**Lignin monomer production integrated into the γ-valerolactone sugar platform**

Valorization of lignin from biomass is challenging and research efforts have lagged behind the upgrading of sugar streams. Yet lignin comprises a substantial portion of lignocellulosic biomass (15-30% by weight), is the most energy dense fraction, and is a rich source of aromatic compounds. Thus tapping into lignin as a source of valuable co-products could improve the economics of biorefineries. A recent paper from GLBRC examines lignin extracted from corn stover utilizing γ-valerolactone (GVL), a renewable solvent that can be obtained from biomass. Previous reports on the GVL process focused on C5 and C6 sugars from biomass and the ability to upgrade to chemicals or biofuels. In the new report, researchers used 2D HSQC NMR to examine the structure of GVL-derived lignin and showed that it is highly native-like, which they attribute to the mild reaction conditions of the GVL process. The lignin could be upgraded using a two-stage hydrogenolysis process over a Ru/C catalyst, resulting in soluble lignin-derived monomers corresponding to 38% of the carbon in the original lignin. Inclusion of methanol in the catalytic upgrading increased the monomer yield to 48%, most likely due to esterification and stabilization of carboxylic acid intermediates. The yield of aromatic monomers from GVL-lignin and lignin obtained from unprocessed biomass are comparable and is 2-3 times higher than lignin derived from acid- or ammonia-based pretreated material. This study suggests the possibility of developing an integrated process for upgrading all three biomass fractions: C5- and C6-sugars as well as the lignin. The GVL platform could allow for easy and efficient upgrading of sugars and lignin, essential steps in the development of a successful, economically viable biorefinery.

**Reference:** **Luterbacher, J.S., Azarpira, A., Motagamwala, A.H., Lu, F., Ralph, J., and Dumesic, J.A.** (2015) Lignin monomer production integrated into the γ-valerolactone sugar platform. Energy and Environmental Science 8:2657-2663.

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