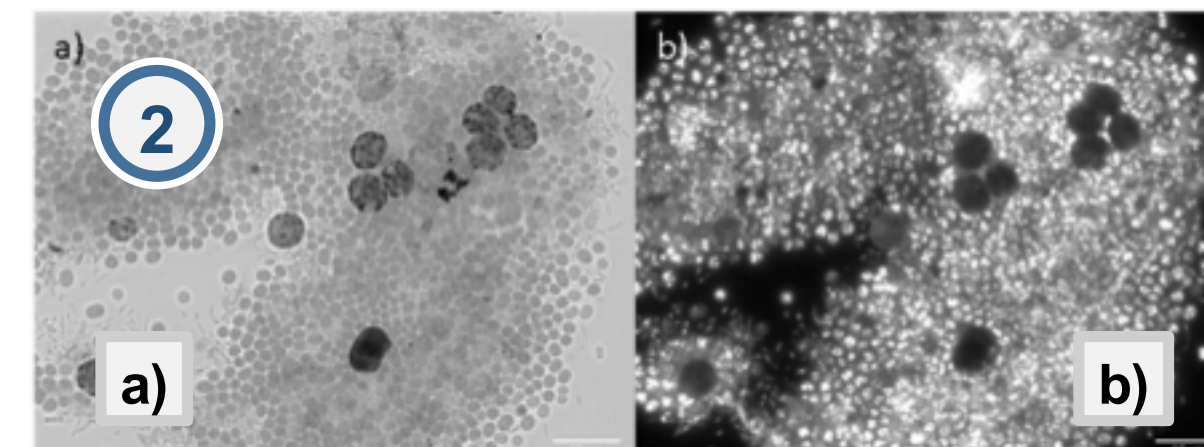
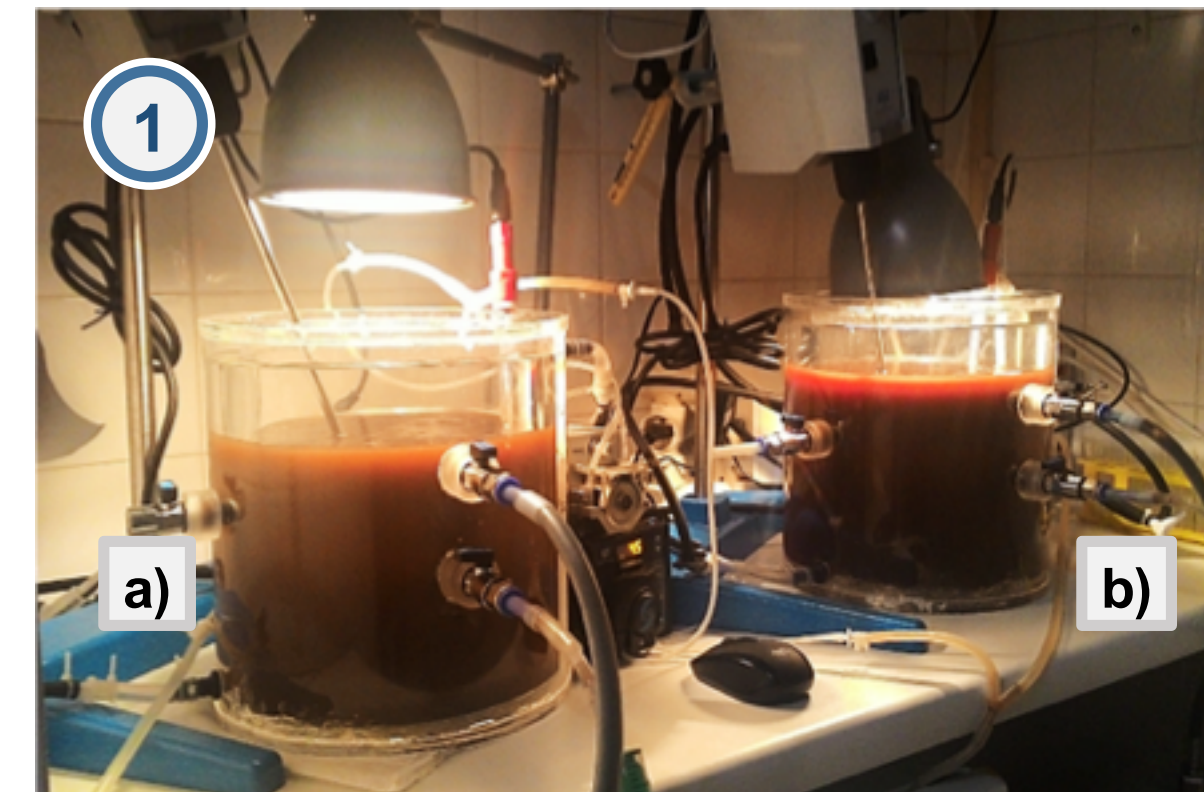
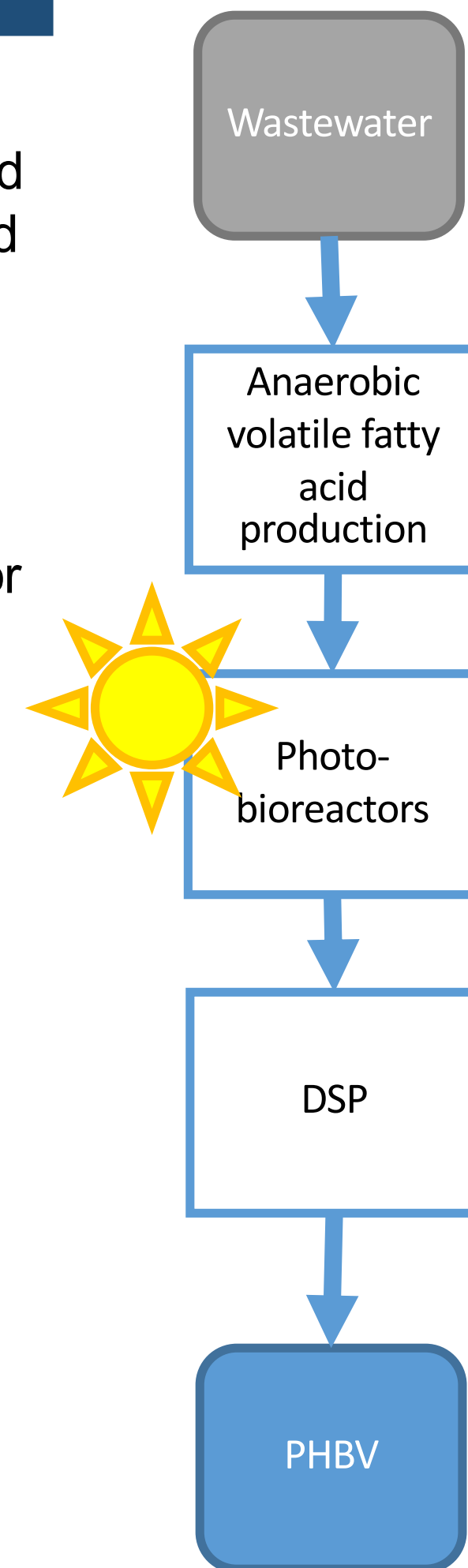


## Scope

**Polyhydroxyalkanoates (PHAs)** are biopolymers that can be synthesized and internally accumulated by diverse microorganisms. PHAs are incorporated into plastic formulations with **reduced carbon footprint** and improved **biodegradability**.

The **INCOVER collaborative project** aims to optimize existing algae production infrastructure for **PHA production from wastewater using photosynthetic mixed cultures** through enrichment in PHA-producing **photosynthetic purple bacteria**. Mixed cultures to produce PHAs from wastewater provide **low cost production systems** yielding co-polymers with useful mechanical properties.

However, the challenges involved in the **purification of the PHA** from such a complex mix are significant. Biotrend is currently developing **simple, low-cost and environmentally friendly processes**, that can be easily plugged in existing wastewater treatment plants, for the **purification of PHAs** with different specifications.



## Results

### 1) Photo bioreactors enriched with PHA-accumulating purple bacteria.

- a) PBR operated under permanent carbon feast and simulating a high-rate algal pond (HRAP) with low sun exposure and anaerobic conditions.
- b) Feast and famine operation and simulating a paddle wheel HRAP. Reactors operated with temperature and illumination simulating average summer conditions.

### 2) Microscope image of the culture.

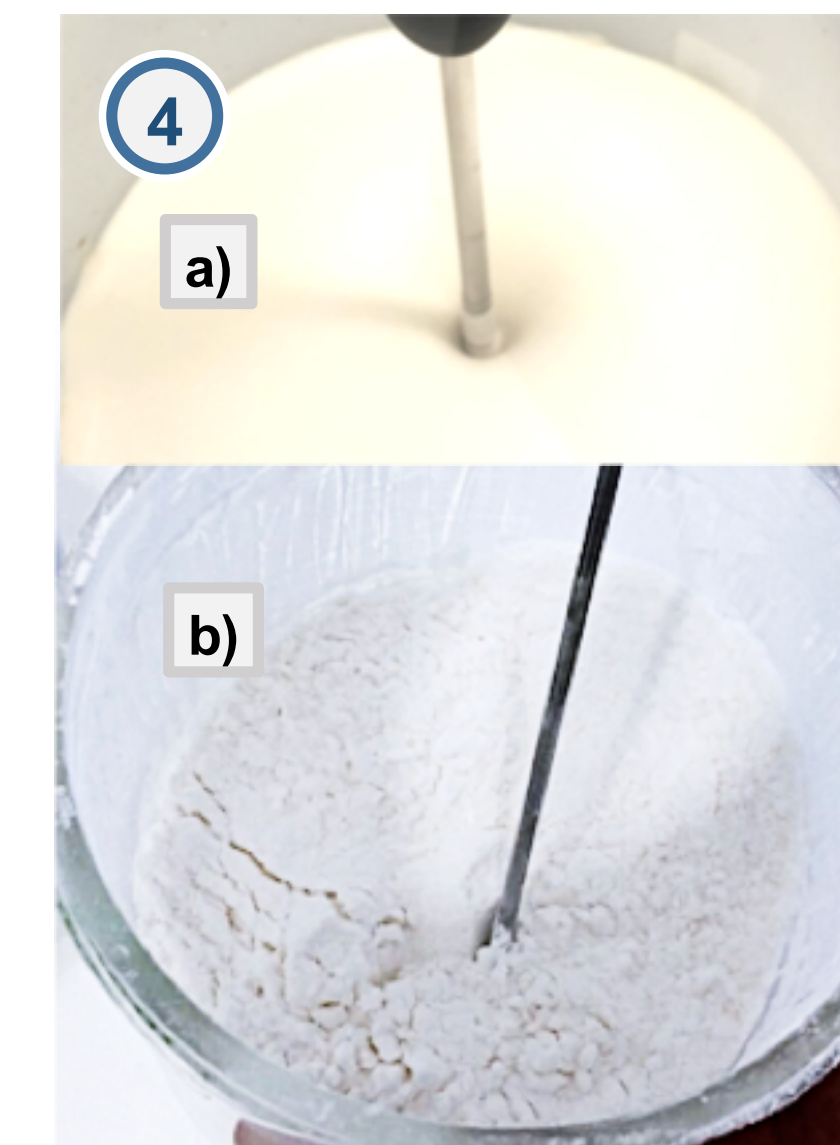
- a) Bright field;
- b) Fluorescence image of Nile blue staining indicating PHA granules.

### 3) Pilot plant ponds:

- a) Conventional HRAP
- b) PBR with PHA-accumulating purple bacteria

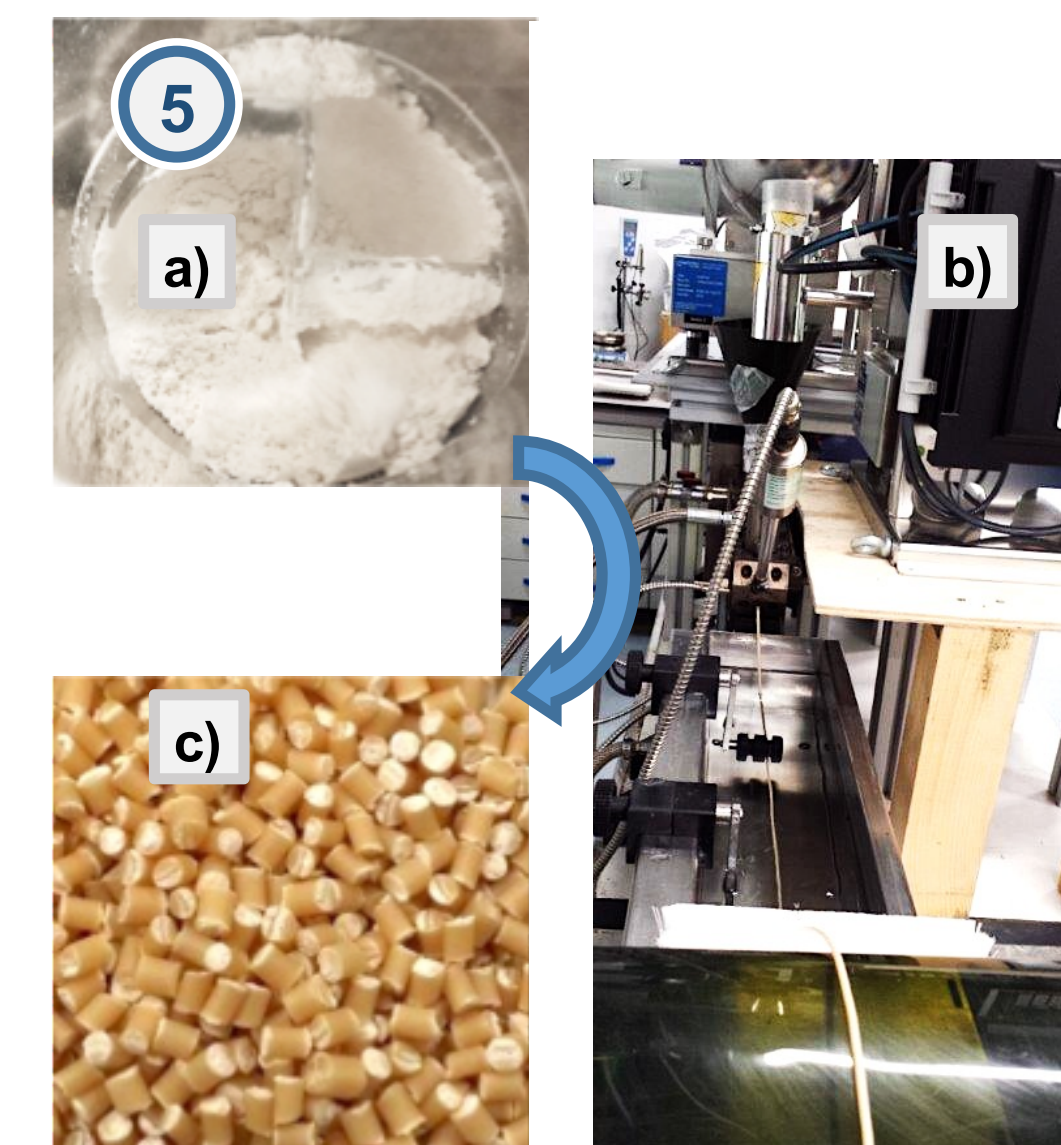
### 4) PHA extraction from the bacterial biomass

- a) Using proprietary aqueous-based process, the biomass components are digested and washed out.
- b) Water removal and drying to obtain PHA powder with high purity.



### 5) Polymer formulation and pelletizing

- a) The polymer powder is mixed with customary processing aids and added to the hopper of an extruder.
- b) A PHA filament is obtained.
- c) PHA pellets are produced from the PHA filament.



## Conclusions

PHA-accumulating photosynthetic purple bacteria were selected and used in industry-relevant conditions.

An aqueous PHA extraction method was developed to provide a polymer with commercial specifications.