

## **PREPARATION AND CHARACTERIZATION OF MODIFIED LIGNIN FOR THE PRODUCTION OF CARBON FIBERS**

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Lignin, one of the most abundant and cheap natural biopolymers, can be efficiently converted to low cost carbon fibers. From light weight automobile to energy storage applications, lignin carbon fibers can be used for a wide range of applications. However, different applications require different types of carbon fibers. The property of lignin fibers vastly depend on its precursors. Thus, by modifying the precursor, lignin fibers can be customized for a specific application. In this work, a series of modified lignin samples were prepared from Alcell and softwood lignin and we developed procedures to modify key functional groups. Further, these procedures were optimized to obtain high yields of modified precursors at low cost. All lignin samples were characterized by NMR (<sup>13</sup>C and HMQC) which clearly showed structural changes in modified lignin samples. Thermo-gravimetric analysis (TGA) and differential scanning calorimetry (DSC) generally revealed higher thermal stability of modified lignin precursors compared to unmodified lignin samples. Precursor modification affects parameters for melt processing, stabilization and carbonization, which impacts the material properties of the final carbon fiber. Our current efforts focus on the characterization of the lignin carbon fiber microstructure.