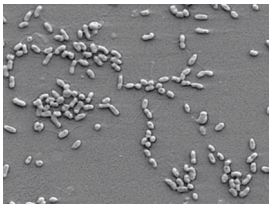
Biopolymers – extracellular high-yield production

The innovation

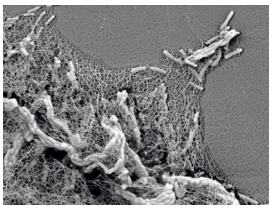
Overpopulation and increasing oil prices urge the efficient and sustainable use of natural resources in order to produce eco-friendly and high efficient materials such as biodegradable polyhydroxy alkanoates (PHAs). Thus, the sector of these so-called biopolymers is growing fast, already expected to become a multibillion dollar market. This is despite the cost disadvantages in comparison to oil-based polymers. Much faster growth is expected once significant reduction in costs and increases in yield have been achieved.

The cost-efficient production of biopolymers i.e. natural occurring polymers produced by bacteria is hampered by their intracellular localization. This circumstance limits biopolymer production to the space provided by the cell's cytoplasm and increases the complexity of downstream processing, requiring breakdown of the bacterial cell wall, substantial use of solvents as well as time-consuming and expensive separation of the biopolymers from the cell's crude extracts.

The innovation relates to a genetically engineered PHA producer strain e.g. of the genus Pseudomonas, capable of hyperproducing biopolymers from inexpensive feedstocks and extracellularly accumulating them in the growth medium. This offers several advantages compared to state-of-the-art processes, with the most important one being the easy, efficient and ecofriendly product recovery directly from the growth medium. This benefit facilitates – for the first time – the cost-efficient and economic production of biopolymers (PHAs) for technological purposes e.g. production of ecofriendly, biodegradable packing materials. The process provides a long term competitive advantage with limited future competition if any.



Wild-type strain



Genetically engineered strain

Advantages at a glance

- Overproduction of medium chain-length polyhydroxyalkanoates (PHAs)
- Substantial advantages in product recovery due to extracellular deposition
- Biodegradable and non-immunogenic biopolymers with favorable, mechanical properties (e.g. toughness, softness)
- Non-competition with food production (current feedstock: grease or oil waste)
- All genes and polypeptides involved in PHA anabolism protected

Keywords

- **Biodegradable plastics**
- **Biopolymers**
- **Ecofriendly production and recovery**
- **Extracellular localization**
- **Polyhydroxyalkanoates, PHAs**

Areas of application

- **Biodegradable materials, i.e. packing materials, fast food supplies, textiles/ fibers, medicine, toys, agriculture**
- **Medicine: biodegradable, non-immunogenic implants**
- **Bioremediation**
- **"White" biotechnology**

Patent status

The invention is filed internationally. It is owned by Dritte Patentportfolio Beteiligungsgesellschaft mbH & Co. KG. The application was filed in August 2005.

To acquire a licence for this new technology, please don't hesitate to contact us!

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