

Transforming waste into bio-based chemicals

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Researchers at Berkeley Lab have transformed lignin, a waste product of the paper industry, into a precursor for a useful chemical with a wide range of potential applications.

Lignin is a complex material found in plant cell walls that is notoriously

difficult to break down and turn into something useful. Typically, lignin is burned for energy, but scientists are focusing on ways to repurpose it.

In a recent study, researchers demonstrated their ability to convert lignin into a [chemical compound](#) that is a building block of bio-based [ionic liquids](#). The research was a collaboration between the Advanced Biofuels and Bioproducts Process Development Unit, the Joint BioEnergy Institute (both established by the Department of Energy and based at Berkeley Lab), and the Queens University of Charlotte.

Ionic liquids are powerful solvents/catalysts used in many important industrial processes, including the production of sustainable biofuels and biopolymers. However, traditional ionic liquids are petroleum-based and costly. Bio-based ionic liquids made with [lignin](#), an inexpensive organic waste product, would be cheaper and more environmentally friendly.

"This research brings us one step closer to creating bio-based ionic liquids," said Ning Sun, the study's co-corresponding author. "Now we just need to optimize and scale up the technology."

According to Sun, bio-based ionic liquids also have a broad range of potential uses outside of industry. "We now have the platform to synthesize bio-based ionic liquids with different structures that have different applications, such as antivirals," Sun said.

More information: Shihong Liu et al. Statistical design of experiments for production and purification of vanillin and aminophenols from commercial lignin, *Green Chemistry* (2020). [DOI: 10.1039/D0GC01234C](#)

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