CO_2-Recycling: Carbon-Negative Bioplastic Production

acib in cooperation with Graz University of Technology has developed a method for automatic production of bioplastics from CO_2. The CO_2 from exhaust gases is assimilated by bacteria and converted into biodegradable natural polymers.

BACKGROUND

Biodegradable plastics made from CO_2 combine the advantages of CO_2 recycling with the replacement of fossil plastics. Natural microbes produce the bioplastic polyhydroxyalkanoate (PHA) from 98% CO_2. PHA plastics have properties that are similar to the petroleum polymers polypropylene (PP) and polyethylene (PE). They are UV-stable, able to withstand higher temperatures, show good resistance to moisture and provide a good barrier for aroma compounds. Currently, PHAs are provided for in compostable waste bags, biodegradable mulch films, packaging but also cosmetics and 3D high-tech medical applications such as implants. In 2021, 48 kilotons were produced with traditional technology using mainly sugars or oils as feedstocks.

TECHNOLOGY

acib exploits *Cupriavidus necator* (aka *Ralstonia eutropha*), a fast-growing bacterium able to use H_2 (e.g. from electrolysis of water using excess of electric energy), O_2 and CO_2 for growth and PHA formation**. A highly automated process for the production of top quality PHA from CO_2 is already available (TRL 4 – Technology validated in lab). We now strive to valorise CO_2-rich off-gases from industrial processes and to produce innovative, biodegradable plastic products with new partners.

OFFER

acib seeks investors and industrial partners to develop this technology to commercial scale. We are addressing the CO_2-producing industry, plant engineering companies and those interested in bioplastics. Under protection of a CDA/NDA we provide you with details on advanced biopolymer productions. Any IP developed in a joint project would fully belong to the new investor/industrial partner.

acib-EXPERTS
Prof. Dr. Regina Kratzer
Prof. Dr. Markus Reichhartinger
DI Vera Lambauer

AVAILABLE FOR
- Investments
- Joint Research Projects
- Contract Research

DEVELOPMENT STATUS
Technology Readiness Level 4
(Technology validated in the lab)

IPR
Will be generated for our industrial partner / investor

KEYWORDS
CO_2-Recycling
PHA, PHB
Bioplastics
Exhaust gas
Biodegradable
Cupriavidus necator

CONTACT
acib GmbH
Krenngasse 37
8010 Graz
tel: +43 316 873 9316
e-mail: bd@acib.at
www.acib.at

*Illustration Kratzer, R.

**Lambauer, V., Kratzer, R. (2022) Lab-scale cultivation of *Cupriavidus necator* on explosive gas mixtures: carbon dioxide fixation into polyhydroxybutyrate. Bioengineering, 9:204; DOI.org/10.3390/bioengineering9050204