Direct and Efficient Synthesis of Poly(3-Hydroxybutyrate)

CCTEC D-5171

Invention Summary:

A direct and highly efficient, one-pot method for the synthesis of poly(3-hydroxybutyrate) (P3HB) from epoxides and CO. This process eliminates the need for purification of the toxic lactone intermediate.

Poly(3-hydroxybutyrate) is a naturally occurring biodegradable and biocompatible polyester that exhibits properties similar to polyolefins. The current processes for production result in low molecular weight polymers, are energy-intensive and necessitate polymer separation from the bacterial culture used for synthesis.

Potential Commercial Applications:

- For commercial production of P3HB.

Potential Advantage:

- Yields a high-molecular weight polymer versus a low molecular weight polymer produced via bacterial fermentation.
- A one-pot tandem catalytic transformation eliminates the need for purification of an intermediate.
- An atom-economical and low-energy, low-cost method that can replace the energy-intensive, currently used process.

Technical Merits:

- High purity of P3HB polymer.
- Eliminates the need to isolate and purify the toxic intermediate compound that occurs with current production methods.
- Can be substitute for petroleum-derived polyolefins.

Publication: