Results

PHAs are recyclable bioplastics that can be produced by microbes such as Cupriavidus necator [1]. This bacteria was selected for this study because:

- It is very robust,
- it grows well at low temperatures [1-4],
- produces high yields of PHAs.

Figure 1: PHA structure (left) PHA granules within microbes (right) [2].

Over 25 million tonnes of waste plastic accumulate in the environment per year. Polyhydroxyalkanoates (PHAs) could be an alternative, non-toxic, biodegradable, eco-friendly plastic [1].

**Factors currently limiting the use of PHAs**

- High cost of the nutrient sources for biosynthesis,
- expensive processing requirements to extract,
- comparatively cheaper traditional plastics [1,4].

**Materials**

- Cupriavidus necator formallyRalstonia eutropha H16 (NCIMB 10442, ATCC 17699).
- The Oxidised PS produced by The Department of Chemical Organic Technology and Petrochemistry, Silesian University, Poland.
- PHA-blend scaffolds produced at the Centre of Polymer and Carbon Materials, P.A.N., Zabrze, Poland.
- Chemicals used for this study were provided by Lab M Ltd, UK.

**Introduction**

Polyhydroxyalkanoates (PHAs) of Chemical Organic Technology and Petrochemistry, Silesian University, Poland.

**Project aims**

- To use waste polystyrene (PS-0) plastics (thermally treated) as a carbon source for bacteria to make bioplastics [4].
- To prove the PHAs produced can be used for novel purposes.

**Method**

**Upstream:** To prevent any impurities that could have a negative affect on the bacterial growth media, no initiators or catalysts were used in the production of PS-1 to 4, making the process more eco-friendly.

**RESULTS**

**PHAs**

- The Oxidised PS produced by The Department of Chemical Organic Technology and Petrochemistry, Silesian University, Poland.
- PHA-blend scaffolds produced at the Centre of Polymer and Carbon Materials, P.A.N., Zabrze, Poland.
- Chemicals used for this study were provided by Lab M Ltd, UK.

**Acid Number range 22 - 39.**

**Confirmation of PS using titration.**

**Chemical analysis of PS-0 to 4.**

**Figure 3:** Overall process

**Conclusions**

- PHAs were produced from PS-0 to 3 and structures were confirmed using NMR, ESI-MS analysis [4].
- PHA-blends can be used for novel applications replacing traditional plastics [5].

**Future aims**

- Investigation into extraction techniques.
- Wider range of waste plastics for PHA processing.
- Improved PS emulsifying methods.

**References**


