Docket #: S06-206

Bacterial Poly-Hydroxy-Alkanoate (PHA) Polymer and Natural Fiber Composites for Structural Applications

A team of Stanford engineers has developed a process for making structural-grade materials with renewable, biodegradable resources. This technology uses resins of the bioplastic PHA (polyhydroxyalkanoate) combined with woven and other natural fibers to form strong, stiff, light-weight laminate composites. These composites can be formed into boards and sandwich panels or shapes such as tubes to form structural components using a very low cost feedstock (such as methane) to produce the bioplastic.

Stage of Research
The inventors have performed sandwich panel testing and modeling as well as accelerated weathering testing. They have also demonstrated that the materials can be easily cut with a laser cutter.

Ongoing Research
The inventors have been exploring fiber treatments to limit moisture uptake while still allowing for anaerobic biodegradation so as to make useful products that will biodegrade rapidly to be fully recyclable.

Applications

- **Cleantech construction** - renewable fabrication of materials for housing and light industrial construction; including supplies such as
    - interior finishes
    - formwork

    - flooring
    - wall panels

Advantages

- **Renewable** - can be grown and replenished at a much faster rate than wood; after their useful service life the biocomposites can be biodegraded to methane to be sold as fuel or to be used as feedstock to produce more bioplastic.
- **Stronger and stiffer** than many current biocomposites
- **Customizable** - compared to timber, wider range of possibilities for structural properties and shapes
- **Non-toxic**

Publications

- US Patent Application 20110112257
- Christian, SJ and SL Billington (2009) "Mechanical Characterization and Structural Assessment of Biocomposites for Construction", Blume Center Technical Report.
- Christian, SJ and SL Billington (2009) "Sustainable Biocomposites for Construction," Proceedings for Composites & Polycon 2009, American Composites Manufacturers Association, Tampa, FL, January.

Patents

- Published Application: 20080160567
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