



Biodegradable Polyester Produced From Non-toxic, Renewable Monomer

Technology No. z05135

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Biodegradable Polyester has Higher Molecular Weight

A method has been developed to produce a biodegradable polyester known as poly(3-hydroxypropionic acid). The method combines the high-molecular weight and control aspects of ring-opening polymerization with the commercial availability of the beta hydroxy acid, 3-hydroxypropionic acid which is abbreviated as 3-HP. Since 3-HP can be derived from biological sources, the resulting material, poly(3-hydroxypropionic acid) or P(3-HP), is biorenewable. The new method allows direct synthesis of the bio-based polymer P(3-HP) from 3-HP, a commercial monomer that is derived from corn. The method uses a single vessel reactor for simple synthesis and rapid scale up. The method results in a higher molecular weight which makes the polymer more structurally sound using a process with lower toxicity than competing technologies.

The market for a bio-based and biodegradable replacement for polyester is expected to grow rapidly during the next five years. The bio-based polyester, P(3-HP), has attractive mechanical properties, such as rigidity, ductility, and exceptional tensile strength in drawn films and can be created using the new lower toxicity method. On account of these properties, P(3-HP) has applications in packaging or biodegradable plastics.

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FEATURES AND BENEFITS OF METHOD TO PRODUCE P(3-HP)

- Allows direct synthesis of a biodegradable, bio-based polymer, poly (3-hydroxypropionic acid) from 3-hydroxypropionic acid, which can be derived from corn and is commercially available
- Uses a single vessel reactor that can be used for simple synthesis and rapid scale up
- Results in a higher molecular weight using a process lower in toxicity than competing technologies

Phase of Development Synthesized on laboratory scale. Additional development needed to optimize and scale-up the process.

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