High Strength Lignin Based Plastics

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High Lignin Plastics with Impressive Tensile Strength

A new generation of lignin plastics feature very high lignin content and exhibit comparable—or even superior—properties compared to conventional PMMA and polystyrene. These innovative polymeric materials contain at least 80% lignin and are predominantly comprised of methylated or non-methylated ligninsulfonate. These plastics show promising tensile strength, and plasticizers or other polymers can further enhance their mechanical properties. Click here to view the Non-confidential Summary.

Lignin Content More Than Doubled

Current lignin-based plastics lack satisfactory mechanical properties and previous processes have limited the amount of lignin that can be incorporated, as they exhibit significant degradation with more than 35-40% lignin content. The high-lignin plastics and polymeric materials show promising tensile strengths with formulations using 85-100% lignin content. Not only are these plastics stronger than current lignin-based plastics, but they add value to the bio-refining and pulp industries that produce lignin as a byproduct and most often burn it for its fuel value. This technology offers a route to realizing significant commercial value from lignin in the form of a new renewable plastic.

BENEFITS AND FEATURES:

- Eco-friendly alternatives to traditional petroleum-based plastics
- Comparable or even superior to conventional polystyrene and poly(methyl methacrylate) PMMA
- Increased lignin content and higher durability than most lignin-based plastics
- Tensile strength >50 MPa
- Fully biodegradable

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• Cost-reduction of biofuel production by commercializing lignin side product

APPLICATIONS:

• All applications in which plastics are used (polystyrene replacement in engineered plastic, non-petroleum or bioplastics, BPA-free plastics)
• Could replace plastic film or netting residues in agricultural or soil erosion control applications
• Non-packaging applications (e.g., automotive, furniture, appliance and other durable

Phase of Development

Proof of concept demonstrating high-strength plastics with high ligninsulfonate and methylated ligninsulfonate content. Plastic samples made and mechanical properties tested in the laboratory.

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