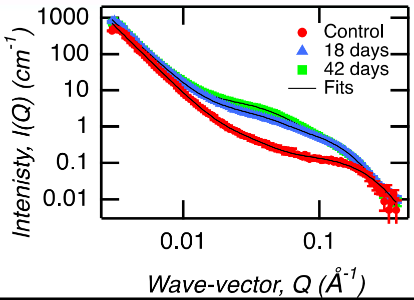
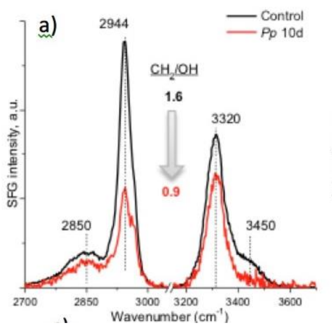
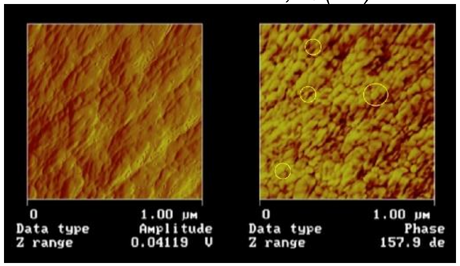
Brown rot fungi reveal a new approach for converting biomass to fuels and chemicals







(A) Brown-rot fungi sporophores (B) SANS profiles and (C) SFG spectra of brown-rot fungi mediated cellulose deconstruction (C) AFM images of repolymerized lignin in brown-rotted wood cell walls

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Goodell B, Zhu Y, Kim SH, Eastwood D, Daniel G, Jellison J, Yoshida M, Groom L, Pingali SV, and O'Neill H. *Biotechnology for Biofuels* (2017) **10**:179

Scientific Achievement

A multi-modal approach was used to study wood decay by brown-rot fungi and the chelator-mediated Fenton (CMF) reaction. The data support a common degradation mechanism where sugars released by non-enzymatic action diffuse from the cell-wall rather than an enzyme mediated degradation mechanism that requires an increase in the porosity of the cell walls.

Significance and Impact

This is a paradigm shift in understanding fungal biocatalysis for biomass conversion. Further, related data show that room temperature CMF treatment can produce >75% lignocellulose solubilization and aid in the efficient recovery of a uniformly modified lignin fraction to enhance biorefinery profitability.

Research Details

- *Gloeophyllum trabeum* deconstructs wood using a non-enzymatic mechanism (chelator-mediated Fenton system).
- SANS shows changes in microfibril bundling and lignin structure during biomass breakdown.
- XRD, SFG, AFM and TEM provide complementary information on nano-scale structural changes in wood over time.

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