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SIMPOSIO INTERNACIONAL SOBRE MATERIALES LIGNOCELULOSICOS

Towards Thermoplastic Lignin Polymers ; Synthesis & Characterization of Poly(aryl ether sulfone) Kraft Lignin Heat Stable Copolymers

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During this presentation, the fundamental work of our group will be described aimed at creating reactive lignin materials that are stabilized and rendered better suited for industrial applications. Specifically, our work provides methods for creating lignins of controlled and modulated characteristics exhibiting thermal and polymerization stabilities. Such thermal properties and stable molecular weight distributions of lignins and copolymers produced from commercial lignins provides a means for beneficially modulating the properties of an otherwise intractable bio-polymer.

More specifically, our presentation will describe our understanding of using the phenolic hydroxyl groups of technical softwood kraft lignin in replacing the multifunctional phenolic component required for the synthesis of poly(arylene ether) sulfones. To do this we use a two-pronged approach that uses fractionated softwood kraft lignin whose phenolic hydroxyl groups have been systematically protected in order to avoid gelation when copolymerized with 4, 4'-diflourodiphenyl sulfone (DFDPS). We will thus describe the progress of these copolymerizations for the different lignin and the initial unfractionated lignin. This has been done by careful ^{31}P NMR profiling of the various hydroxyl groups present in the lignin as a function of the degree of phenolic hydroxyl group protection. For all copolymers, weight average molecular weights (M_w), polydispersity indices (PDI), glass transition temperatures (Tg) and thermal stability profiles were characterized, providing an integrated picture of the scientific and technological ramifications of this work.