

Ireland's leading plastics researchers to fight global plastic waste problem

Athlone Institute of Technology launch a new research initiative to make plastic more environmentally friendly

Since its 1950s, global production and consumption of plastic have grown exponentially. In 2017, approximately 400 million tonnes of plastic were produced, a significant portion of which was single use. Common examples that surround us in our day-to-day lives include light-weight bags, straws, disposable razors, plastic drinks bottles and coffee capsules. The ubiquity of these items means that plastic pollution has become a global problem of prodigious proportions.

Plastic doesn't degrade or rust in the way other, more expensive to produce materials do, and can take hundreds, if not thousands of years to break down fully. In the sea, plastic can present an even bigger problem as it breaks up into tiny microparticles that are often ingested by aquatic life, like mussels and oysters, and subsequently enters the food chain. By 2050, it is likely our oceans will be populated with more plastic than fish.

While it's true that improper usage and disposal of plastic can have a detrimental effect on the environment, it also has many positive uses and has become indispensable to modern living. Dr Declan Devine, director of the Materials Research Institute (MRI) at Athlone Institute of Technology, explains: "Plastic has many applications and low production costs, something that has driven public demand for plastics in areas like food packaging and manufacturing. It has completely revolutionised the way we consume and store our food. It's also extremely strong and adaptable in ways many alternatives are

not. Plastic is an incredibly sophisticated tool for extending the shelf life of most fresh perishables while maintaining freshness.

According to Dr Ian Major, programme leader at the MRI, the use of plastic in food packaging can actually lessen the environmental impact of food waste by extending its shelf life from days to weeks. “Polyethylene shrink wrap, for example, can extend the shelf life of a refrigerated cucumber by a week, while beef that has been vacuum packed in multilayer plastic can last up to 45 days on the shelf. By extending the shelf life of food, food waste is kept to a minimum. From this perspective, plastic is key to reducing the significant environmental impact of food waste in terms of climate, land, water and biodiversity, all of which are impacted by the multiple processes involved in growing and distributing food,” he said.

Currently, more than 1.3 billion tonnes of food is being lost or wasted each year through inefficiencies in the food supply chain. Weak infrastructure, including issues with food storage, processing and packaging, and the ability to keep food fresh, leads to significant income loss for farmers and an increased cost for the consumer. The introduction of sustainable, compostable plastic could greatly reduce this wastage.

Usefulness aside, the impact of plastic on the environment and the subsequent challenges surrounding its production are keenly felt by those working in plastics research and in industry. To address this, plastic researchers and manufacturers from all over Ireland have come together to find a solution to this widescale problem. Led by Athlone Institute of Technology’s MRI, a consortium, dubbed INSPIRE (Innovative Sustainable Packaging Ireland), hopes to find a more environmentally friendly way to address the challenges associated with plastic entering the environment.

INSPIRE will seek to make the production of plastic more environmentally friendly by utilising food waste and biomass to generate a range of materials capable of replacing petroleum-based polymers for packaging applications. “The most commonly used biodegradable polymer is polylactic acid which is most frequently synthesised from corn. However, this puts added pressure on already strained global food production. We’re hoping to use special compostable polymers to make plastic production more sustainable. In the food packaging space, where plastic contamination is common, this is particularly salient.

“Used food packing is often difficult to sort and clean, and that’s if it’s a simple one plastic sheet or container. The use of multiple plastics in the same film adds complexity to this process. Combined with the prohibitive cost, this can make recycling uneconomical. Through INSPIRE, we’ll create special compostable plastic that can be disposed of in the brown food waste bin. This will help create a circular economy that will reduce the quantity of plastic ending up in the landfill or the sea.”

To help fund their research, the college will be making an application to the recently established €500 million Disruptive Technologies Innovation fund, which was established as part of Project Ireland 2040, the government's overarching policy to "make Ireland a better country for us all". More than 20 national industrial partners, ranging from small SMEs to larger multinational companies, have endorsed the project with many joining the INSPIRE consortium, in partnership with academic partners including Maynooth University, Limerick Institute of Technology, University of Limerick, University College Dublin and Trinity College Dublin.

Since opening its doors in 1970, Athlone Institute of Technology has lead polymer research and innovation in Ireland. Its polymer engineering graduates form the backbone of the flourishing Irish Plastics and Med Tech sectors. Currently, more than 430 Med Tech companies produce thousands of devices and implants in Ireland, 80% of which require at least one plastic component. To support these and other industries, the MRI house the Applied Polymer Technologies (APT), Technology Gateway. This Centre is a part of the Enterprise Ireland funded Technology Gateway Network, a nationwide resource for industrial partners. Its manager Dr Noel Gately notes that: "APT aims to provide close to market solutions for Plastics, Med Tech and related industries, and is consistently ranked in the top 3 (of 15) gateways nationally in terms of industry engagement".

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