BioICEP 解塑再用

Bio Innovation of a Circular Economy for Plastics

Previous press releases & media impacts

Global production and consumption of plastic has grown exponentially in recent decades. Since the 1950s, approximately 8.3 billion tonnes of the material have been produced – 60% of which has ended up in landfill or the natural environment.

Researchers believe that it will take hundreds, if not thousands, of years for bacteria and the enzymes that they produce to evolve to a point where they can break down the long chains of molecules that compose plastic. As a result, the accumulation of plastic is causing serious problems in the environment.

Using an innovative triple action process the BioICEP team will attempt to accelerate the degradation of traditional plastic and turn it into biopolymers, which can be used as natural biodegradable replacement plastics.

With dependency on petroleum-based plastic showing no sign of abating, the race is on to create viable, ecological alternatives that will not negatively impact companies' bottom line or affect the consumer adversely.

It is not just individuals who are looking for ecological solutions to the global plastic pollution crisis either. With more than one million plastic bottles being produced every minute, soft drinks manufacturers are under pressure to make their packaging more sustainable.

While other plastic substitutes, such as glass or sugarcane, are available to manufacturers, they can be significantly more expensive to produce and energy intensive to transport - resulting in a higher net carbon footprint.

While bioplastics research is still emerging and as of, yet most materials do not contain the performance properties required to ensure that they can be fully biodegraded, project BioICEP is still a much-needed step in the right direction.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870292.
This publication reflects only the author's view and that the Commission is not responsible for any use that may be made of the information it contains.

The project's approach is a triple-action depolymerisation system where the plastic waste will be broken down in three consecutive processes:

Mechano-biochemical disintegration processes, including a new proprietary sonic-green-chemical technology to reduce the polymer molecular weight of the base polymer to make it amenable to biodegradation.

Biocatalytic digestion, with enzymes enhanced through a range of innovative techniques including accelerated screening through a novel fluorescent sensor and directed evolution.

Microbial consortia developed from best in class single microbial strains, which combined leads to highly efficient degradation of mixed plastic waste streams. The outputs from this degradation process will be used as building blocks for new polymers or other bioproducts to enable a new plastic waste-based circular economy.

The €5 million project, which will span four years, commencing in February 2020, will be led by Athlone Institute of Technology, a third level institute in the heart of Ireland with a significant expert knowledge base and strong industry connections. AIT plus thirteen other partners from nine different European and Asian countries took part in the BioICEP project: ACTECO AND AIMPLAS (Spain), AVECOM (Belgium), TECHNISCHE UNIVERSITAT CLAUSTHAL (Germany), INSTITUT ZA MOLEKULARNU GENETIKU I GENETICKO INZENJERSTVO (Serbia), INSTITUTO DE BIOLOGIA EXPERIMENTAL E TECNOLOGICA and LOGOPLASTE INNOVATION LAB LDA (Portugal), ATHLONE INSTITUTE OF TECHNOLOGY, LIMERICK INSTITUTE OF TECHNOLOGY and THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN (Ireland), MICROLIFE SOLUTIONS BV (the Netherlands), NATIONAL TECHNICAL UNIVERSITY OF ATHENS – NTUA (Greece) and BEIJING INSTITUTE OF TECHNOLOGY, INSTITUTE OF MICROBIOLOGY – CHINESE ACADEMY OF SCIENCES and SHANDONG UNIVERSITY (China).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870292.
This publication reflects only the author's view and that the Commission is not responsible for any use that may be made of the information it contains.