%20-%20SK%20final+CID\\_b74964173c18642b6987d99176227b25&utm\\_source=campaign\\_monitor\\_uk&utm\\_term=Coronavirus%20how%20T%20cells%20are%20involved%20and%20what%20it%20might%20mean%20for%20vaccine%20development](https://theconversation.com/coronavirus-how-t-cells-are-involved-and-what-it-might-mean-for-vaccine-development-140374?utm_medium=email&utm_campaign=UK%20donations%20May%202020%20-%20SK%20final&utm_content=UK%20donations%20May%202020%20-%20SK%20final+CID_b74964173c18642b6987d99176227b25&utm_source=campaign_monitor_uk&utm_term=Coronavirus%20how%20T%20cells%20are%20involved%20and%20what%20it%20might%20mean%20for%20vaccine%20development)

<https://www.biorxiv.org/content/10.1101/2020.06.05.134551v1>

## **Regeneron Launches Trials of COVID-19 Antibody ‘Cocktail’**

June 11, 2020



[https://www.genengnews.com/news/regeneron-launches-trials-of-covid-19-antibody-cocktail/?utm\\_medium=newsletter&utm\\_source=GEN+Daily+News+Highlights&utm\\_content=01&utm\\_campaign=GEN+Daily+News+Highlights\\_20200612&oly\\_enc\\_id=3781B8250656B8W](https://www.genengnews.com/news/regeneron-launches-trials-of-covid-19-antibody-cocktail/?utm_medium=newsletter&utm_source=GEN+Daily+News+Highlights&utm_content=01&utm_campaign=GEN+Daily+News+Highlights_20200612&oly_enc_id=3781B8250656B8W)

## **New COVID-19 Antibody Test Targets Unique Region of Spike Protein**

June 15, 2020

[https://www.genengnews.com/news/new-covid-19-antibody-test-targets-unique-region-of-spike-protein/?utm\\_medium=newsletter&utm\\_source=GEN+Daily+News+Highlights&utm\\_content=01&utm\\_campaign=GEN+Daily+News+Highlights\\_20200615&oly\\_enc\\_id=3781B8250656B8W](https://www.genengnews.com/news/new-covid-19-antibody-test-targets-unique-region-of-spike-protein/?utm_medium=newsletter&utm_source=GEN+Daily+News+Highlights&utm_content=01&utm_campaign=GEN+Daily+News+Highlights_20200615&oly_enc_id=3781B8250656B8W)

## **Is the K number the new R number? What you need to know**

June 16, 2020

[https://theconversation.com/is-the-k-number-the-new-r-number-what-you-need-to-know-140286?utm\\_medium=email&utm\\_campaign=Latest%20from%20The%20Conversation%20for%20June%2016%202020%20-%201652815903&utm\\_content=Latest%20from%20The%20Conversation%20for%20June%2016%202020%20-%201652815903+CID\\_8d055706f043191017a88f37eae24e89&utm\\_source=campaign\\_monitor\\_uk&utm\\_term=Is%20the%20K%20number%20the%20new%20R%20number%20What%20you%20need%20to%20know](https://theconversation.com/is-the-k-number-the-new-r-number-what-you-need-to-know-140286?utm_medium=email&utm_campaign=Latest%20from%20The%20Conversation%20for%20June%2016%202020%20-%201652815903&utm_content=Latest%20from%20The%20Conversation%20for%20June%2016%202020%20-%201652815903+CID_8d055706f043191017a88f37eae24e89&utm_source=campaign_monitor_uk&utm_term=Is%20the%20K%20number%20the%20new%20R%20number%20What%20you%20need%20to%20know)

## **Modeling and Simulation Proposes New Insights for SARS-CoV-2**

April 21, 2020

[https://blogs.3ds.com/biovia/modeling-and-simulation-proposes-new-insights-for-sars-cov-2/?utm\\_medium=email&utm\\_source=promotional&utm\\_campaign=bioviaeflashsendinwaves\\_OP53851&utm\\_content=2020-06-biovia-newsletter-en\\_DM968751](https://blogs.3ds.com/biovia/modeling-and-simulation-proposes-new-insights-for-sars-cov-2/?utm_medium=email&utm_source=promotional&utm_campaign=bioviaeflashsendinwaves_OP53851&utm_content=2020-06-biovia-newsletter-en_DM968751)

## **Inhibiting SARS-CoV-2 Main Protease**

### **Drug Repurposing**

May 5, 2020

[https://blogs.3ds.com/biovia/drug-repurposing/?utm\\_medium=email&utm\\_source=promotional&utm\\_campaign=bioviaeflashsendinwaves\\_OP53851&utm\\_content=2020-06-biovia-newsletter-en\\_DM968751](https://blogs.3ds.com/biovia/drug-repurposing/?utm_medium=email&utm_source=promotional&utm_campaign=bioviaeflashsendinwaves_OP53851&utm_content=2020-06-biovia-newsletter-en_DM968751)

## **Coronavirus Antibody Tests Have a Mathematical Pitfall**

**The accuracy of screening tests is highly dependent on the infection rate**

<https://www.scientificamerican.com/article/coronavirus-antibody-tests-have-a-mathematical-pitfall/>

## **Broad neutralization of SARS-related viruses by human monoclonal antibodies | Science**

<https://science.sciencemag.org/content/early/2020/06/15/science.abc7424.full>

## **New Models of COVID-19 Spike Protein Could Be Key to Vaccine**

*The protein structure facilitates viral entry into host cells making it a key target for vaccine and antiviral drug development, according to the researchers*

June 22nd, 2020

<https://www.labmanager.com/news/new-models-of-covid-19-spike-protein-could-be-key-to-vaccine-23071>

<https://pubs.acs.org/doi/pdf/10.1021/acs.jpcc.0c04553>

[http://charmm-gui.org/?doc=demo&id=cov\\_2\\_s&lesson=1](http://charmm-gui.org/?doc=demo&id=cov_2_s&lesson=1)

## **Swab vs spit: researchers trial new saliva-based COVID-19 test**

17 JUN 2020

[https://www.biotechniques.com/coronavirus-news/swab-vs-spit-researchers-trial-new-saliva-based-covid-19-test/?utm\\_campaign=BioTechniques&utm\\_medium=email&hsmi=90289272&hsenc=p2ANqtz-99Jen2nWE7JwWAL5jJM5KRrAGSYsxHxOEeSxiSPYJkqvFsA6u66H1hTo6CUEfBhjRfze1ZzGEJ2xoVX59tyJMhV9nbiQ&utm\\_content=90289272&utm\\_source=hs\\_email](https://www.biotechniques.com/coronavirus-news/swab-vs-spit-researchers-trial-new-saliva-based-covid-19-test/?utm_campaign=BioTechniques&utm_medium=email&hsmi=90289272&hsenc=p2ANqtz-99Jen2nWE7JwWAL5jJM5KRrAGSYsxHxOEeSxiSPYJkqvFsA6u66H1hTo6CUEfBhjRfze1ZzGEJ2xoVX59tyJMhV9nbiQ&utm_content=90289272&utm_source=hs_email)

## **Study is first to identify potential therapeutic targets for COVID-19**

**Researchers profile the body's immune response in critically ill patients**

June 25, 2020

<https://www.lawsonresearch.ca/study-first-identify-potential-therapeutic-targets-covid-19>

## **Viruses Can Create Human-Virus Chimeric Proteins**

June 22, 2020

[https://www.genengnews.com/news/viruses-can-create-human-virus-chimeric-proteins/?utm\\_medium=newsletter&utm\\_source=GEN+Daily+News+Highlights&utm\\_content=01&utm\\_campaign=GEN+Daily+News+Highlights\\_20200622&oly\\_enc\\_id=3781B8250656B8W](https://www.genengnews.com/news/viruses-can-create-human-virus-chimeric-proteins/?utm_medium=newsletter&utm_source=GEN+Daily+News+Highlights&utm_content=01&utm_campaign=GEN+Daily+News+Highlights_20200622&oly_enc_id=3781B8250656B8W)

## **Mutating coronavirus: what it means for all of us**

June 23, 2020

[https://theconversation.com/mutating-coronavirus-what-it-means-for-all-of-us-140209?utm\\_medium=email&utm\\_campaign=Latest%20from%20The%20Conversation%20for%20June%2024%202020%20-%201659715978&utm\\_content=Latest%20from%20The%20Conversation%20for%20June%2024%202020%20-%201659715978+CID\\_e13ee3308895474a5022bac802052e8d&utm\\_source=campaign\\_monitor\\_uk&utm\\_term=Mutating%20coronavirus%20what%20it%20means%20for%20all%20of%20us](https://theconversation.com/mutating-coronavirus-what-it-means-for-all-of-us-140209?utm_medium=email&utm_campaign=Latest%20from%20The%20Conversation%20for%20June%2024%202020%20-%201659715978&utm_content=Latest%20from%20The%20Conversation%20for%20June%2024%202020%20-%201659715978+CID_e13ee3308895474a5022bac802052e8d&utm_source=campaign_monitor_uk&utm_term=Mutating%20coronavirus%20what%20it%20means%20for%20all%20of%20us)

 <https://www.ibs.re.kr/eng.do#popup>

## **New Coronavirus (SARS-CoV-2) Mapped Out**

A high-resolution gene map reveals many viral RNAs with unknown functions and modifications

[https://www.ibs.re.kr/cop/bbs/BBSMSTR\\_00000000738/selectBoardArticle.do?nttId=18344](https://www.ibs.re.kr/cop/bbs/BBSMSTR_00000000738/selectBoardArticle.do?nttId=18344)

## **Gilead Announces Results from Phase 3 Trial of anti-viral Remdesivir in Patients With Moderate COVID-19**

<https://www.gilead.com/news-and-press/press-room/press-releases/2020/6/gilead-announces-results-from-phase-3-trial-of-remdesivir-in-patients-with-moderate-covid-19>

## Gilead's Remdesivir Manufacturing Process

A long, linear chemical synthesis process that must be completed sequentially.

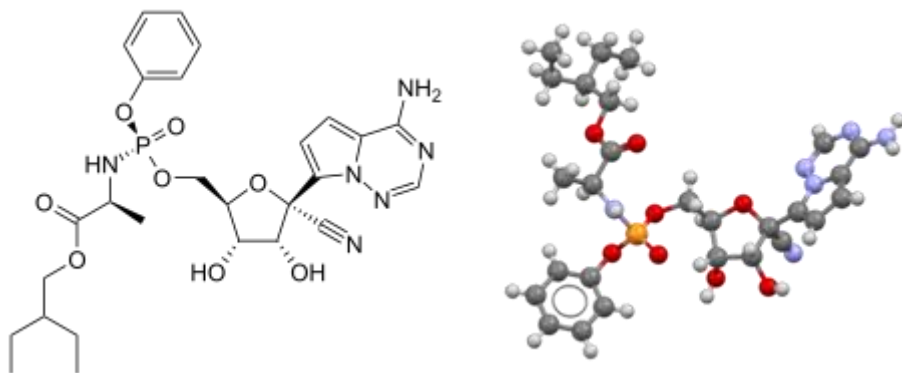
<https://www.gilead.com/purpose/advancing-global-health/covid-19/working-to-supply-remdesivir-for-covid-19>

## Gilead's remdesivir has seen success against the coronavirus. Now the company has to make enough to supply the world

April 30th

<https://www.statnews.com/2020/04/30/gileads-remdesivir-has-seen-success-against-the-coronavirus-now-the-company-has-to-make-enough-to-supply-the-world/>

## Remdesivir Structure



<https://pubchem.ncbi.nlm.nih.gov/compound/Remdesivir>

<https://www.acs.org/content/acs/en/molecule-of-the-week/archive/r/remdesivir.html>

<https://www.asbmb.org/asbmb-today/science/031720/what-makes-remdesivir-a-promising-antiviral>

## Remdesivir explained – what makes this drug work against viruses?

May 6, 2020

<https://theconversation.com/remdesivir-explained-what-makes-this-drug-work-against-viruses-137751>

## How far away is a coronavirus vaccine? Latest news on UK and US trials

the clinical trial at the University of Oxford is progressing well and, if it proves successful, the doses could be ready by the end of summer. 3 July 2020

<https://www.telegraph.co.uk/global-health/science-and-disease/coronavirus-vaccine-news-update-trials-uk-covid-19>

## **Oxford offers best hope for Covid-19 vaccine this year, MPs told**

University is leading rivals but first drugs may not work fully, says vaccine taskforce chair.

<https://www.theguardian.com/world/2020/jul/01/oxford-offers-best-hope-for-a-covid-19-vaccine-this-year-mps-told>

## **Trial of Oxford COVID-19 vaccine starts in Brazil**

28 JUN 2020

<http://www.ox.ac.uk/news/2020-06-28-trial-oxford-covid-19-vaccine-starts-brazil>

Hot off the press today as ICN goes publication:

### **Scientific America: Inside the Corona Virus**

Brilliant graphics, free for now or subscribe. Use page down for 1<sup>st</sup> link

[https://www.scientificamerican.com/interactive/inside-the-coronavirus/?utm\\_source=promotion&utm\\_medium=email&utm\\_campaign=coronavirus-interactive&utm\\_content=text&utm\\_term=SA\\_ENGMT\\_v1\\_s1&spMailingID=67262750&spUserID=NDc3MjA5ODI0OTM3S0&spJobID=1920115602&spReportId=MTkyMDExNTYwMgS2](https://www.scientificamerican.com/interactive/inside-the-coronavirus/?utm_source=promotion&utm_medium=email&utm_campaign=coronavirus-interactive&utm_content=text&utm_term=SA_ENGMT_v1_s1&spMailingID=67262750&spUserID=NDc3MjA5ODI0OTM3S0&spJobID=1920115602&spReportId=MTkyMDExNTYwMgS2)

<https://static.scientificamerican.com/sciam/assets/media/SARSCoV2-topspin.mp4>

<https://www.scientificamerican.com/article/a-visual-guide-to-the-sars-cov-2-coronavirus>



SFI Alert: 8 July 2020

## SFI Future Innovator Prize 2020

SFI is pleased to announce the launch of two new challenges each offering teams the opportunity to compete for **prize awards of €2M**.

The [SFI Food Challenge](#) will support the development of novel, potentially disruptive, sustainable STEM-led solutions to reduce food loss and waste across the full breadth of the food supply chain from “farm to fork”.

The [SFI Plastics Challenge](#) will support the development of innovative STEM-led solutions that will enable the sustainable use of plastics in a circular economy, restore and preserve our oceans’ health, and maximise how we use the Earth's finite resources.

We are pleased to confirm that our partnership with the Department of Foreign Affairs and Trade will be extended to support additional teams under these Challenges. Teams funded under this partnership will focus on delivering impact in countries where Ireland’s official development assistance is directed.

SESAME will open for applications at the end of July. The deadline for submission of applications to this call is **25 September 2020**.

Tel: +353 (0) 1 6073200

Email: [info@sfi.ie](mailto:info@sfi.ie)

[www.sfi.ie](http://www.sfi.ie)



SFI Alert: 15 July 2020

## SFI Frontiers for the Future 2020

Science Foundation Ireland is pleased to announce that the [SFI Frontiers for the Future 2020](#) Call is now open.

The SFI Frontiers for the Future Programme provides opportunities for independent investigators to conduct highly innovative, collaborative research with the potential to deliver impact, whilst also providing discrete opportunities for high-risk, high-reward research projects.

The Programme is divided into **Project** and **Award** streams. Projects will run as a fixed deadline call with a submission **deadline on 8th October 2020**. Awards will run as a rolling call and applicants will be free to submit applications **from 1st September 2020**.

Application forms will be available on SESAME shortly. An information webinar will be held on **Tuesday 28th July 2020**.

For more information on this Call, please visit [our website](#). All queries should be directed to [ffp@sfi.ie](mailto:ffp@sfi.ie).

Tel: +353 (0) 1 6073200

Email: [info@sfi.ie](mailto:info@sfi.ie)

[www.sfi.ie](http://www.sfi.ie)



SFI Alert: 21 July 2020

## Royal Society - SFI University Research Fellowship

### Upcoming deadline

The **Royal Society – SFI University Research Fellowship** scheme is for outstanding scientists based within eligible research bodies in the Republic of Ireland who are in the early stages of their research career and have the potential to become leaders in their field. It enables early career researchers to apply for up to five years' research funding including salary in the first instance, with the possibility to apply for competitive renewal for an additional three years.

The deadline for submission to the call is **3rd September 2020**. Please refer to the **Royal Society - SFI University Research Fellowship** scheme notes for details regarding programme remit, eligibility and application procedure.

Tel: +353 (0) 1 6073200

Email: [info@sfi.ie](mailto:info@sfi.ie)

[www.sfi.ie](http://www.sfi.ie)



## Irish diaspora leaders honoured with prestigious SFI St Patrick's Day Science Medal in Washington DC

MIT Robotics Pioneer, Prof Neville Hogan, and Intel Senior Vice President and General Manager, Dr Ann Kelleher, recognised for outstanding contributions to academia and industry

**Washington D.C., USA, 11th March 2020:** Science Foundation Ireland (SFI) has today presented the prestigious SFI St Patrick's Day Science Medal at a celebratory event in Washington D.C., to **Prof Neville J Hogan**, Sun Jae Professor of Mechanical Engineering and Professor of Brain and Cognitive Sciences at Massachusetts Institute of Technology (MIT), and **Dr Ann B Kelleher**, Senior Vice President (SVP) and General Manager at Intel, for their significant scientific contributions to academia and industry.



Now in its seventh year, the SFI St Patrick's Day Science Medal is awarded annually to US-based scientists, engineers or technology leaders with strong Irish connections, as chosen by an independent selection committee. The Medal recognises Prof Hogan and Dr Kelleher's significant roles in supporting and engaging with the research ecosystem in Ireland.

Recipient of the **SFI St Patrick's Day Science Medal for Academia**, Prof Hogan is regarded as the father of rehabilitation robotics. Born in Dublin, Ireland, he graduated from Dublin Institute of Technology (now TU Dublin) in 1970, before going on to receive a degree and an MSc in Mechanical Engineering, and then a PhD in Mechanical Engineering, all from Massachusetts Institute of Technology. As a professor in MIT's Department of Mechanical Engineering and Department of Brain and Cognitive Sciences, Prof Hogan is one of the few faculty members at MIT to have appointments both in the School of Engineering and School of Science.

Upon receiving the award, **Prof Hogan** said: "I am honoured to accept the SFI St Patrick's Day Academic Medal, which not only recognises my work, but also the strong Irish connections across the research community in the U.S. Working at the forefront of robotics to progress knowledge and discovery with the potential to transform our societies and economies, I am very proud of my Irish roots. The strong Irish commitment to education is a major factor in the success of Irish people everywhere. I hope US-Ireland



research collaborations will continue to grow, as it is through these cross border, multi-team partnerships that we will generate greater convergence and new innovations.”

Prof Hogan’s contribution to the area of robotic therapy, to improve movement after stroke, has inspired many researchers worldwide and now extends into rehabilitation for people with spinal cord injury, Parkinson’s disease, multiple sclerosis and cerebral palsy. He has an outstanding record of highly influential publications, with over 42,000 citations, and his research has led to eight patents. Prof Hogan heads the Eric P and Evelyn E Newman Laboratory for Biomechanics and Human Rehabilitation and has previously been awarded the Silver Medal of the Royal Academy of Medicine in Ireland, and an Honorary Doctorate in 2004 from TU Dublin. He also serves on the Board of the TU Dublin Foundation.

Recipient of the **SFI St Patrick’s Day Science Medal for Industry**, Dr Ann B Kelleher, Senior Vice President and General Manager at Intel, has had an outstanding scientific and technical career. Originally from Macroom, Co. Cork, she achieved First Class honours in Engineering in 1987 and a MEng in 1989 from University College Cork. In 1993, Dr Kelleher became the first female to receive a PhD from the National Microelectronics Research Centre (NMRC), the forerunner of Tyndall National Institute. She was the first Irish woman in the history of Intel to be named as a Vice President, and she maintains strong links to Ireland, making significant contributions across several areas.

Welcoming the award, **Dr Kelleher**, said: “I am honoured to accept the SFI St Patrick’s Day Industry Medal for my work at Intel. I am a firm advocate for industry collaboration between Ireland and the United States, given my career with Intel began in Leixlip. The benefits and positive impact of this collaborative relationship are considerable. This is evidenced by the long and fruitful collaborative research engagement between Tyndall, multiple SFI Research Centres and US multinationals. These relationships present significant opportunities for people in Ireland to work and prosper in major multinational companies such as Intel. I hope that awards such as this will also highlight the career paths available to young women who have an interest in working in STEM.”

Dr Kelleher was appointed to the Tyndall National Institute Board of Directors in 2012 and since 2014 is an Adjunct Professor in the Engineering Department, University College Cork. Dr Kelleher has also been a strong role model and advocate for gender equality, and for women working in engineering roles and senior management positions in the tech industry. She has provided leadership to Women in Science initiatives and in 2015 she was elected as a Fellow of Engineers Ireland. In 2018 she was one of 25 women recognised in the "Ireland's Most Powerful Women Awards."

**Prof Mark Ferguson, Director General, Science Foundation Ireland and Chief Scientific Adviser to the Government of Ireland**, congratulated the Medal recipients, saying: “The SFI St Patrick’s Day Science Medal shines a light on the incredible achievements and diversity of Irish researchers in the diaspora. As we continue to advance Ireland’s society and economy through excellent ground-breaking research and technology, the forging of strong international collaborations remains vital. US-Ireland research collaborations generate new insights and create significant value to both countries, their academic communities and industry. I am delighted to see two highly deserving recipients in Prof Hogan and Dr Kelleher, whose leadership, vision and passion are helping to address significant national and global societal challenges.”

Wilton Park House, Wilton Place,

D02 NT99, Ireland. +353 (0)1 607 3200 info@sfi.ie

## President Higgins honours SFI President of Ireland Future Research Leaders

**Dublin, Ireland, 2 March 2020** – President of Ireland Michael D. Higgins, has today honoured ten recipients of the SFI President of Ireland Future Research Leaders Award at a special ceremony in Áras an Uachtaráin, Dublin. The SFI President of Ireland Future Research Leaders Programme recruits and retains outstanding and emerging early career research leaders with exceptional accomplishments in scientific and engineering domains. The research areas awarded span human health in the areas of lung disease, ageing, traumatic brain injury, bowel and gastrointestinal diseases and sensors for prosthetics to environmental projects in the area of barley production and marine bioresources to understanding the impact of the Sun on the Earth using advanced data analytics.



*The SFI President of Ireland Future Research Leaders Award Ceremony held at Áras an Uachtaráin on 2 March, 2020 celebrates the success of the ten award recipients. The SFI Future Research Leaders programme recruits and retains outstanding early career researchers in scientific and engineering domains, with a focus on research excellence with impact to Ireland. President Michael D. Higgins congratulates Future Research Leader Awardee Caitriona Jackman, Honorary Professor, DIAS.*

As a strong supporter of the sciences and advocate for equal access to learning for all members of our society, President Higgins has for many years promoted the positive contribution made by our creative and innovative scientists. The President continues to recognise the important role science has in empowering people to explore, innovate and collaborate for a better future.

The ten awards represent an investment of €15 million, with a duration of five years each, and will also support the additional recruitment of 40 research positions, including 18 PhD students, 15 postdocs and seven research assistants. There are four awardees based in Trinity College Dublin (TCD), three in University College Dublin (UCD), two in Maynooth University (MU) and one in Dublin Institute for Advanced Studies (DIAS).

**Dr Ruth Freeman, Director of Science for Society, Science Foundation Ireland** said “*Science Foundation Ireland’s overarching aim is to contribute to the betterment of our society and economy through the transformative research we support. The SFI President of Ireland Future Research Leaders*

*Award recognises outstanding new research leadership and talent. I am delighted to see the ten awardees choosing to come to Ireland to continue their work and congratulate them on their achievements. We are dedicated to supporting research leaders with ideas to drive innovation and assist Ireland and the world in meeting the many challenges we face, from climate change, supporting healthy ageing and understanding the universe."*

Many of the awards support research in areas related to health such as Chronic Obstructive Pulmonary Disease, the fourth leading cause of mortality in Ireland, and Eosinophilic oesophagitis (EoE), a chronic allergic gastrointestinal disorder which currently has no known cure. The awards will also support the design and development of artificial touch/tactile sensors to improve robotic and prosthetic grippers (e.g. artificial hands), and the development of a blood test to diagnose brain injury and to improve traumatic brain injury outcomes. The development of new therapies for lung cancer will be addressed by applying the latest genomic technology CRISPR-Cas9. Potential new treatments for Inflammatory Bowel Diseases will be investigated as well as improving quality of life for the elderly by applying big data to help diagnose frailty and develop smart devices that can assist our ageing population.

The awards also support research focused on agriculture and the marine, for example utilising drones and artificial intelligence to improve and secure the future of barley production against the onslaught of climate change. Biofuels, seaweed aquaculture in particular, will be investigated in terms of climate change mitigation and the potential application of alginate for the treatment of osteoarthritis. The Future Research Leaders Awards is also supporting research into Space. Data analytics and machine learning will be applied to large data catalogues to help understand the impact that the Sun has on the Earth and beyond.

The awardees are: Honorary Prof Caitriona Jackman, recruited from University of Southampton (UK) to DIAS; Assistant Prof Eoin McNamee, recruited from University of Colorado to MU; Assistant Prof Joanne Masterson, recruited from University of Colorado, Denver (USA) to MU; Assistant Prof Suzanne Cloonan, recruited from Weill Cornell Medical College, New York (USA) to TCD; Assistant Prof David Loane, recruited from University of Maryland School of Medicine (USA) to TCD; Associate Prof Nessa O'Connor, recruited from Queens University Belfast to TCD; Associate Prof Roman Romero-Ortuno recruited from Addenbrooke's Hospital in Cambridge to TCD; Dr Rory Johnson recruited from University of Bern, Switzerland to UCD; Assistant Prof Sónia Negrão recruited from the King Abdullah University of Science and Technology in Saudi Arabia to UCD; and Associate Prof Stephen Redmond was recruited from University of New South Wales (AUS) to UCD.

## Summary of Awardees:

### Honorary Prof Caitriona Jackman, DIAS

**Title:** *Data analytics and machine learning in Space Science*

On receiving the prestigious award Prof Caitriona Jackman said: *"I am delighted to receive this award and excited about joining the vibrant research community at DIAS. My SFI-funded programme will allow knowledge exchange between academia, industry, and the general public on topics from Space Weather to machine learning. I look forward to recruiting my team of talented PhD students and postdocs to engage in curiosity-driven research at the interface of Space Physics and Data Science."*

**Summary:** Space Physics involves studying data from orbiting spacecraft and telescopes, some of which have been recording data continuously for years. We have a huge catalogue of observations in our solar system, with a particularly large amount of data focusing on Earth, where the Sun can have an influence on the magnetic field and plasma (charged particle) environment with implications for satellites and other space-based technology. We live in an era where computer analysis techniques are becoming more

sophisticated. This work will apply advanced data analytics to large data catalogues to understand the impact the Sun has on Earth and beyond.

**Biography:** Dr Jackman (BSc in Applied Physics, Univ. of Limerick, 2003 and PhD 2006, Univ. of Leicester) holds the position of Honorary Professor at DIAS, having previously been an Associate Professor at the University of Southampton. Prior to this, she held research fellowships at Imperial College and University College London. She is a Fellow at the Alan Turing Institute, the UK's National Institute for Data Science and Artificial Intelligence. At the heart of her research is Space Plasma Physics in our solar system and beyond. Dr Jackman's research interests include large-scale structure of giant planet magnetospheres, the energy budget of Earth's magnetosphere, machine learning and complexity science. She has worked with data from missions including NASA's Cassini at Saturn, ESA's Cluster mission in orbit around Earth, NASA's Juno at Jupiter, and with data from the Hubble Space Telescope, and the Chandra X-ray Observatory.

**Award Value:** €1,325,539

### Assistant Prof Joanne Masterson, MU

**Title:** *Transcriptional Mechanisms Controlling Epithelial Cell Fate Determination during Allergic Oesophageal Inflammation in Eosinophilic Oesophagitis*

On receiving the prestigious award Dr Joanne Masterson said: *“Receiving this prestigious SFI President of Ireland Future Research Leaders Award has allowed me to move the research programme that I had established at the University of Colorado School of Medicine back to Ireland, and recruit an international and interdisciplinary team of researchers to work together on our state-of-the-art, globally competitive research. This will place Ireland at the forefront of global research into the development of Eosinophilic Oesophagitis and will support the scientific talent of tomorrow in this challenging area of rapidly emerging allergic diseases.”*

*“It is even more exciting that I get to share this day with my husband Eoin McNamee who is also receiving his own Future Research Leader Award today. These awards allow us to continue our scientific journeys together, that began over 20 years ago as curious and determined undergraduate science students at Maynooth University.”*

**Summary:** Eosinophilic oesophagitis (EoE) is a chronic clinicopathologic allergic gastrointestinal disorder, and an increasing clinical problem. Although immense efforts have been invested in understanding the clinical course and natural history of this emerging disease, to date there is a paucity of therapeutic modalities and no cure. Understanding the molecular mechanisms of how hypoxia, and the novel and directly translatable target HIF-1 $\alpha$  (hypoxia-inducible factor), drives regenerative morphogenic machinery in the oesophagus is an attractive avenue to target therapeutically. Upon completion, this project would lead to a paradigm-shift in our current concepts about the failure to resolve maladaptive epithelial responses in EoE.

**Biography:** Dr Joanne Masterson is an Assistant Professor in the Department of Biology and the Kathleen Lonsdale Institute for Human Health Research at Maynooth University where she leads the Allergy, Inflammation and Remodelling Research (AIRR) laboratory. With the support of the SFI President of Ireland Future Research Leaders award her lab has relocated from University of Colorado School of Medicine (USA) where Joanne completed a decade of research in epithelial immunobiology and holds an Adjoint Assistant Professor position in the Department of Paediatrics. Dr Masterson has a long-standing interest in defining novel mechanisms of mucosal inflammation and healing, specifically related to eosinophilic gastrointestinal diseases (EGIDs), such as Eosinophilic Esophagitis (EoE) and Inflammatory Bowel Disease. Dr Masterson has been the recipient of major awards including Crohn's & Colitis Foundation of America Fellowship, North American Society for Paediatric Gastroenterology and

Nutrition Career Development Award and a National Institutes of Health Scientist Development Award and is involved in a number of pre-clinical studies examining novel EoE treatments.

**Award Value:** €1,572,600

### Assistant Prof Eóin McNamee, MU

**Title:** *MicroRNA control of Mucosal Inflammation*

On receiving the award, Dr Eóin McNamee said: *"I am delighted to receive the SFI President of Ireland Future Research Leaders award which will allow me to establish a cutting-edge research program at Maynooth University. This substantial funding will enable me to recruit an interdisciplinary team of scientists to explore the underlying causes of inflammatory bowel diseases and to test novel therapeutic approaches."*

**Summary:** The inflammatory Bowel Diseases (IBD; namely Crohn's disease & Ulcerative Colitis) affect ~2.5 million people in Europe (>40,000 in Ireland), with limited treatment options and no cure. A prevailing theory for the progression of IBD is that our immune system becomes hyper-activated and gradually attacks the intestinal tissue, limiting treatment response. Work from the McNamee laboratory has defined how molecular breaks, known as microRNA's, constrain the intestinal immune response and have the capacity to drive mucosal healing. This proposal will combine start-of-the-art immunologic studies using patient samples with novel transgenic preclinical models to define how microRNA circuits shape the intestinal immune response. Novel therapeutics based on microRNA-targets will be tested for their ability to reverse immune-mediate damage and to elicit tissue healing during IBD. Inflazome Ltd. is an industry collaborator on this project.

**Biography:** Dr Eóin McNamee was an Assistant Professor at the University of Colorado - School of Medicine (USA) and was recruited to Maynooth University in 2018, where he is the Principle Investigator of the Mucosal Immunology Research Lab. A graduate of Maynooth University (B.Sc. 2003) and Trinity College Dublin (M.Sc. 2004, PhD 2008), he carried out postdoctoral training at the University of Colorado in Denver. His research program investigates the mechanisms of autoimmune and immune mediated disease with a particular focus on inflammatory bowel diseases. Translational immunology studies in this program have been funded by grants from the Crohn's & Colitis foundation of American (Research Fellowship; Career Development award; Senior researcher award) and the National Institutes of Health, USA (R01)

**Award Value:** €1,488,046.

### Assistant Prof Suzanne Cloonan, TCD

**Title:** *The "Ironome" of the Lung and Disease Pathogenesis*

On receiving the SFI President of Ireland Future Research Leaders award Dr Suzanne Cloonan said: *"I am delighted and honoured to receive this prestigious award. It has allowed me to develop a cutting-edge interdisciplinary research programme at Trinity College Dublin, to understand and develop new treatment approaches for Chronic Obstructive Pulmonary Disease (COPD), a debilitating chronic lung disease that remains the fourth leading cause of death in Ireland. This work will not only place Ireland on the map for world-class COPD research but will also raise much needed awareness for COPD and COPD-related research."*

**Summary:** As the fourth leading cause of death in Ireland, Chronic Obstructive Pulmonary Disease (COPD) remains an incurable, inflammatory lung disease that is hard to diagnose early and has few therapeutic treatment options. Work from the Cloonan laboratory has identified that iron metabolism pathways are dysregulated in the lungs of COPD patients and that targeting these pathways may hold

promise for the development of new therapies for COPD. In particular, the Cloonan lab will decipher where in the lung this iron accumulates and how this excess of iron may promote the growth of bad bacteria rendering COPD patients more susceptible to infections. AstraZeneca is an industry collaborator on this project.

**Biography:** Dr Cloonan is an Assistant Professor of Biochemistry in Medicine at Weill Cornell Medical College, Cornell University, New York City. Dr Cloonan received her PhD in Biochemistry in 2010 from the University of Dublin, Trinity College Ireland. She carried out her Post-Doctoral training in Dr Augustine MK Choi's laboratory in Brigham and Women's Hospital, Harvard Medical School, Boston. In 2014, she moved to Weill Cornell Medicine and obtained the prestigious Pathway to Independence Award (K99/R00) from the National Institute of Health, as well as a Biomedical Research Grant from the American Lung Association. Dr Cloonan's independent research programme is focused on applying cutting edge approaches to understand iron metabolism pathways in normal and diseased lung; related to inflammation, alveolar epithelial cell biology and host-pathogen interactions in the lung microenvironment. Dr Cloonan is also an Associate Editor for the Journals Scientific Reports and Respiratory Research and serves on the Respiratory, Cell and Molecular Biology Program Committee for the American Thoracic Society. The Cloonan Lab, relocating from Cornell to Trinity College Dublin will help to develop and strengthen lung disease research in Ireland, promoting interdisciplinary research between respiratory medicine and basic science.

**Award Value:** €1,587,525

### Assistant Prof David Loane, TCD

**Title:** *NOX2 and the chronic pathologies of traumatic brain injury (TBI) - Integrating basic and translational research to improve TBI outcomes*

Dr David Loane is researching traumatic brain injury and sustained brain inflammation linked to dementia and chronic neurodegeneration. He welcomed the award saying: *"I am delighted to receive the SFI President of Ireland Future Research Leaders Award. It has enabled me to set up a state-of-the-art experimental brain injury lab in Trinity College Dublin to investigate fundamental questions about brain health and functional recovery after traumatic neural injury. It also allows me to recruit talented international researchers to Ireland and train the next generation of young scientist and research leaders in the frontiers field of neuroimmunology."*

**Summary:** Traumatic brain injury (TBI) has been linked to dementia and chronic neurodegeneration. Described initially in professional boxers and currently recognised across high contact sports (e.g. American Football, Rugby Union), the association between repeated concussion (mild TBI) and progressive neuropsychiatric abnormalities has received widespread media coverage. The role of sustained brain inflammation has received less attention, even though this association has been established pathologically since the 1950's. These pathological mechanisms, manifested by extensive microglial activation, may be among the most important causes of posttraumatic neurodegeneration. Identifying the causes of chronic microglial activation following TBI may allow the development of novel biomarkers and therapeutic strategies for TBI and its related dementias.

**Biography:** Dr David Loane is the recipient of the J. Stephen Fink, MD, PhD, American Society for Experimental NeuroTherapeutics (ASENT) Fellowship Award and an Early Stage Investigator Award from National Institutes of Neurological Diseases (NIH). His pre-clinical TBI research programme in the United States was funded by two major R01 grants from NIH and Department of Defense contracts. The Loane Lab identified NOX2, an enzyme system responsible for the production of reactive oxygen species in phagocytes, as a mechanistic driver of chronic microglial activation following TBI. Ongoing research is developing novel ways to selectively inhibit NOX2-mediated neuroinflammation after TBI to rejuvenate neuroimmune responses and enhance functional recovery. The Loane Lab recently relocated from

University of Maryland School of Maryland, Baltimore, MD, where David worked for nine years. Now based in the School of Biochemistry and Immunology, Trinity College Dublin, Dr Loane has established a state-of-the-art pre-clinical research laboratory to study the neuroimmunology of TBI and related dementias with the generous support of the SFI President of Ireland Future Research Leaders Award.

**Award Value:** €1,587,818

### Associate Prof Nessa O'Connor, TCD

**Title:** *Beyond biofuel: Advanced seaweed cultivation for marine biodiscovery and climate change mitigation*

On receiving the prestigious award Dr Nessa O'Connor said: *"I am truly honoured to receive this award and immensely excited to continue our work with a growing team at Trinity College. We will use ecological knowledge to unlock the potential of Ireland's marine resources. By cultivating seaweed to harness products for bioengineering and biofuels, we will be helping to develop new tools for the treatment of debilitating diseases, such as osteoarthritis, while also combating climate change by enhancing carbon sequestration and also enriching local coastal habitats."*

**Summary:** Improving human health and discovering new sources of clean energy are among the most pressing challenges we face as a society. We can tackle such challenges by exploring the potential of marine bioresources. We will identify new methods of growing seaweed (aquaculture) to harness alginate for the treatment of osteoarthritis while also harnessing biofuels. We will also test whether cultivated seaweed can protect shellfish from expected changes in ocean chemistry. Seaweed aquaculture offers vast opportunities to mitigate and adapt to climate change and we will quantify the potential role of seaweed farming, thus, transitioning to a low-carbon and climate-resilient society.

**Biography:** Dr O'Connor (PhD 2004, UCD) is an Associate Professor at TCD, where she is heading the O'Connor Lab. Following her PhD, she carried out postdoctoral research at the University of North Carolina at Chapel Hill before returning to Ireland to work as a postdoc at UCC. Following a brief return to UCD, she secured a Lectureship at Queen's University Belfast, where she worked for seven years and established her lab before moving it to TCD. She is pioneering the exploration of the cultivation of seaweed aimed at reducing reliance on fossil fuels. Her research is focussed on understanding relationships between biodiversity and ecosystem services, developing sustainable aquatic resources and the dynamics of coastal ecosystems.

**Award Value:** €1,374,384

### Associate Prof Roman Romero-Ortuno, TCD

**Title:** *FRAILMatics: Mathematical research and big data analytics towards the development of the next generation of transdisciplinary diagnostics for the assessment of physiological vulnerability in older adults: challenge-based disruptive technology initiative*

On receiving the prestigious award Associate Professor Roman Romero-Ortuno said: *"I am delighted to have received this SFI President of Ireland Future Research Leaders award. This makes me immensely proud as an academic geriatrician and I thank SFI for recognising the crucial importance of investment in interdisciplinary Ageing Research. As a clinician scientist, this award will enable me to build the human and computational capability to investigate a highly complex issue that is of immense importance to our ageing society."*

**Summary:** Increasing numbers of older people live with frailty. A frail person is vulnerable to complications from illnesses or medical procedures. Early recognition of frailty could prevent or delay poor outcomes, but diagnostics to recognise early frailty are limited. The Irish Longitudinal Study on

Ageing (TILDA) has collected detailed information on participants' health by monitoring body systems, including under stress conditions. TILDA offers the opportunity to mine this unexplored "big data". We aim to discover new frailty signals/models, confirm them in real patients, and pave the way towards smart devices that could detect early frailty, helping achieve longer lives without disability.

**Biography:** Dr Romero-Ortuno (PhD 2011, TCD) is now an Assistant Professor in Medical Gerontology at TCD and a Consultant at St James's Hospital. He carried out his medical training in Barcelona before taking an MSc in social policy at the London School of Economics. He also has a music degree from the Conservatory of Barcelona. Dr Romero-Ortuno carried out postdoctoral medical training in Manchester and London before working in a number of Dublin's hospitals to complete his higher medical training. He spent four years at Addenbrooke's Hospital in Cambridge as a Consultant Geriatrician before returning to Dublin to take up his current post in 2018. His research contributions in the area of frailty have been recognised with the 2015 British Geriatrics Society Rising Star Award and the 2017 Count of Cartagena Award from the Royal National Academy of Medicine of Spain.

**Award Value:** €1,525,970

### Dr Rory Johnson, UCD

**Title:** *Discovering non-protein-coding vulnerabilities in lung cancer with CRISPR-Cas9*

On receiving the prestigious award Dr Rory Johnson said: *"I am delighted to receive the President of Ireland Future Research Leaders award from SFI. It provides for a long-term research programme in crucially important areas of genome engineering, noncoding RNAs and cancer research. I believe that this work will make a positive impact on Irish society, by developing new technologies, fostering scientific talent, and advancing towards more effective treatments for disease."*

**Summary:** Lung cancer is one of the greatest single causes of death in Ireland today, but we still lack effective therapies. This project aims to discover new types of genes that promote lung cancer, develop drugs to inhibit their activity, and thereby kill tumours. The project depends on the latest CRISPR-Cas9 "genome-engineering" technology, which allows one to delete genes from a cell's DNA and thus test thousands of potential drug targets in a single experiment. In summary, this project aims to develop new therapies for lung cancer by applying the latest genomic technologies.

**Biography:** Dr Johnson has moved to UCD from the University of Bern in Switzerland. Following his Wellcome Trust-funded PhD at the University of Leeds (2007), he carried out postdoctoral work at the Genome Institute of Singapore, before moving to the Centre for Genomic Regulation in Barcelona, where he was supported by a Ramon y Cajal fellowship. In 2016 he established the Laboratory for Genomics of Long noncoding RNAs in Disease (GOLD Lab) in Bern, as the first Junior Group Leader of the Swiss National Centre for Competence in Research in RNA and Disease. Most recently, he participated in the landmark "PanCancer Analysis of Whole Genomes" project from the International Cancer Genome Consortium. His research programme focusses on the enigmatic, recently-discovered class of genes in the human genome, termed "long non-coding RNAs" (lncRNAs), and their roles in disease. His expertise sits at the interface of computational and experimental biology.

**Award Value:** €1,546,106

### Assistant Prof Sónia Negrão, UCD

**Title:** *Looking into time - how abiotic stress impacts barley production and malting quality*

On receiving the award Dr Sónia Negrão said *"I am delighted and honored to receive this prestigious award from President Michael D. Higgins. I am extremely thankful for the SFI President of Ireland Future Research Leaders Award as a recognition of my research potential. I am looking forward to*



*contributing to a more sustainable production of barley in Ireland in the face of climate change and strengthening Ireland's international reputation in Plant Science"*

**Summary:** Barley is the key ingredient for the production of beer and whiskey. Climate change is driving the occurrence of extreme weather events resulting in elevated rainfall that severely adversely affects barley production. These yield reductions will significantly impact the malting industry, with forecasts estimating a sharp rise in beer and whiskey prices. Modern varieties of barley have lost their protection against such environmental conditions, yet heritage barley has these tolerance features. Here we combine advanced genomic techniques with imaging platforms, using drones and artificial intelligence, to quantify the effects of waterlogging in heritage varieties and secure future barley production.

**Biography:** Dr Negrão (PhD 2008, Universidade Nova de Lisboa) is an Assistant Professor at UCD, having moved to Ireland in 2018. Following her PhD, she carried out postdoc work between Lisbon and the Philippines before moving to the King Abdullah University of Science and Technology in Saudi Arabia to take up the role of Research Scientist for five years. Her research focusses on the genetics and genomics of plants and how these can be utilised in plant breeding. She concentrates on the genomic signatures of stress adaptation by performing association models using naturally occurring genetic diversity and high-throughput phenotyping.

**Award Value:** €1,466,217

### Associate Prof Stephen Redmond, UCD

**Title:** *Design of tactile sensors for robotic and prosthetic grippers inspired by human touch*

On receiving the prestigious award Associate Professor Stephen Redmond said: *"I feel privileged to receive this prestigious award, which allows me to return home to Ireland to join the excellent and rapidly growing biomedical engineering program at UCD. I will contribute to that growth by establishing a world-leading research group working at the frontiers of tactile physiology, tactile sensor design, and autonomous robotic manipulation. I am grateful that Science Foundation Ireland has invested in this ambitious project, and I am confident that we will deliver scientific impact for the world and economic impact for Ireland. We are at the start of a revolution in autonomous robotics, and Ireland will play an active role."*

**Summary:** Prosthetic and robotic hands often drop objects. While we have learned more about the science of how humans feel the slipperiness of an object, there is still much to learn. Given how little we know, it is unsurprising that there are no touch sensors for artificial hands which can practicably sense friction. This research aims to study how humans feel friction, and subsequently build artificial touch sensors which can do the same. The friction-based tactile sensors developed during this project would endow artificial hands with the ability to feel the slipperiness, significantly advancing the fields of prosthetics and autonomous robotics.

**Biography:** Associate Prof Redmond completed his Bachelor of (Electronic) Engineering in 2002, and his PhD on the topic of at-home sleep staging in 2006, at University College Dublin (UCD). In 2008, he moved to the Graduate School of Biomedical Engineering at the University of New South Wales (UNSW) in Sydney, Australia, where he spent 10 years. There he held a prestigious Australian Research Council Future Fellowships award from 2014 to 2018. He is now at the School of Electrical and Electronic Engineering at UCD and holds an Adjunct Associate Professorship at UNSW. Generally, he is interested in the development of novel sensors and sensing systems, and also in the subsequent application of signal processing and pattern recognition techniques to these signals to solve or better understand biomedical engineering problems. The main application areas of these research methodologies include remote management of health, human movement measurement, and tactile sensing and physiology.

**Award Value:** €1,479,655



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To celebrate **International Women's Day 2020** SFI asked some of the recent SFI President of Ireland Future Research Leaders to tell us about their experiences as women working in STEM



Nessa O'Connor, TCD; Sonia Negrão, UCD; Caitriona Jackman, DIAS; Joanne Masterson, MU; Ruth Freeman, SFI; Suzanne Cloonan, TCD; President Higgins, centre

### **Dr Sonia Negrão, Assistant Professor at UCD**

I fell in love with genetics as a high-school student while studying Mendel's genetic laws. From there, I decided to study plant sciences and was always very encouraged by my family. I only realised the importance of women in STEM when at the end of my undergraduate degree, and while starting my research project, I noticed that almost all PIs were male. In my case, I was fortunate to have a strong female role model as a PhD supervisor, Prof Margarida Oliveira from ITQB-Nova (Portugal). Today, I follow in her footsteps and always welcome all students. My advice to young female researchers is to never ever lose your passion for science, the awe in all the little discoveries, and to always continue even after those hard days.

*I believe that as women, our passion, emotional intelligence and curiosity of always wanting to know the why's will be rewarded."*

### **Dr Joanne Masterson, Assistant Professor at MU**

Find your scientific passion and pursue it with gusto. It's a long career so have fun. Be creative, you are the painter and your career is a blank canvas awaiting your talents and inspiration.

*"Focus on the positives, and find great mentors, advocates, and colleagues to help build you up and keep you on track. They will be your sunshine after the storms."*

### **Dr Caitriona Jackman, Honorary Professor at DIAS**

I love working in Space Science: the excitement of analysing data from a spacecraft around a distant planet for the first time, and the opportunity to collaborate with international teams of highly motivated, creative and inspiring people. There have been challenges throughout my career, most recently centred around combining parenthood and work. I submitted my application for my SFI award 10 days before giving birth to my second child, and much of my interview preparation was done while pushing my newborn's buggy around the park! I am lucky to have a supportive family who encourage me and give me perspective about what is most important in life.

*"What drives my career is my passion for my subject and the thrill of seeking new knowledge every day."*



**Happy International Women's Day**



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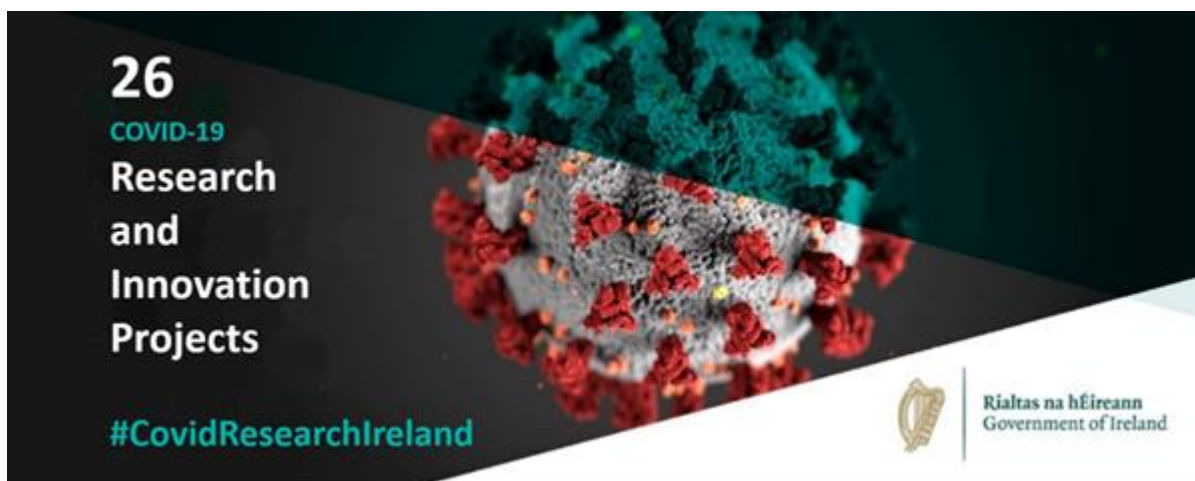
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## Government announces 26 new COVID-19 research and innovation projects to complement existing third-level research activity

Projects will address key areas such as frontline healthcare, diagnostics, infection control, contact tracing, mental health, potential treatments, and management of the mitigation measures related to social distancing and isolation.

**Wednesday, 29 April 2020** – The Government today announced details of the first 26 projects that will receive €5 million funding under the newly-established national, coordinated research and innovation response to the COVID-19 pandemic, complementing the ongoing research work already underway in higher education institutions

Speaking at today's announcement, **Minister for Business, Enterprise and Innovation, Heather Humphreys TD** said: "Research, development and innovation will play a significant role in tackling the COVID-19 pandemic. The projects announced today are part of a national drive to find solutions to the challenges we face. Right across the country, our research community in our higher education institutions and businesses, both indigenous and foreign owned, have mobilised to address these key issues. The projects announced today, which take in health and social care as well as policy and industry, will help to address how we can ease the restrictions over time and get the country back up-and-running again."

The research projects are part of a broader initiative by the Irish State to mitigate and manage the COVID-19 pandemic by unlocking the potential of Irish based researchers and innovators, and to complement

similar work around the world. All of the projects were internationally peer reviewed at the assessment stage.

More than 350 applications were received with these final 26 proving successful.

The 26 projects cover a huge range of areas including:

- Creating a secure, reliable supply of high-quality reagents to enable large-scale testing
- Producing PPE for frontline health staff using state-of-the-art 3D printing equipment.
- Tracking the genetics of the COVID-19 virus in Ireland
- Online resources to support healthcare professionals who have answered Ireland's call for COVID-19
- Why don't we keep our distance? Evidence for more effective communication in the pandemic
- Getting a measure of silent infection: a key to COVID-19 recovery planning

**Minister for Health Simon Harris** said: "Research and development is critical to supporting Ireland's National Action Plan in response to COVID-19 and in navigating a way forward for individuals, communities and society as a whole. In these extraordinary circumstances, I am delighted to see such collaboration and coordination in a collective battle against COVID-19. These projects have real potential to have an impact on the health and wellbeing of patients, families, healthcare workers and the healthcare system. In particular, having suitable treatments or vaccines is the best exit strategy from COVID-19 and the related restrictions we are living with so I am committed to ensuring a coordinated and proactive approach is taken to ensuring that COVID-19 patients across all settings in Ireland have access to new and emerging treatments as part of clinical trials."

This initiative is overseen by a coordinated Rapid Response Research, Development and Innovation programme established by Science Foundation Ireland (SFI), Enterprise Ireland, IDA Ireland, the Health Research Board (HRB) and Irish Research Council (IRC).

**Minister for Training, Skills, Innovation, Research and Development, John Halligan** said "I want to acknowledge the ongoing support from the higher education institutions and researchers across the country that have undertaken a vast array of actions to support and deal with the challenges we face. Research, development and innovation will have a significant role to play in our response to Covid-19. Governments around the globe have also rapidly mobilised research in tackling the crisis, and the opportunities being provided to our research community will ensure a coordinated and meaningful contribution to solving some of the challenges we are presented with during the current crisis. It is through sustainable investment in research that we will beat Covid-19 and future pandemics, as well as generate the insight and understanding to support responsive social, economic and cultural policies. In response to the pandemic, researchers right across higher education and all disciplines have self-mobilised to re-direct research activity toward the national response to COVID-19. The current situation has brought to light very many examples of relevant research being undertaken in higher education. Research projects already underway have been re-purposed to solve multiple challenges arising: the stories below demonstrating, as well naturally as health and medical research, the role of ICT research, psychology, law, and many other disciplines, in Ireland's COVID-19 response. This highlights the value of the broad-based research which is underpinned by the core investment in our higher education sector and which provides the bedrock of Ireland's public research system."

Researchers across higher education and all disciplines have self-mobilised to re-direct research activity toward the national response to COVID-19. All of our universities and institutes of technology have developed research, innovation and/ or technical assistance projects that are adding significantly to the national effort to combat the virus and assist us on the path to recovery. A Research sub-group of the Senior Officials Group has been working to facilitate an exchange of views across Government and provide an overview of research programmes, priorities, and gaps relating to the evolving COVID-19 pandemic.

[Full list of approved projects is available here](#)

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SFI Alert: 14 May 2020

## SFI Frontiers for the Future 2020 Call

### Advance Notice

SFI is pleased to advise that the SFI Frontiers for the Future Programme 2020 Call will launch in July.

The structure of the programme, including eligibility criteria and information required for the application will be similar to the 2019 Call. Again, female candidates are strongly encouraged to apply.

In this Call, SFI Research Centre co-PIs will **not** be precluded from applying, subject to all other eligibility criteria being met.

SFI will be inviting full proposal applications only and will **not** have a pre-proposal stage.

The programme will once again be divided into Project and Award streams. Projects will run as a fixed deadline call with a deadline in the Autumn (early October). Awards will run as a rolling call and applicants will be free to submit applications at any time from 1st September 2020.

More information will follow in the coming weeks. Please direct all queries to [ffp@sfi.ie](mailto:ffp@sfi.ie)

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There are two ways for your body to deal with the virus that causes COVID-19. One is to keep away from it, so you don't get infected. The other is when you do get infected, your immune system kicks into gear to get rid of the virus. Unfortunately, as this virus is brand new and has ways of hiding from the immune system, our immune responses may not be ideal for fighting the virus. In some cases, the virus can trigger an overwhelming immune response that itself results in illness.

What will ultimately keep this virus at bay in the long-term is if enough of us have antibodies to it in our immune system's 'memory'. We may get this from being exposed to the virus, but a big goal for medical science right now is to find effective treatments and to develop vaccines that 'teach' our bodies how to recognise the virus and make antibodies, without the need to be exposed to it. That's why understanding how the immune system works is key to getting out of this pandemic.

Ireland has a wealth of scientific researchers who are contributing to our global understanding of the immune system and the response to COVID-19. Here are links to some of them:

Professor Luke O'Neill, Trinity College Dublin:

<https://www.sfi.ie/research-news/news/immunology/treat-covid-19/index.xml>

Professor Andrew Bowie at Trinity College Dublin

<https://www.sfi.ie/research-news/news/immunology/implications-covid-19/index.xml>

Professor Lydia Lynch, Trinity College Dublin

<https://www.sfi.ie/research-news/news/immunology/obesity-covid-19/index.xml>

Dr Sinéad Corr, Trinity College Dublin

<https://www.sfi.ie/research-news/news/immunology/gut-microbes-covid-19/index.xml>

Professor Paul Moynagh, Maynooth University

<https://www.sfi.ie/research-news/news/immunology/immune-system-covid-19/index.xml>

Professor Kingston Mills, Trinity College Dublin

<https://www.sfi.ie/research-news/news/immunology/immune-memory-covid-19/index.xml>

Dr Nigel Stevenson, Trinity College Dublin

<https://www.sfi.ie/research-news/news/immunology/covid-19-pathway/index.xml>

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## **doTERRA CHOOSES CORK, IRELAND FOR FIRST MANUFACTURING FACILITY OUTSIDE THE UNITED STATES**



The state-of-the-art facility located at Blarney Business Park is set to become operational in September

**CORK CITY, IRELAND and PLEASANT GROVE, UTAH – MAY 29, 2020** – doTERRA, the world leader in essential oils and wellness products, is set to create up to 100 new jobs in the northern suburbs of Cork City over the next three years with the opening of the company’s first manufacturing facility outside of the United States. The Irish operation, which will serve as doTERRA’s European Manufacturing Headquarters, will manufacture and distribute doTERRA products to the European marketplace, as well as provide increased capacity to serve other international markets, including the Middle East and Africa. The privately held company was founded in 2008 and employs over 3,500 people in the U.S. and multiple offices around the world.

The 95,000 sq. ft. state-of-the-art facility in Blarney consists of cleanrooms, bottling rooms, office space, a lab, cold storage and warehousing and is expected to be completed by the end of July. There are currently 10 employees based in Cork City, and the company will look to add a number of operations roles and warehouse staff in August as the facility ramps up to start production in September. The company will grow its staff in quality control, supply chain management, finance, legal and HR as production increases. doTERRA’s arrival in Ireland is the result of a capital investment made by the company of more than €10m. Construction of the facility began in October 2019, and to date, the project has supported more than 60 construction jobs.

“doTERRA Europe is thriving and enjoying record growth as more people continue to share and use doTERRA’s essential oils,” said David Stirling, doTERRA Founding Executive and CEO. “doTERRA sources so many of its essential oils from Europe, and we are thrilled that this facility allows us to greatly reduce our carbon footprint by ensuring that these oils intended for European customers never leave Europe.”

Minister for Business, Enterprise and Innovation Heather Humphreys TD said:

“I am delighted to welcome doTERRA to Ireland and the news that they are planning to create 100 jobs in Cork over the next three years. We are very pleased that the company has picked Ireland as the location for its first manufacturing facility outside of the USA. This is very welcome news at this time.”

IDA Ireland supported the company in its search for a European Headquarters, and Ireland beat off strong competition from several other locations.

Martin Shanahan, CEO of IDA Ireland said, “doTERRA’s investment is in line with IDA Ireland’s strategy to continue to win investment and jobs in regional locations. Ireland is the ideal gateway location to Europe, while Cork continues to be a world-class investment location for international companies. doTERRA’s arrival in Cork shows the confidence business leaders have in a region that continues to assert its adaptability and agility despite some extraordinary challenges that have emerged as a result of the global pandemic. I wish doTERRA every success and assure them of IDA Ireland’s continued support.”

“Our new facility is a demonstration of doTERRA’s long-term vision and commitment to supporting our growing customer base throughout Europe and the surrounding areas,” said Sean Poynter, senior vice president of operations for doTERRA.

*“Our presence in Ireland will increase how quickly we can respond to our customers’ needs while reducing the environmental impact of our global fulfilment and logistics. We are thrilled with the location in Ireland and our great partnerships with local officials, developers, and many others. These local resources and the availability of such a skilled workforce are some of the main reasons we are calling Ireland home for our first global manufacturing site outside the U.S.”*

For more information about job opportunities with doTERRA in Cork, contact [irelandjobs@doterra.com](mailto:irelandjobs@doterra.com)

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## Meissner Manufactures Single-Use Systems in Castlebar, Ireland

28th May 2020



Meissner Filtration Products announced today that their new manufacturing facility in Co. Mayo is operational. The new facility features a state of the art 930 m<sup>2</sup> (10,000 ft<sup>2</sup>) ISO class 7 cleanroom dedicated to the manufacture of Single-Use Systems. Validation of the facility was completed in mid-April and the facility is currently manufacturing products for their biopharmaceutical and pharmaceutical client base.

“While we had envisaged marking this day with a ribbon cutting ceremony to recognize the efforts of all those involved in bringing this new facility online, this is obviously not possible given Covid-19,” stated **Nigel Cannon, Managing Director** of the new site. “This symbolic day will come, but what is of immediate importance, perhaps now more than ever given the current health crisis, is that Meissner has an additional operational manufacturing facility capable of supplying our clients with products critical to the manufacture of life saving medicines including those directly related to Covid-19.”

Meissner’s new manufacturing facility is over 3900 m<sup>2</sup> (42,000 ft<sup>2</sup>), and future expansion plans call for a substantial size increase over the coming years. Initial groundwork for this development is set to begin later this year. Meissner anticipated future expansions at the time of purchasing the new Advanced Technology Building from the IDA, by also purchasing the adjacent land.

With the facility now operational, Meissner had looked forward to welcoming visitors to their new manufacturing site, however Covid-19 has impacted these plans. “While the site is currently fully operational and otherwise ready for customer visits, as a critical supplier to the pharmaceutical industry, it is of primary importance that all of our sites remain operational, and thus, Meissner Ltd. in Castlebar is not currently allowing outside visitors,” stated **Laura Meissner, Executive Director of Quality at Meissner**. “While site visits are not yet possible, we have been actively working with our clients to allow them to remotely review the facility operations and validation thereof prior to a physical visit. Contemporary technology has allowed us to still move forward in spite of the current restrictions.”

Congratulating Meissner on this significant milestone, **Martin Shanahan, CEO IDA Ireland** said, “Just over a year ago, Meissner, in partnership with IDA Ireland, announced its ambitious plans for this

manufacturing facility in Castlebar. Now operational, the facility is providing products to its clients in the pharmaceutical and biopharmaceutical sector at this critical time. Meissner continues to create excellent employment opportunities in addition to making an important contribution to the local economy in the West of Ireland. I wish the teams both in Castlebar and in California continued success and the ongoing support of IDA Ireland.”

Meissner wishes to thank all those involved in bringing the Castlebar site online, on schedule, and looks forward to welcoming visitors to the facility as soon as the situation permits.

### **About Meissner Filtration Products**

Meissner develops, manufactures, supplies and services advanced microfiltration and single- use systems worldwide. Their product portfolios are built upon a solid foundation of quality, operational excellence and technical expertise allowing them to deliver high performance products and technical support services for their clients’ critical applications. For more information about Meissner, please visit [www.meissner.com](http://www.meissner.com).

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## Minister Humphreys announces new scheme aimed at supporting the production of Covid-19 related products

4th June 2020



The COVID Products Scheme will accelerate the production of vital medicines, potential vaccines and essential medical equipment.

- The Scheme allows for grant aid of up to 50% of eligible capital investment.
- The life sciences sector directly employs over 60,000 people in Ireland.

Minister for Business, Enterprise and Innovation, Heather Humphreys TD, today announced details of a new grant scheme aimed at supporting the production of vital medicines and medical equipment in Ireland. The Department of Business, Enterprise and Innovation received approval for the Scheme from the European Commission today.

The COVID Products Scheme has been developed under a new European Commission Temporary Framework that allows additional aid to be granted by EU Member States to companies that are developing or producing medicinal products used in the fight against COVID-19. The scheme will be delivered through IDA Ireland and Enterprise Ireland under the terms of the Temporary Framework, which is aimed at supporting the research, development, and production of COVID-19 related products in Ireland.

The scheme allows for up to €200m in targeted State support to facilitate the research and development of COVID products, to enable the construction or upgrading of testing and upscaling infrastructures that contribute to the development COVID-19 relevant products, as well as to support the production of products needed to respond to the outbreak.

**Minister Humphreys said:** *“The challenge of COVID-19 is first and foremost a health emergency and we will continue to prioritise the medical response to the pandemic. The intention of this new scheme is to accelerate the production of vital medicines and potential vaccines, along with essential equipment, used in the fight against COVID-19”.*

Minister Humphreys continued: *“The life sciences sector directly employs over 60,000 people right around the country and virtually all of the world’s top companies have chosen Ireland as a manufacturing base. This new scheme aims to capitalise on that hard-earned reputation and the positive effects of this additional investment will be felt not only in additional direct employment, but also throughout the economy, as many companies based in Ireland are an integral part of the materials and services supply chain”.*

The introduction of the scheme will allow IDA Ireland and Enterprise Ireland to generate significant additional capital investment from firms in the life sciences sector, thereby helping the national economic recovery from

the COVID-19 crisis. Companies in the pharmaceutical sector, including a number of existing IDA clients, are currently engaged in developing both COVID-19 treatments and vaccines. Companies are also seeking to increase manufacturing capacity to meet intense global demand for treatments found to be effective.

**CEO of IDA Ireland, Martin Shanahan, said:** *“This new State Aid Framework sanctioned for Ireland by the EU and targeted at Medicinal products for Covid-19 is a significant step forward. The Life Sciences sector will be central to creating an environment where human health is protected, and economic life can begin to return to normal and this will allow us to support the sector.”*

*“The size and breadth of Ireland’s Life Sciences industry makes us well placed to leverage the Framework to support the industry to quickly respond to Covid-19 demand and form a key pillar in Ireland’s comprehensive economic recovery plan.”*

**CEO of Enterprise Ireland, Julie Sinnamon, said:** *“Enterprise Ireland very much welcomes the announcement of this new scheme. We have a fantastic cluster of Irish companies in the medtech, engineering, consumer and digital technology sectors in Ireland who have demonstrated the strength of their innovative capabilities in the face of the Covid-19 crisis. Driven by the increased demand for lifesaving solutions their response to Covid-19 has positioned the country 6th in the world for Covid19 innovations and will see growth opportunities for this cohort across the globe. The Commission’s approval of this new scheme will allow us to further support this sector in driving increased innovation and production of products, supporting research and development of Covid-19 products, and enabling the construction or upgrading of testing and manufacturing facilities in Ireland.”*

The scheme allows for grant aid of up to 50% of eligible capital investment. This will ensure that the intervention will have a substantial impact on COVID-19 related production and will drive a significant return for the State.

Details on the opening of the scheme will be made available in the coming days. Applications for aid under the scheme must be approved no later than 31 December, 2020.

ENDS

The Department of Business, Enterprise and Innovation (DBEI) plays a key role in implementing the Government’s policies of stimulating the productive capacity of the economy and creating an environment which supports job creation and maintenance. The Department has lead responsibility for Irish policy on global trade and inward investment and a remit to promote fair competition in the marketplace, protect consumers and safeguard workers.

A comprehensive listing of supports, grants, and advice available to businesses affected by COVID-19 is available at [dbei.gov.ie/coronavirus](https://dbei.gov.ie/coronavirus)

#### **Contact the Business Support Call Centre**

The Department of Business, Enterprise and Innovation has established a **Business Support Call Centre** for information on the business supports available to **businesses and enterprises affected by COVID-19**. It can be reached at [infobusinesssupport@dbei.gov.ie](mailto:infobusinesssupport@dbei.gov.ie) or [+353 1 631 2200](tel:+35316312200)

For further information, members of the media can contact

#### **Press Office**

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## Industry to benefit from €6 million Enterprise Ireland research equipment investment

4th June 2020



*Heather Humphreys TD, Minister for Business, Enterprise and Innovation*

### **Minister Humphreys announces Enterprise Ireland funding for access to cutting edge R&D equipment in Technology Gateways and Centres to increase R&D collaboration and competitiveness for companies**

Minister for Business, Enterprise and Innovation, Heather Humphreys TD today announced the successful applicants of the Capital Equipment Fund administered by Enterprise Ireland through the Technology Gateway and Technology Centre Programmes. 37 successful applicants from across the Third Level Sector have secured over €6 million in funding.

The Enterprise Ireland Technology Gateway Programme funds interactions between local and national industry and the Institutes of Technology and aims to increase collaboration and enterprise development at both a regional and national level.

The Technology Centres programme is a joint initiative between Enterprise Ireland and IDA Ireland and allows Irish companies and multinationals to work together on market focused strategic R&D projects in collaboration with research institutions.

The Capital Funding Programme provides industry with access to critical, leading-edge equipment and infrastructure which will help them to build resilience and to remain globally competitive, particularly in the face of challenges such as those posed by the Covid-19 pandemic.

The winners were selected through a rigorous evaluation process based on eligibility criteria for the call which included, but was not limited to, a strong track record of industry engagement, a significant industrial need for the new equipment, and space to service and maintain the equipment according to international standards.

**Minister for Business, Enterprise and Innovation Heather Humphreys TD said:** *“The Technology Gateway and Technology Centre programmes aim to bring Irish companies together with Irish research institutes to provide near-to-market innovation and solutions in a range of areas, both regionally and nationally. This fund directly supports innovative projects that are emerging from the ground up, providing the necessary technology to our Technology Gateways and Technology Centres to nurture and develop cutting edge research projects. I am confident the successful projects announced today have the potential to make a positive impact for the benefit of wider society including the development of innovative solutions and methodologies to address immediate national and global needs with respect to the Covid 19 crisis.”*

Speaking about the announcement **Gearoid Mooney, Divisional Manager, Research & Innovation at Enterprise Ireland said:** *“Access to the best in class technologies can provide a step-change in how companies innovate and develop new and globally differentiated products and services. This important investment in equipment coupled with the support and expertise of our Technology Gateways and Technology Centres will help companies adapt, survive and, ultimately, thrive in the face of the current economic challenges.”*

### Successful applicants

Gateway / Centre	Equipment Description
Medical Engineering Technologies (MET) GMIT	An Ultrasound System and Associated Transducers
Applied Polymer Technologies (APT) Athlone IT	Stereolithography (SLA) 3D printer
CeADAR UCD	Data Science Computing Platform
CREST – TU Dublin	Thermal Analysis Suite
CREST - TU Dublin	Reflectometer
Shannon Applied Biotechnology Centre (Shannon ABC) – Limerick IT	Liquid Chromatographer / Tandem Quadrupole Mass Spectrometer
Shannon ABC – IT Tralee	High Throughput ELISA Suite
Intelligent Mechatronics & RFID (IMaR) – IT Tralee	RFID Test and Development Suite
Irish Manufacturing Research (IMR)	State-of-the-art master/slave teleoperation system -Telebot
MiCRA – TU Dublin	Interconnected Instrument Suite
Meat Technology Ireland (MTI) - Teagasc	Meat Factory Automation Test Bed

Pharmaceutical Manufacturing Technology Centre (PMTc) UL	Cleaning Facility (for Pharmaceutical production)
IMR	Three axis CNC milling machine
APT	Planetary Roller Extruder
IMR	State-of-the-art multi robot system - Cobot
APT	Scanning Thermal Microscope with Nano Thermal Analysis
Centre for Advanced Photonics & Process Analysis (CAPPA) – Cork IT	Near Infra Red Hyperspectral Imaging Camera
COMAND – Athlone IT	Immersive Extended Reality (XR) suite
Shannon ABC (Limerick)	High End FT-IR Spectrometer
Shannon ABC (Tralee)	Plate Reader
Dairy Processing Technology Centre (DPTC) - Teagasc	Cheese Characterisation suite
DPTC UCC	Dynamic Image Analyser
Shannon ABC (Limerick)	Microalgae Cultivation Suite
Telecommunications Software & Systems Group (TSSG) Waterford IT	Smart Material and E-textile Living Lab
IMaR	Manufacturing in-line product inspection system suite
CREST – TU Dublin	Viscometer
PMTc – UCC	Liquid Dispenser / SLA Printer
SEAM	X-Ray Tomography Upgrade
Shannon ABC – Tralee	Cosmetic Suite

CREST– TU Dublin	Desktop Scanning Electron Microscope
CREST – TU Dublin	Glovebox
IMR	Dry Electropolishing system
Precision Engineering, Materials & Manufacturing (PEM) IT Sligo	General Material Test Suite
Food for Health Ireland (FHI) - Teagasc	High Precision Liquid Chromatographer
Microelectronic Circuits Centre Ireland (MCCI) Tyndall	Cryogenic Refrigeration System
Wireless Sensor & Applied Research (WiSAR) Letterkenny IT	High Spec Scanner
Pharmaceutical & Molecular Biotechnology Research Centre (PMBRC) Waterford IT	Differential Scanning Calorimeter

### **About the Technology Gateway Programme**

15 Technology Gateways in nine Institutes of Technology and TU Dublin deliver innovation expertise to industry across Ireland. These Gateways provide companies of all sizes with access to over 300 highly skilled and industrially focused researchers, together with specialist equipment and facilities.

Each Technology Gateway focuses on key technology areas aligned to industry needs. Companies all over Ireland are using Technology Gateways to develop new or better products and services and smarter ways of doing things.

### **About the Technology Centre Programme**

The Technology Centre programme is a joint initiative between Enterprise Ireland and IDA Ireland. It allows Irish companies and multinationals to work together on market focused strategic R&D projects in collaboration with research institutions.

The Technology Centres in the programme are resourced by highly qualified researchers who provide a unique ecosystem for collaboration in areas identified, by industry, as being strategically important.

Over 300 member companies collaborate with the Centres in the areas of analytics, dairy processing, food for health, learning technologies, manufacturing, materials, meat technology, microelectronics and pharmaceutical manufacturing.

### **Technology Centres:**

- Promote growth and competitiveness through industry-led research collaboration
- Address technology opportunities and threats in the key industry sectors
- Increase the levels of industry investment in R&D
- Leverage investment in existing academic research capabilities and build critical mass in key sectors
- Facilitate and encourage collaboration between Indigenous and Foreign Direct Investment companies



**About the Capital Equipment call**

Of 105 eligible applications reviewed, 37 have been approved for funding totaling €6,018, 806. Funding was based on an extensive review process which looked at the number of companies that will benefit and the criticality of the equipment to servicing their R&D needs, how access to the equipment can be shared across the Technology Gateway and Technology Centres network and current capability gaps within the collaborative research system that can be alleviated by making this equipment available.

For further information, contact.

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# siliconrepublic

## RCSI and UCD share €1.47m award for super-resolution microscopes

**RCSI and UCD have been jointly awarded a €1.47m SFI grant for highly advanced microscopy instruments.**

*by Colm Gorey*

15 MAY 2020

The Royal College of Surgeons in Ireland (RCSI) and University College Dublin (UCD) will soon have access to powerful scientific instruments, in what has been described as an “exciting development for the Irish research community”.

It has been announced that the institutions will share a €1.47m Science Foundation Ireland (SFI) Infrastructure Award. RCSI will receive €1.1m to develop a facility for highly advanced microscopy in Ireland and purchase two super-resolution microscopes that will be housed at the new facility.

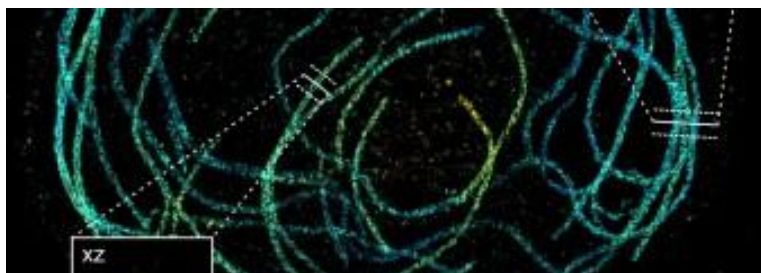
The full article by Colm Gorey is available at the link below:-

Colm Gorey/Siliconrepublic.com

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

<https://www.siliconrepublic.com/innovation/rcsi-ucd-sfi-award-super-resolution-microscopes>

**SFI** also cover this story:



*Nanoscale super-resolution image showing the hollow structure of microtubules in a blood platelet taken in Dr Schoen's laboratory.*

<https://www.sfi.ie/research-news/news/rcsi-super-microscopy>

# siliconrepublic

## A day in the life of a Covid-19 testing volunteer

By *Mariam Marai*, in conversation with Elaine Quinn, institute manager for communications and education at UCD Conway Institute

10 APR 2020



*Mariam Marai. Image: UCD Conway Institute*

Mariam Marai, a PhD candidate and research assistant based in the UCD Conway Institute, shares her experience of volunteering in the Covid-19 testing lab in St Vincent's University Hospital.

My research at the University College Dublin (UCD) Conway Institute focuses on resolving inflammation in the context of the complications that arise in diabetes. We are particularly interested in an anti-inflammatory messenger called Lipoxin A4. This molecule is relatively unstable in the body and expensive to make.

We work with colleagues in the UCD School of Chemistry who designed new synthetic versions (analogues) in order to stabilise this molecule. My job was to help screen around 30 lipoxin analogues in the laboratory (in vitro). I worked with Dr Eoin Brennan on some promising analogues. We tested one in a diabetic mouse model last year to study the potential anti-inflammatory effect of this new molecule in vivo.

With the Covid-19 crisis, the institute is closed so, like all of my colleagues, I have had to stop my research. However, I replied to an email calling for Covid-19 testing volunteers that was circulated in the Conway Institute.

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

[https://www.siliconrepublic.com/innovation/covid-19-testing-lab-ucd-researcher?utm\\_source=Tech+Trends&utm\\_campaign=a81c207b89-EMAIL\\_CAMPAIGN\\_2020\\_04\\_14\\_09\\_12&utm\\_medium=email&utm\\_term=0\\_c7ec65939c-a81c207b89-110226594&mc\\_cid=a81c207b89&mc\\_eid=9d1576d375](https://www.siliconrepublic.com/innovation/covid-19-testing-lab-ucd-researcher?utm_source=Tech+Trends&utm_campaign=a81c207b89-EMAIL_CAMPAIGN_2020_04_14_09_12&utm_medium=email&utm_term=0_c7ec65939c-a81c207b89-110226594&mc_cid=a81c207b89&mc_eid=9d1576d375)



## 1,500 Irish scientists call for a department of higher education and research

by [Colm Gorey](#)

27 May 2020

With universities and higher education institutes among those hit hard by the Covid-19 pandemic, 1,500 scientists have urged the Government to back them both politically and financially, or face Ireland becoming a “backwater” in the area of science.

An open letter, which includes Prof Luke O’Neill of Trinity College Dublin (TCD) as its lead signatory, is calling for the creation of a department of higher education and research as a priority for government formation talks.

**‘We need outstanding researchers. Without them, Ireland will become a backwater when it comes to science and discovery’**

– PROF LUKE O’NEILL

The signatories wrote: “Ireland needs a dedicated government department, with a full cabinet minister, mandated to support science, research and higher education and to champion the sector.” They added that “this change of focus would enhance Ireland’s recovery prospects and its ability to develop a green and sustainable economy”.

The full article by Colm Gorey is available at the link below:-

[Colm Gorey/Siliconrepublic.com](#)

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

<https://www.siliconrepublic.com/innovation/department-of-higher-education-ireland-open-letter-covid-19>

# siliconrepublic

## €200m Government scheme to fund Covid-19 medicine production

*by Kelly Earley*

5 May 2020

**Approved by the EU Commission, a new Covid-19 scheme for Irish manufacturers aims to accelerate the production of medicines and equipment.**

Today (4 June), Minister for Business, Enterprise and Innovation Heather Humphreys, TD, announced details of a new grant scheme aimed at supporting the production of medicines and medical equipment in Ireland used to treat Covid-19.

The scheme, which was approved by the European Commission, has been developed under a new temporary framework. This allows additional aid to be granted by EU member states to companies that are developing or producing medicinal products used to treat Covid-19.

The funding will be delivered through IDA Ireland and Enterprise Ireland, and will allow for up to €200m in targeted State support to facilitate the research and development of products, and to enable the construction or upgrading of testing infrastructure.

The full article by Kelly Early is available at the link below:-

Kelly Early/Siliconrepublic.com

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

<https://www.siliconrepublic.com/innovation/government-covid-19-production-grant-scheme>

## Irish researchers help boost catalogue of RNA viruses

by *Colm Gorey*

7 FEB 2020

**To better understand RNA viruses, Irish researchers have pieced together parts of a massive puzzle.**

As teams of scientists scramble to find [a potential vaccine](#) for the current coronavirus outbreak that originated in Wuhan, China, many other researchers across the world continue to search for a better understanding of ribonucleic acid (RNA) viruses.

While it was the first biological entity to have its full genome sequenced in 1976, bacterial RNA viruses have been largely overlooked as many thousands of additional viruses and bacteria have since had their genomes sequenced.

Now, researchers Julie Callanan and Stephen Stockdale from the Science Foundation Ireland (SFI) APC Microbiome Ireland research centre at University College Cork (UCC) are among a team that has uncovered a wealth of new information about bacterial RNA viruses.

In a paper published to Science Advances, the researchers analysed data from environmental samples sourced from the US, Austria, Japan and Singapore. They identified 15,611 new fragments of RNA viruses, including more than 1,000 full-length genomes.

**‘A rare and exciting event’ ....**

The full article by Colm Gorey is available at the link below:-

Colm Gorey/Siliconrepublic.com

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

<https://www.siliconrepublic.com/innovation/rna-viruses-discovered-apc-microbiome-ireland>

# siliconrepublic

## NUI Galway and UCC share most of €10m environmental research funding

*by Colm Gorey*

25 FEB 2020

The Environmental Protection Agency (EPA) is set to distribute €10m in Government funding to 60 different projects proposed under its 2019 annual research calls and various schemes. The largest awards have been made to University College Cork (UCC) and NUI Galway for projects looking at plastic packaging and pesticide management for better water quality.

Other projects awarded as part of this latest funding will look at areas such as the effects of the climate crisis on Irish coasts, the effect of traffic emissions on air quality in Dublin and the radioactivity of Ireland's surrounding water.

“Over 100 proposals were received by the EPA research programme under EPA research calls in 2019 and we are happy to announce today that the most promising projects are now getting underway,” said Laura Burke, the EPA's director general.

The full article by Colm Gorey is available at the link below:-

Colm Gorey/Siliconrepublic.com

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

<https://www.siliconrepublic.com/innovation/epa-funding-environment-ireland>



# siliconrepublic

## Irish team finds significant link between Covid-19 deaths and blood clots

*by Colm Gorey*

30 APL 2020

Scientists from the Royal College of Surgeons in Ireland (RCSI) believe they may have made a significant discovery in our understanding of Covid-19, the disease caused by the coronavirus. In a study published to the British Journal of Haematology, the researchers wrote that Irish patients with severe cases of Covid-19 are experiencing abnormal blood clotting which, in some cases, has led to deaths.

These micro-clots are found within the lungs and patients with higher levels of blood clotting had a significantly worse prognosis, requiring ICU admission.

“In addition to pneumonia affecting the small air sacs within the lungs, we are also finding hundreds of small blood clots throughout the lungs,” said Prof James O’Donnell, director of the Irish Centre for Vascular Biology at RCSI.

The full article by Colm Gorey is available at the link below:-

Colm Gorey/Siliconrepublic.com

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

<https://www.siliconrepublic.com/innovation/rcsi-covid-19-deaths-blood-clots>

## DCU establishes Research and Innovation Hub to tackle Covid-19 challenges

*by Colm Gorey*

13 MAY 2020

DCU has established a new research hub focused entirely on finding solutions to challenges posed by Covid-19.

Dublin City University (DCU) has established the Covid-19 Research and Innovation (R&I) Hub, which will support 16 multi-disciplinary projects focused exclusively on challenges caused by the coronavirus pandemic.

These projects cover five key areas: rapid diagnostics, protecting healthcare workers, speeding up national testing, mitigating the impact on the economy and tackling societal issues.

A focus has been placed on tests and turnaround times for the testing process, including the search for independently validated, commercial antibody tests. To that end, Dr Paul Leonard of DCU's science and health faculty is working with the HSE's Covid-19 laboratory R&D product solutions group to find an antibody test solution that could form part of a national testing strategy.

Colm Gorey/Siliconrepublic.com

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

<https://www.siliconrepublic.com/innovation/dcu-covid-19-research-and-innovation-hub>

# siliconrepublic

## SFI research centre 3D printing face shields for hospitals and test centres

*by Colm Gorey*

2 APR 2020

### **As demand for PPE soars globally, the I-Form research centre has revealed plans to 3D print face shields and other equipment.**

I-Form, the SFI research centre for advanced manufacturing, is using its 3D printing facilities to produce face shields, as vital personal protective equipment (PPE) is currently being sought by medical staff across the country.

The project began on 27 March at I-Form's University College Dublin (UCD) base with the production of 300 3D-printed face shields. This came after a direct request for this particular item from Tallaght University Hospital for protecting staff from Covid-19, the disease caused by the coronavirus.

### **.... 'To meet an immediate need'**

Prof Denis Dowling, director of I-Form, said 3D printing is "a highly adaptable technology that can be quickly harnessed to meet an immediate need".....

Colm Gorey/Siliconrepublic.com

This article first appeared on [www.siliconrepublic.com](http://www.siliconrepublic.com) and can be found at:

<https://www.siliconrepublic.com/machines/face-shields-3d-printing-i-form-coronavirus>



**REGISTER NOW**

The manufacturing and supply chain sector in Ireland is experiencing a once in 100 year event that will have implications long after the Covid-19 pandemic has passed. This online event will bring together all of the key stakeholders from industry, Government & academia to form a narrative and a platform to pivot to the new normal.

You complimentary passes to attend the [Online Manufacturing & Supply Chain Conference & Expo](#) which is an online conference and expo which is being held on **5<sup>th</sup> August 2020**. The event will run live online from **10am to 5pm BST(British Summer Time)**.

The manufacturing and supply chain sector in Ireland is experiencing a once in 100 year event that will have implications long after the Covid-19 pandemic has passed. This online event will bring together all of the key stakeholders from industry, Government & academia to form a narrative and a platform to pivot to the new normal.

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## Enterprise Ireland Approves €1.14 Million Co-funding For Small Business Innovation Research (SBIR) Competitive Challenges



March 05. by mike

*Pictured (L-R): Hilda Dowler, Mater Misericordiae University Hospital; Nuala Nevin, Department of Business, Enterprise and Innovation; David Wall, Tallaght University Hospital; Tom Kelly, Enterprise Ireland; Naomi Rooney, National Transport Authority; Tommy Furey, Marine Institute; and Abigail Murphy, Environmental Protection Agency.*

Enterprise Ireland (EI) has approved a total of €1.14 million joint funding to drive collaborative projects, or ‘Challenges’, between innovative companies and the public sector. The Small Business Innovation Research (SBIR) programme encourages businesses to explore and co-design unique solutions with public sector teams, through competitive Challenges. 23 applications from public sector bodies to participate in the SBIR programme were shortlisted to five Challenges.

Enterprise Ireland’s approved SBIR Challenges for 2020 are:

- **Climate Action** – Environmental Protection Agency – *Innovating a circular economy for soft plastic waste in Ireland.*

This Challenge is seeking solutions to counter the problem of plastic waste and look at opportunities for closed-loop reuse systems, with an initial focus on reducing plastic waste from school lunches. The goal for this Challenge is to reduce the carbon footprint of schools by cutting plastic waste generation. Total fund €240K

- **Health** – Mater Misericordiae University Hospital and National Orthopaedic Hospital Cappagh as part of Ireland East Hospital Group – *Reducing the incidence and impact of inpatient falls within the hospital.*

This Challenge aims to address the prediction, detection and prevention of falls in the Mater Hospital initially, with potential to extend a solution nationally. Total fund €200K

- **Health** – Tallaght University Hospital – *Improving the care of, and empowering, Chronic Obstructive Pulmonary Disease (COPD) patients in the community.*

Tallaght University Hospital is seeking solutions to improve COPD patient self-management and incentivise affected patients to take control of their health. Total fund €200K

- **Biodiversity** – Marine Institute – *Innovative solutions to map coastal seaweed resources in Ireland.*

Seaweed is an underutilised natural resource and a technology-based solution is needed to enable future determination of its distribution in inter-tidal areas across Ireland. Total fund €300K

- **Transport** – National Transport Authority – *Vehicle Capacity Information for bus and coach passengers with a focus on improved accessibility.*

The Challenge is seeking innovative solutions to encourage and support mobility impaired passengers when using public transport in Ireland. Total fund €200K

Enterprise Ireland’s Executive Director Stephen Creaner said: “Innovation is a key priority for Enterprise Ireland. We know that effective innovation is essential to the future growth and sustainability of every business. The SBIR Challenges present excellent opportunities, particularly for small and medium sized businesses, to extend their innovation ambition and capability, while accelerating their route to commercialisation, and enabling improved efficiency and effectiveness in the delivery of public services. The five Challenges, identified by the public sector bodies, are sectorally diverse and will ultimately benefit citizens’ needs both in Ireland and internationally. Enterprise Ireland encourages entrepreneurs, developers and researchers who have solutions in these spaces to take up the Challenge. We look forward to the exciting new concepts and innovative ideas that will emerge as a result of these Challenges.”

The new Challenges are expected to be live on e-tenders no later than May 1<sup>st</sup> 2020. More information on SBIR Ireland and the Challenges will be available soon on [www.sbirireland.ie](http://www.sbirireland.ie)

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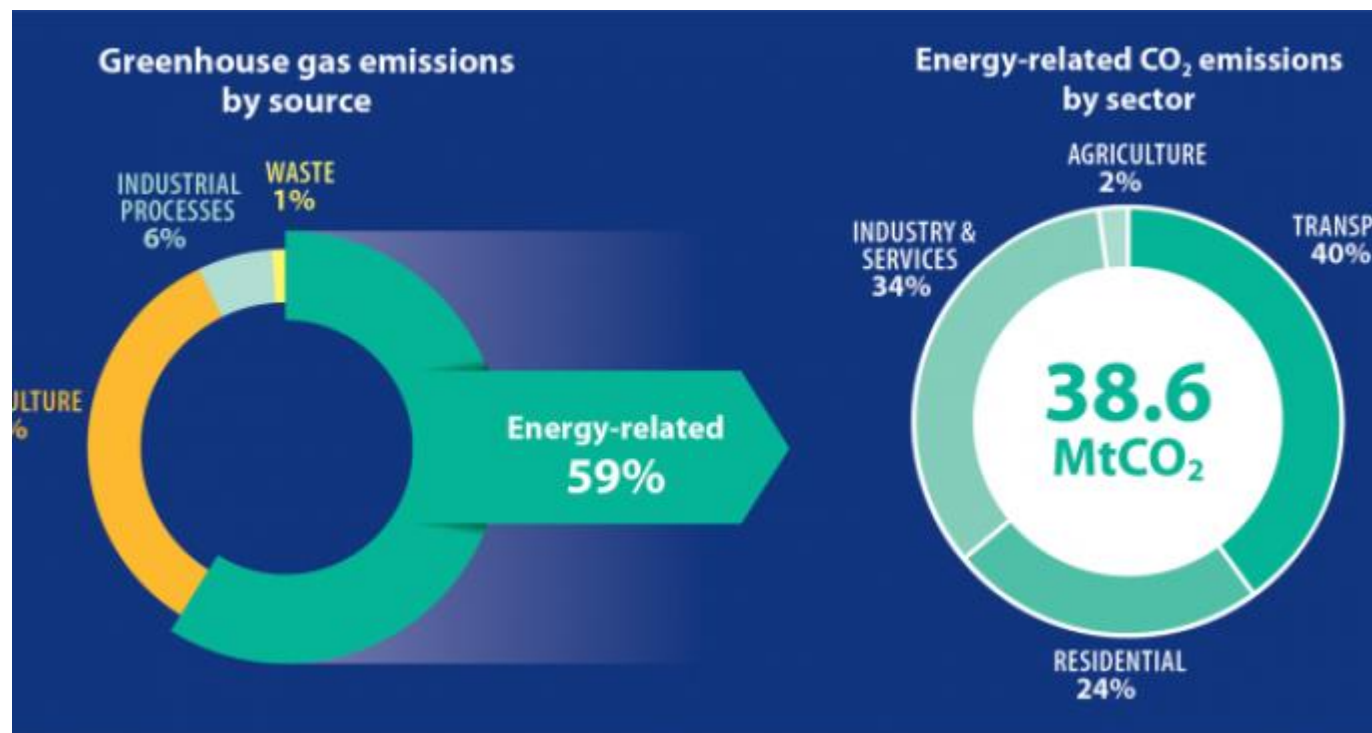
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## Reduction in Overall Carbon Emissions But Transport and Home Heating Increases put Ireland well off Target



March 10 [by mike](#)

The Sustainable Energy Authority of Ireland (SEAI) has published its *Energy-Related CO<sub>2</sub> Emissions in Ireland* report. The report shows that energy-related CO<sub>2</sub> emissions declined slightly in 2018, even as energy use increased. This was due to changes in the mix of fuels used, particularly for electricity generation, where more renewable energy and less coal was used. However, the overall reduction was not enough to keep Ireland on track to meet long term decarbonisation goals.

Commenting on the report Jim Scheer, Head of Data and Insights at SEAI, said: “This report shows us once again the challenges we face in reducing our CO<sub>2</sub> emissions from energy use. CO<sub>2</sub> emissions from travel and heating our homes and businesses increased again in 2018. While emissions from electricity decreased, we have a hill to climb if we are to make meaningful inroads in the other sectors. The data in this report pre-dates the release of the Government’s Climate Action Plan. The ambitious course of action plotted in that plan has the potential to turn these trends around. It’s important now that citizens, businesses and Government work together to deliver on those actions to tackle the climate crisis.”

Energy is commonly split into three sectors: transport, heat and electricity. In 2018, transport was the biggest emitter of energy-related CO<sub>2</sub> emissions accounting for 40%. Energy used for heat was the next biggest at 33% and electricity generation was responsible for 27%.



Transport emissions increased by 24% between 2012 and 2018, in line with economic growth. Transport remains almost entirely dependent on fossil fuels. Private cars were responsible for the largest share of CO<sub>2</sub> emissions from transport in 2018 at 40%. The largest growth was in air travel which increased by 8% in 2018.

In the heat sector, fossil fuels used to heat homes were the largest source of CO<sub>2</sub> emissions at 47%, up 8% on the previous year. Industry had the next largest share at 21%. Even with an increase in the amount of renewable energy used for heat, Ireland has the second lowest share of renewable energy used for heat in the EU.

CO<sub>2</sub> emissions from electricity generation fell in 2018, even as the amount of electricity used increased. The reduction in CO<sub>2</sub> intensity of electricity was due mostly to two factors, a 44% decrease in coal used for electricity generation because of a technical fault at Ireland's only coal fired power plant, and a 16% increase in wind generated electricity. Zero-carbon renewable energy generated 33% of all electricity in 2018, up from just 7% in 2005.

Using renewable energy for heat, electricity and transport reduced CO<sub>2</sub> emissions by 4.9 million tonnes of CO<sub>2</sub>. This is equivalent to the CO<sub>2</sub> emissions of half of all homes in Ireland. Despite this, the latest data shows that the CO<sub>2</sub> emissions intensity of Ireland's energy supply is 20% higher than the European average. This is due to greater use of high carbon fossil fuels including coal, peat and oil.

Jim Scheer concluded: "Reducing CO<sub>2</sub> emissions from energy use requires increased energy efficiency and increasing the use of renewable energy in our energy mix. To achieve our targets, we need to tackle this urgently in every part of society. As citizens, we can play our part by changing how we use energy in our homes and how we travel. There are a wide range of Government supports available via SEAI, which have already supported over 420,000 homeowners with energy upgrades and around 9,000 car owners to purchase an electric vehicle. Community based action is also on the rise. People should get involved in the transition and avail of these, and other supports where they can."

The 2018 energy results underline the need to swiftly implement the Climate Action Plan, which sets out over 180 actions to tackle the climate crisis across all sectors of the economy, and reduce greenhouse gas emissions by 36%. From an energy perspective, these include:

- Phasing out coal and peat from electricity generation, and taking the necessary actions to deliver 70% of electricity from renewable sources by 2030
- Creating a new national retrofit model to upgrade the energy efficiency of 500,000 existing homes to B2 equivalent Building Energy Rating
- Installing 600,000 electric heat pumps to replace fossil fuel home heating
- Enabling homeowners to generate their own electricity and sell it back to the grid under a micro-generation scheme from 2021
- Increasing the number of EV's on Irish roads to 1 million by 2030.

For the full *Energy- Related CO<sub>2</sub> Emissions in Ireland 2005 – 2018* report visit, [www.seai.ie/emissionsreport](http://www.seai.ie/emissionsreport)

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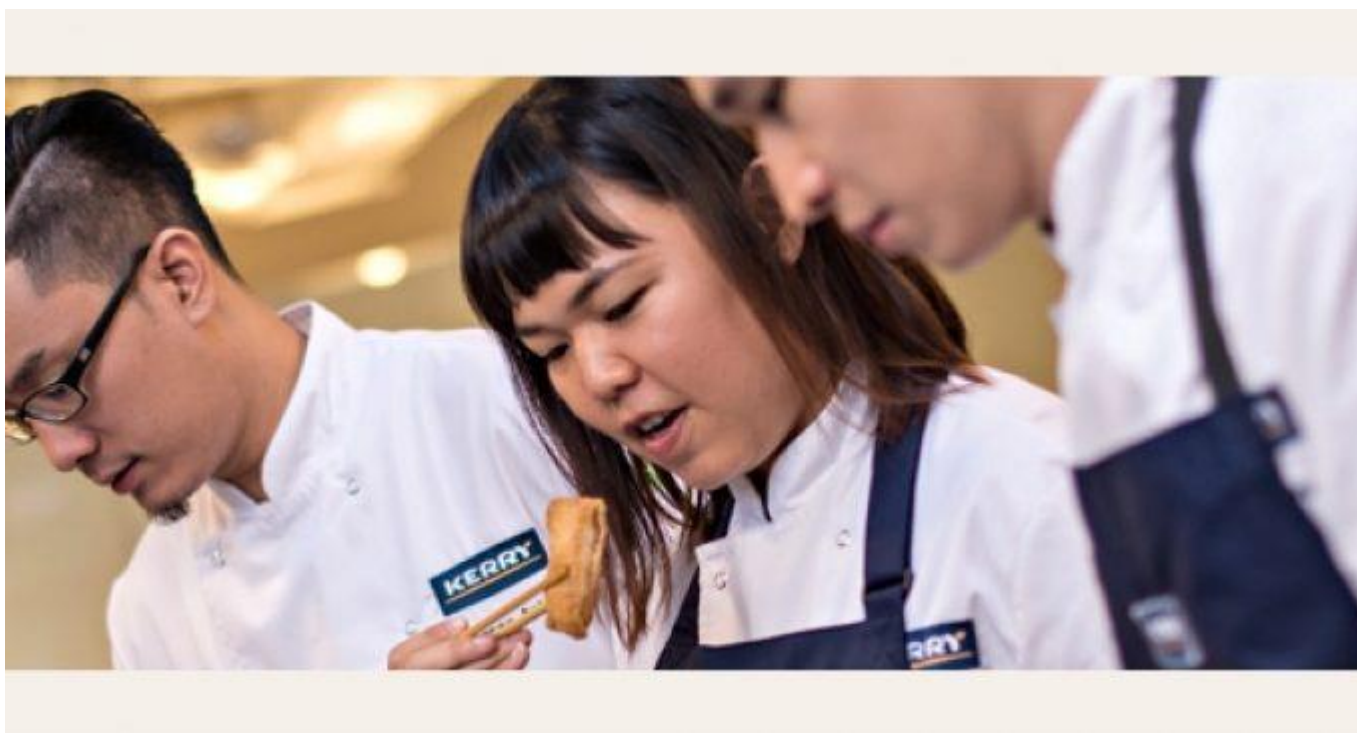
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## Kerry Group to Invest \$125 Million to Create World-class Food Manufacturing Facility in the US



March 12 by [mike](#)

Kerry Group, the leading international taste and nutrition company, has confirmed that it is to invest \$125 million in its facility at Rome, Georgia in the US to create a new world-class food manufacturing facility. This is Kerry's largest ever capital expenditure investment and when complete, the 360,000 sq ft facility will be one of the most modern and efficient facilities of its kind in the world with the highest standards of food safety.

The facility will produce integrated taste and nutrition solutions to help customers meet growing consumer demand in the poultry, seafood and alternative protein markets. As part of Kerry's sustainability agenda, the new facility will use 100% renewable electricity and will have a number of other sustainable initiatives including zero waste to landfill, bulk receiving and energy efficient equipment.

Kerry Group has worked closely with the Governor of Georgia's office to deliver this investment which will employ more than 400 people during the construction phase and over 100 full-time positions once the facility is fully operational.

Construction will begin immediately and is expected to be completed by early 2021 which will more than double the production capacity of the existing site within the same footprint. This will significantly increase Kerry's capacity in its largest market to meet the growing demand for holistic food solutions.

Gerry Behan, CEO of Kerry Taste & Nutrition, North America, comments: "North America is our largest market, and as such it is fitting that it is here that we announce our largest ever capital expenditure investment. This new facility will be one of the most advanced and modern food manufacturing facilities in

the world which will support our customers as they produce tasty and nutritious food products which will be consumed all across the US and Canada.

“The consumer-led food revolution and the world’s environmental challenges are driving accelerated change and reshaping the entire food industry. World-class facilities, such as this one in Georgia, combined with our technology portfolio and our fantastic people allows us to co-create with our customers to produce tasty and nutritious food products that meet changing consumer demand.”

Enterprise Ireland is the Irish government agency for the advancement of international business by Irish companies. Commenting on the investment, Sean Davis, Regional Director, North America for Enterprise Ireland, says: “Irish investment into the United States is at an all-time high with strong momentum indicating further partnerships between the Irish and American business communities. We’re pleased to see the impact of Kerry Group’s investment here in Georgia and we look forward to further collaboration with the state and the regional community.”

From humble beginnings as an Irish dairy co-operative, Kerry has grown into a large international food industry leader, with offices in 32 countries, 151 manufacturing facilities and an employer to over 26,000 people globally, including over 1,000 food scientists.

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## Irish company Kastus developed coating effective against coronavirus



May 01 by Admin

The Irish Times reported that a surface-coating technology developed by Irish company Kastus is effective against the coronavirus, a leading US testing laboratory has confirmed. Founded in 2014, Kastus has pioneered an antimicrobial treatment that can be used to coat glass and ceramics or added to plastics and paint.

The treatment, which can be used on everything from smartphones to ceramic floor tiles and touchscreen kiosks, had previously been proven to have a 99.99 per cent kill rate against harmful bacteria and fungi including antibiotic-resistant superbugs such as MRSA and E.coli. Testing conducted by Nelson Laboratories in New York over the past month has now confirmed its effectiveness against the coronavirus that has led to the pandemic.

This validation is expected to lead to a huge surge in demand for Kastus's technology from manufacturers. The company's chief executive John Browne said: *"This gives our customers and commercial partners a real unique selling point in that they are bringing out products that can help save people's lives," "It should also mean that businesses that are reopening following the lifting of restrictions will be better prepared to ensure public safety. Our technology is totally unique. We've spent about €1 million on our intellectual property portfolio and have been relatively aggressive with our IP strategy, always with a view that the day would come eventually and the penny would drop in regard to how important the solution is. We've been working on getting the testing done for a couple of months and it is great to get the validation through. We just got the results through last night so it was something nice to wake up to on a wet Wednesday morning,"* While the coating is primarily for use in new products, companies can add screen protectors retrospectively that have had the coating applied to provide protection. This means it could soon be used widely in products such as touchscreen kiosks in restaurants, shopping centres and airports.

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## Veolia cleans up to avoid short supply



April 20 by admin

The unprecedented demand for biocidal hand sanitiser products during the pandemic means suppliers are now facing significant challenges. To beat this shortage and ensure the supply of sanitiser for their own key workers, resource management company, Veolia, has now turned to providing its own resources. By using their own specialist laboratory facilities in Ellesmere Port, the company is now manufacturing its own sanitiser liquid to protect the workforce in the essential waste, energy and water operations.

Manufacturing the product are the Veolia team of qualified chemists normally used to sampling and cataloguing hazardous waste to ensure compliance with waste identification legislation and specifying the right recovery, recycling or treatment routes. The team has made over 500 litres so far in two variants – one based on isopropanol, the other on ethanol.

The sanitiser is compliant with the latest the Health and Safety Executive (HSE) short term derogations from the requirements for product authorisation, a mandatory requirement to ensure the safety of this type of biocidal product. It also follows recent World Health Organisation (WHO) guidelines. Commenting on this latest resourcing innovation:

Richard Kirkman, Chief Technology & Innovation officer from Veolia UK and Ireland explains: *“As a company with key workers keeping waste, energy and water infrastructure operational we are also focused on keeping our dedicated teams safe. The new sanitiser, produced in our own labs, will mean we can ensure they will have the supplies they need to continue their critical roles supporting hospitals, electricity generation, waste collection, food production and the water industry.”*

The innovative laboratory teams responsible for this product work at Veolia’s High Temperature Incinerator HTI facility, one of the most technically advanced in Europe, and the largest of its type in the UK. The facilities are fully permitted and have gained ISO9001, ISO14001 and OHSAS 18001 accreditation.

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## Hawkins Construction to build UK's largest carbon capture plant



May 27 by admin

**Skelmersdale-based Hawkins Construction Limited has been appointed as the Principal Contractor of the delivery of a 40,000-tonne capacity Carbon Capture and Utilisation (CCU) Plant on behalf of Tata Chemicals Europe (TCE) in Northwich, Cheshire.**

The ground-breaking £16.7m project announced by the Minister for Clean Energy and Growth in 2019 is a key project set to demonstrate the viability of industrial-scale carbon capture and utilisation technology. The project will be the largest of its kind in the UK and will remove carbon dioxide from TCE's combined heat and power plant emissions. The gas will then be purified and liquified for use in the manufacture of sodium bicarbonate. The TCE site is the largest single-site user of carbon dioxide in the UK, and is set to capture emissions equivalent to 22,000 cars being taken off the road, contributing to the UK government's recently announced target of net-zero carbon emissions by 2050.

Hawkins have a long track record of project delivery in the food, pharmaceutical and chemical manufacturing sector for various clients such as Heinz, AstraZeneca, Weetabix, Thornton & Ross, Dairy Crest and British Salt. The Hawkins scope of work for the CCU plant includes:

- Acting as Principal Contractor for the £16.7m project, with responsibility for the project management of the CCU plant construction.

- The civil works, which will involve the preparation of a site the equivalent size of a typical Premier League football pitch and piling to a depth of 13m to prepare the ground for process equipment installation.
- The steelworks for a dedicated substation for the CCU plant and the liquefaction building that will house the process equipment that will liquefy the captured and purified carbon dioxide ready for storage and use. The steelwork used in this will be the equivalent weight of a large passenger aeroplane.
- The installation of the CCU process equipment including the absorber tower, a key component of capturing carbon dioxide from the energy plant emissions, along with the purification, liquefaction and other process equipment.

Products supplied by TCE are critical raw materials to the food manufacturing supply chain as well as pharmaceutical product manufacturing, and thus work on this project has commenced during the COVID-19 lockdown. To enable this, Hawkins have introduced new policies and procedures to ensure a safe work environment for site employees and contractors. Steps have been taken to ensure that social distancing is observed, and other measures have been implemented including additional handwashing facilities, staggered break and lunchtimes and frequent disinfection of break areas the following use. Where social distancing is not possible, workers are using additional PPE.

Commenting on the project, Commercial Director Ben Birchall said:

*“We’re delighted to have been appointed to deliver this high-profile project on behalf of Tata Chemicals Europe. It is a strategically important project for all stakeholders; to the UK on its pathway to net zero emissions and for Tata as the company aims to reduce emissions and provide a critical raw material. This project is a major win for Hawkins, as it supports our expansion and demonstrates our ability to deliver clean growth projects on behalf of our clients.*

*“We’ve been looking to build our project portfolio in the clean growth and chemicals sector for a number of years, and this venture is the culmination of this effort. There is a stringent timeline to this project, and I’m confident that our highly experienced team will deliver in time and within budget, whilst also ensuring that the health and safety of all those on the site continues to be of paramount importance.”*

Commenting on the appointment of Hawkins, Ladan Iravanian, Project Director at TCE said: *“We first worked with Hawkins in 2018 at our British Salt manufacturing site. The project they completed for us at this time was implemented extremely well, and we are pleased to be working with Ben and the Hawkins team again as we deliver this hugely exciting carbon capture and utilisation project. The project continues to be delivered with onsite work handled by Hawkins and is accelerating as we near the installation of the major CCU process equipment.*

*“As we are the UK’s only manufacturer of sodium bicarbonate, an important ingredient in food manufacturing and a critical component of some pharmaceutical products, it is a great credit to the combined efforts of all our team and supply chain that construction on this project continues safely during the COVID-19 pandemic.”*

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## Coronavirus: 81% of manufacturing firms in Northern Ireland put workers on furlough



April 14 by admin

More than four in five manufacturing companies in Northern Ireland had to put some staff on leave, according to the industry body and about half of employees have been furloughed at 72 per cent of business, according to Manufacturing NI, which counts some of the North's biggest companies including Bombardier, Almac and Norbrook among its members.

It says the sector has "largely closed down" due to the coronavirus crisis.

As part of the UK government's coronavirus job retention scheme, businesses can furlough employees by keeping them on the payroll even if they are not working and then apply for a grant that covers 80 per cent of the individual's usual monthly wage up to £2,500 (€2,850).

Thousands of companies across all key sectors of the economy have had to temporarily lay staff off because of the impact of Covid-19 on their business, according to the latest figures.

Invest NI, the North's economic development agency, confirmed that it had received notification from 500 of its client companies that, between them, have sent close to 30,000 employees home.

Manufacturing NI chief executive Stephen Kelly said one in four of the organisation's members have now completely closed their businesses. *"There is a huge amount of stress and anxiety among manufacturers,"* he said. *"There are a lot of firms who have closed their doors that may never reopen again. Others are trying to keep afloat but it's like they have been thrown into a really deep pool and no one is throwing them a net or coming to their rescue,"* Mr Kelly warned.

He acknowledged the UK government and the NI Executive have taken action to help protect firms and jobs, *"but this appears to be only delaying a major economic crash in the weeks ahead,"* he warned. *"The biggest issues remains a lack of certainty on the jobs retention scheme. We have to be deeply concerned that we will be unable to restart the sector if we leave the lockdown for too long,"* Mr Kelly added.

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## Regeneron reaches 1,000 employees at Limerick facility



June 01 by admin

Regeneron has announced that it has reached a milestone of 1,000 employees at its Industrial Operations and Product Supply (IOPS) facility in Limerick. The biotechnology company acquired the former Dell computer facility in Limerick and achieved planning in 2014 for its first IOPS site outside of the United States.

Regeneron has invested almost €1 billion over the past six years to build the largest biologics manufacturing facility in Ireland. The Limerick site is currently recruiting for more than 60 open positions with construction ongoing for a new laboratory and office building.

Speaking about Raheen, Daniel Van Plew, Executive Vice President and General Manager, IOPS said: *“It feels surreal to now have over 1,000 of the most talented people in the industry working at our Raheen site. At the time we decided to set up shop in Limerick, I didn’t fully appreciate the depth of the Irish talent pool or how welcoming the community would be. It is a privilege to continue to work and grow in Limerick, and to be surrounded by so many hardworking and innovative people.”*

Niall O’Leary, Vice President and Site Head, IOPS said: *“Since we hired our first employee in Ireland six years ago, to the 1000th employee today, we have continuously looked for people that fit our culture and this has served us very well. Our team is world-class.”*



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