**[Intensified reductive catalytic deconstruction of lignin: A low-pressure process for high-value bioproducts](https://acs.digitellinc.com/acs/live/22/page/677/5?eventSearchInput=&eventSearchDateTimeStart=&eventSearchDateTimeEnd=&eventSearchTrack%5b%5d=201" \l "sessionCollapse394076)**

[*Robert O'Dea*](https://acs.digitellinc.com/acs/live/22/page/677/5?eventSearchInput=&eventSearchDateTimeStart=&eventSearchDateTimeEnd=&eventSearchTrack%5b%5d=201)*,*[*Olumoye Ajao*](https://acs.digitellinc.com/acs/live/22/page/677/5?eventSearchInput=&eventSearchDateTimeStart=&eventSearchDateTimeEnd=&eventSearchTrack%5b%5d=201)*,*[*Marzouk Benali*](https://acs.digitellinc.com/acs/live/22/page/677/5?eventSearchInput=&eventSearchDateTimeStart=&eventSearchDateTimeEnd=&eventSearchTrack%5b%5d=201)*, and*[*Thomas Epps*](https://acs.digitellinc.com/acs/live/22/page/677/5?eventSearchInput=&eventSearchDateTimeStart=&eventSearchDateTimeEnd=&eventSearchTrack%5b%5d=201)

*University of Delaware*

Lignin is the most abundant natural source of aromatics, and although its recovery/isolation from biorefineries is increasing, current commercial extraction is primarily through Kraft pulping. Only 2% of the separated Kraft lignin (~160 kt/y) is recovered, and the lack of isolation infrastructure hinders the potential utility of existing lignin feedstocks. Additionally, structural heterogeneity, broad molecular weight distribution, dark color, and unpleasant odor generally limit lignin to low-value applications. Deconstruction to aromatic compounds is a promising strategy for the generation of high-value bioproducts from lignin, and in this work, two catalytic processes were examined for the valorization of technical lignin samples from numerous sources (*e.g.,*Kraft, soda, organosolv, and thermomechanical pulping). First, the technical lignins were deconstructed *via*a conventional reductive catalytic fractionation (RCF) process, and a correlation between lignin thermal stability and phenolic product yield was developed. This relationship enabled the development of a facile screening method for the ‘deconstructability’ of technical lignins. Second, a novel, reactive distillation-reductive catalytic deconstruction (RD-RCD) process was leveraged to simultaneously deconstruct lignin to its constituent phenolic building blocks and purify those compounds. RD-RCD was similar to conventional RCF with respect to phenolic yields and product distributions but operated at significantly lower pressure, resulting in a safer, less-costly process that may be more scalable than existing valorization approaches. Finally, to demonstrate the utility of the RD-RCD bio oils, a biobased stereolithography resin was prepared and successfully printed with a commercial stereolithography (SLA) 3D printer.

Diagram

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