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The Effect of Plant Source on the Structural Properties of Lignin-based Polyurethane Blends JASON LANG, MARK DADMUN, Univ of Tennessee, Knoxville — The development of polyurethane materials based on incorporating lignin from a variety of plant sources (softwood, hardwood, and non-wood) were synthesized. Further experiments study the physical properties of the resulting lignin-based polyurethane as a function of the lignin structure, which varies with plant source. Here, we report the effect that internal crosslinking of the lignin structure has on the modulus, hardness, glass transition temperature, and thermal decomposition of the synthesized lignin-based polyurethane composites. The lignins used in this work were a softwood kraft lignin, hardwood lignosulfonate, and a wheat straw soda lignin. The lignin, acting as a polyol and the hardblock segment, reacts with TDI-endcapped PPG (2,300 M_N) as the rubbery softblock component to produce lignin-based polyurethanes with varying lignin content (10, 20, 30, 40, 50, and 60 wt%). Results show that the wheat straw lignin provides the superior mechanical properties and thermal resistance. These properties are correlated to the two-phase morphology of the resultant polyurethane.

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