

## ANALYSIS OF NOVEL LIGNIN EXTRACTED FROM “MELT COMPOUNDED” BIOMASS

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Lignin fractionation from biomass, in good yield and with little modification, is a key challenge to produce biobased value-added components from lignocellulose. The purpose of this study was to investigate the novel characteristics of extracted lignin from “melt compounded” wood. Pretreatment of sweet gum (*Liquidambar styraciflua*) using industrially proven polymer-processing equipment with a non-toxic solvent enabled the disruption of the recalcitrant wood cell wall, resulting in high-yield lignin extraction. Nine different pretreatment severities were used to explore the impact of processing on the extracted lignin structure. Quantitative <sup>31</sup>P and <sup>1</sup>H nuclear magnetic resonance spectroscopies, along with thioacidolysis were the main tools to illustrate the isolated lignin functionality and structure. Additionally, size exclusion chromatography analysis was used to determine the molecular weight for the isolated lignin. Overall, extracted lignin from the pretreated biomass exhibited a high molecular weight, a minimum amount of condensed phenolic groups, and a minimum amount of carboxylic acid groups. Hence, the melt compounding pretreatment of biomass offers a route to fractionate and recover lignin in good yields from biomass that has functionality and structure with minimal modification compared to other pretreatment methods such as dilute acid and organosolv pretreatment methods.