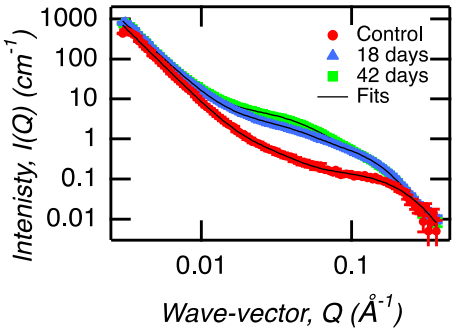
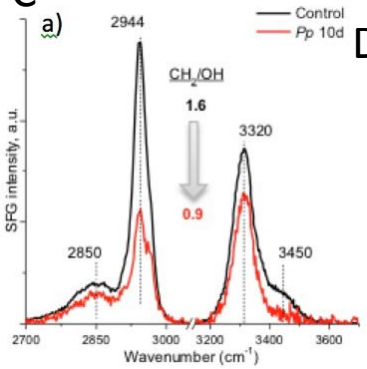
Brown rot fungi reveal a new approach for biomass conversion to fuels and chemicals

A

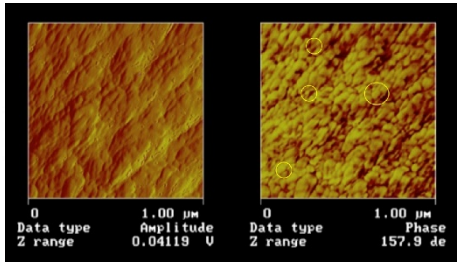
B



C



D



(A) Brown-rot fungi mushrooms; **(B)** SANS profiles and **(C)** SFG spectra of brown-rot fungi mediated cellulose deconstruction; **(D)** AFM images of repolymerized lignin in brown-rot cell walls.

Work was carried out at ORNL, PSU and Umass.
Goodell B, Zhu Y, Kim SH, K. Kafle, Eastwood D, Daniel G, Jellison J, Yoshida M, Groom L, Pingali SV, and O'Neill H. **Biotechnol. for Biofuels (2017)** 10(1): 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 is facilitated by increasing the porosity of the cell walls.

Significance and Impact

This is a paradigm shift in understanding the mechanism of brown rot fungal degradation. Further, the data suggest that the CMF mechanism could result in >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.
- SFG , XRD, AFM and TEM provide complementary information on nano-scale structure changes in wood over time