

Title:

The synthesis of biobased epoxy resins using lignin

People:

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Short Description:

The growth of the biobased economy has fueled interest in replacing non-renewable polymers with sustainable alternatives. Epoxy resins represent a major class of thermosetting polymers that are largely synthesized from the petrochemical-derived precursor bisphenol A. Lignin offers a potential biobased alternative to bisphenol A, however developing lignin-based epoxy resins that can outperform bisphenol A resins has proved scientifically challenging. Traditional pulping methods for extracting lignin from lignocellulosic biomass can heavily modify the chemical structure of the lignin, making it difficult to process into epoxy resins with desirable properties.

Our research, focuses on taking the advantage of the inherent properties of native lignin found in wood to produce a bio-derived polyphenol which is a more suitable precursor to high quality epoxy resins. Using mild hydrogenolysis, native lignin could be selectively depolymerized into a well-defined mixture of monomers and oligomers with reactive phenolic groups. These products are reacted with epichlorohydrin to give epoxy prepolymers for subsequent blending with bisphenol A or glycerol-based epoxy prepolymers. Curing of the blended resins produces biobased epoxy resins with comparable properties to the commercial bisphenol A resins.

