

Science Powered Future Sustainable Prosperous Living

Nature is manifestly the omnipotent universal scientific inventor. Our human minds have an enduring awe of nature's astronomical feats, spanning churning supermassive blackholes to evolutionary directed reproduction and indeed our own conscious awareness of all of these formidable phenomena. Nature has bestowed us too with some impressive scientific capacities and thankfully is relatively forgiving of the fact that we do not always direct these towards the best outcomes. The warnings of climate change and the Covid-19 pandemic are however, prompting us to reform. As we reflect on the models which nature operates, in particular circularity, rather than our current linear mine-use-dispose mode of operation, we realise that nature provides many templates upon which we can better base our scientific advancement and avoid propelling ourselves and the majority of the earth's other inhabitants towards extinction.



Dr. Margaret Brennan Fournet

There are already many successful examples of the transfer of analogues from nature to science and engineering, ranging from vaccines to architectural works. Citizens are now strongly driving the demand for sustainable solutions and avenues to accomplish living in balance with our planet. Science based innovation is recognised as central in achieving our mission for sustainability.

MRI Progressing Sustainable Polymer Science

Polymer Science is core to the MRI activities and we are all aware of the pressing global challenge posed by plastics polymers. The sustainable polymer initiative at the MRI is actively working to meet this challenge. Our technologies are designed to decouple the use of plastic from the consumption of finite carbon intensive resources and reduce the use of virgin plastics. Suites of new disruptive technologies and platforms are under co-development with industrial partners with exciting new solutions emerging.

PerPETual, AIT's New €2.8 M Disruptive Technology Fund project

The MRI Team have been successful in securing a new €2.8 M nationally funded Disruptive Technology Fund project named PerPETual for the Permanent recycling of waste PET plastics.



PerPETual Team: AIT: Michelle Cooney, Dr. Ian Major, Dr. Margaret Brennan Fournet, UCC: Prof Justin Holmes, AIT Dr Declan Devine, NovelPlast: Neil Skeffington and AvonCourt: Ross Bateman. Inset above: AIT PerPETual team members, Dr. Olivia Adly, Dr. James Murray, Dr. Yuanyuan Chen and Dr. Marija Mojicevic

This is an exciting circular plastic technology allowing PET plastic to enter a permanent regenerative loop.



PerPETual Seamless route to resolving pervasive PET plastic pollution

PerPETual is a compelling ecological-based proposition enabling industrial circularity and we are excited to develop this together with our SME partners AvonCourt and NovelPlast, and UCC. Essentially, we are taking in waste PET plastic packaging, depolymerising it with new high throughput technology and remaking it as fresh virgin PET for production of the same packaging. As the name PerPETual suggests, we are delivering continuous PET plastic recycling, without any need for more petroleum.

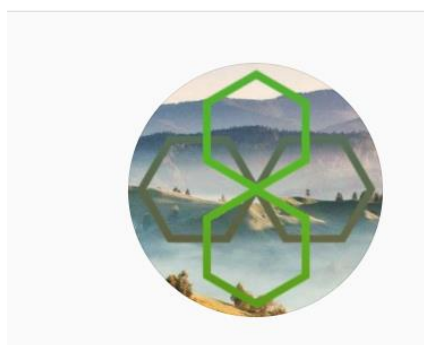


Plastic pollution mitigating technologies for sustainable innovation-led growth

The MRI is actively establishing and leading major “big sustainable polymer ideas” campaigns to exploit the considerable opportunities and meet the growing demand for sustainable polymer science and technology. We are fast-tracking sustainable solutions, that preserve natural resources, reduce polluting emissions while building market opportunities and equipping Irish based companies prosperity within the midlands region and beyond. PerPETual is a clear example of scientific advancement demonstrating the power to elevate our activities towards accomplishing sustainable prosperous living.

Keeping Up to Date With Our Sustainable Plastics Outputs

Instagram



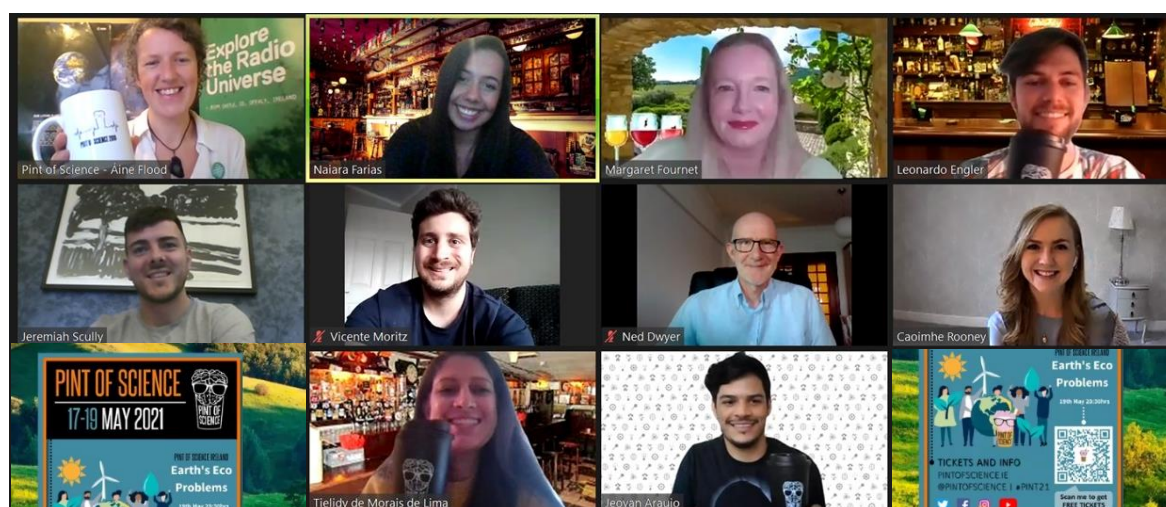
www.instagram.com/bioicep/

bioICEP.eu/

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MRI teams are actively disseminating our activities. The Pint of Science festival annual event where scientists share their research with the public was organised by as local volunteers and MRI PhD students; Jeovan Araujo, Naira Farias and Vicente Moritz Leonardo Engler and Tielidy Lima. Dr Margaret Fournet held a conversation on "Earth's Eco Challenges and Solutions"



Pint of Science Team: I Lofar Observatory Birr Castle Aine Flood, MRI Naira Farais, Margaret Fournet, Leonardo Engler, SRI Jeramiah Scully, MRI Vincente Moritz, UCC Coastal and Marine Research Centre Ned Dwyer, NASA, Caoimhe Rooney AIT Tielidy Lima and MRI Jeovan Araujo

Pint of Science 2021 was held from the 17th to the 19th of May at 16 different locations around Ireland to deliver great science to our communities. The festival, sponsored by SFI, the Faculty of Science & Health at the AIT and the Applied Polymer Technologies (APT) Gateway, among other supporting institutions, was held online with all the details and updates available at the Twitter account <https://twitter.com/pintofscienceIE/>. Dr Romina Pezzoli, who leads Packaging Research Engineering at the APT Gateway, is the Festival Regional Chapter Manager. Dr Pezzoli says “We want to keep building on the tradition of bringing Pint of Science to Athlone and other cities and towns all around Ireland as it is a wonderful opportunity to share and enjoy the great science created locally. The national team has been working in the background to make sure Pint of Science 2021 goes ahead and we look forward to celebrating our science again in the pubs in 2022”.

BiolCEP PhD students and collaborative researchers, Diana Garza (AIT), Brana Pantelic (IMGGE), N Eduardo Lanzagorta Garcia (AIT), Naira Farias and Vicente Moritz Leonardo Engler have presented their work at virtual conferences. EFB2021 is a major scientific conference organised by the European Federation of Biotechnology (EFB) and Shannon Region Postgraduates Researcher Conference (SRPRC) brings together postgrads from LIT, AIT, MIC and UL.



Collage of SRPRC and EFB2021 posters and winning presentations. This work shows on progress on microbe and enzymatic degradation of petroleum-based plastics and adding antimicrobial features and novel manufacturing to biodegradable plastics

And we have SRPRC winners too: Leonardo Engler was awarded the bBest Overall poster, Naiara Farais was awarded as Audience Favourite presentation for her 3 minute elevator pitch and Diana Garza for best graphics.

Chaitra Venkatesh has participated as a *speaker* in the Virtual Workshop “Latest advances in Urinary Stents. Biomaterials, Technology and Coatings.” As part of the COST Action CA16217, “European network of multidisciplinary research to improve the urinary stents” (ENIUS). The event was held from 23rd-24th March 2021, at which Chaitra presented a lecture entitled: Biodegradation and Antimicrobial Properties of Zinc Oxide–Polymer Composite Materials for Urinary Stent Application.

Turmeric Coloured Straws Adding Spice to Sustainability

AIT is playing a lead role in the EU Interreg NWE **CurCol** project, developing biobased colourants for biopolymer products. The spice turmeric is used. Yes, it's the same one you use to cook, with its intense orange-yellow colour. The Curcol project is cultivating and chemically modifying curcumin and at AIT we are incorporating it into polymers as a biocolourant. As curcumin is a food source, it is both bio-sourced and bio-degradable. The turmeric plant from which the curcumin is extracted has a low cultivation intensity and is an ideal candidate as a colourant for biopolymers.



Dr. James Murray

While curcumin is naturally orange in colour, by manipulating the chemistry, yellow, red and blue pigments can be produced. The ability to produce the three primary colours, means a full spectrum of bio-colourants are available. The MRI research team is busy formulating curcumin within different plastics and bioplastics to improve the ability of curcumin to maintain its colour when exposed to both ultraviolet light and heat over time. The material has recently been introduced into several different biopolymers and the team are very excited to announce their work on introducing curcumin into products like drinking straws!



Curcumin coloured drinking straws for spicy sustainable cocktail consumption