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PET BIORECYCLING : FROM ENZYME ENGINEERING TO A FIRST INDUSTRIAL UNIT

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PURPOSE OF THE ABSTRACT
PET BIORECYCLING : FROM ENZYME ENGINEERING TO A FIRST INDUSTRIAL UNIT

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Plastics are found everywhere in our daily-life, they are exceptional materials and represent an annual world production of 322 million tons. However, their lifetime is often limited and nowadays they represent a major environmental issue with 125 million tons of generated plastic waste annually. Only 10% of collected plastics are recycled, and, at best, plastic wastes are incinerated but an unacceptable quantity are lost in nature, with for instance 9 million tons ending each year in the oceans.
Carbios (http://www.carbios.com), a young innovative green chemistry company, in collaboration with the laboratory TBI (Toulouse Biotechnology institute; INSA/CNRS/INRAE; http://www.toulouse-biotechnology-institute.fr), developed an extraordinary enzyme used to break down PET to return to monomers. A purification scheme was developed at pilot scale (1m3) to produce monomers with the same quality than petrochemical ones. It enables the material to be recycled ad infinitum and creates a virtuous circular economy scheme. The work of enzyme evolution leading to the possibility to make a new bottle from plastic waste was published in Nature (Volume 580 Issue 7802, 9 April 2020) and new development in enzyme engineering will be presented. A demo plant (reactor of 20m3) is operational since September 2021 and validates the technology. Carbios has announced the construction of a first industrial unit which will process 50,000 tonnes of PET waste in France which will be operational in early 2025

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

PET recycling | Enzyme | PETase | Industrial unit

BIBLIOGRAPHY