Low-Cost Synthesis of High Performance Polyurethanes

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BACKGROUND

Polyurethane (PU) materials, including elastomers, flexible/rigid foams, films, coatings, fibers, and thermoplastics are of growing interest in the field of green chemistry. In 2017, approximately 5.8 billion pounds of PU materials were consumed in various end-use markets such as building and construction, furniture, and bedding with an economic output reaching $296.8 billion in the US. Currently, there is yet to be an economically viable model for a lignocellulosic biorefinery.

BRIEF DESCRIPTION

Professor Charles Cai from the University of California, Riverside has developed a method to produce a high-performance, renewable polyurethane material made from biomass lignin for use as an adhesive, resin, coating, or plastic. In this method, diols were introduced to realize faster and complete dissolution of technical lignins in volatile organic solvents, which improve lignin miscibility with other components and its dispersion in the PU materials. This technology is advantageous because it improves the economic viability of lignocellulosic biorefinery, can replace petroleum-based polyols in commercial polyurethanes products to reduce carbon footprint, and, as a natural UV-block, lignin reduces the UV aging of PU materials.

Fig 1: The UCR method to produce polyurethane material from biomass lignin.

APPLICATION

- To produce a high-performance, renewable polyurethane material made from biomass lignin for use as an adhesive, resin, coating, or plastic.

PATENT STATUS

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OTHER INFORMATION

KEYWORDS

bioplastic, resin, coating, polyurethane, adhesive, lignin, biomass, bioproduct

CATEGORIZED AS

- **Materials & Chemicals**
  - Chemicals
  - Polymers

RELATED CASES

2022-895-0

Country	Type	Number	Dated	Case
United States Of America	Published Application	2023036574	11/16/2023	2022-895

RELATED MATERIALS

▶ Polyurethanes Based on Unmodified and Refined Technical Lignins: Correlation between Molecular Structure and Material Properties
Yun-Yan Wang, Brent Scheidemantle, Charles E. Wyman, Charles M. Cai, and Arthur J. Ragauskas Biomacromolecules 2021 22 (5), 2129-2136 DOI: 10.1021/acs.biomac.1c00223 - 04/26/2021

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