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Novel Catalyst for Breaking Down Lignin

It currently takes more energy to break down lignin—the cementing agent that binds the matrix of cellulose fibers of tough plant cell walls—than it is worth. However, ISTC has developed a novel catalyst that has shown promise for separating lignin into shorter polymers and monomers. The catalyst works at a much lower temperature than existing techniques, potentially making the process significantly cheaper.

The optimum pretreatment strategy does not yet exist that can efficiently release sugars from the crystalline structure of cellulose and the more complex matrices of hemicellulose and lignin. That is because energy used to achieve sugar release dehydrates lignin, making it harder still to break it down.

Several types of lignin have a market value of \$50 to \$500/tonne. But if biofuel producers could produce higher-value materials from lignin (> \$1,000/tonne), biorefineries' profits would greatly improve. Higher-value chemicals derived from lignin could replace petrochemicals used in manufacturing polyurethanes, polyesters, resins, and activated carbon. Carbon fibers used in cars, jets, and sporting goods might be produced more cheaply using lignin-derived materials. These materials could replace more metals in consumer products, with lasting environmental benefits.

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