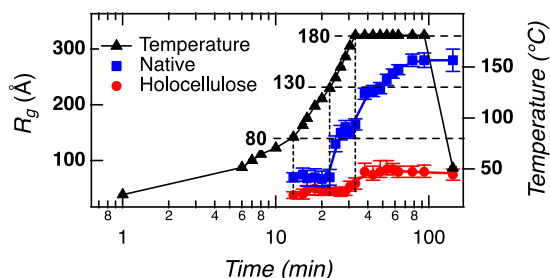
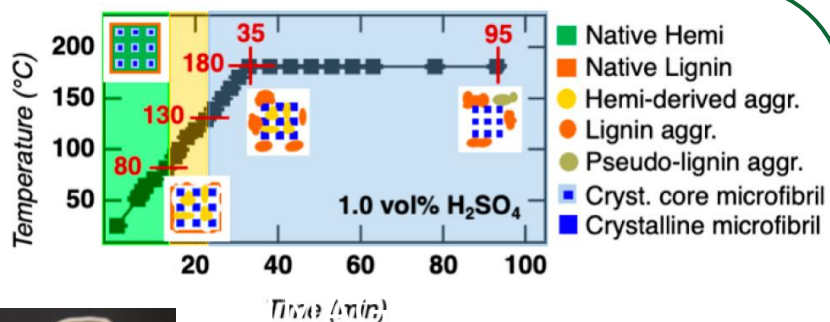


Hemicellulose forms pseudo-lignin during biomass pretreatment



Scientific Achievement

We provide the first direct evidence that supports the formation of pseudo-lignin aggregates from hemicellulose during thermochemical pretreatment.

Significance and Impact

Lignin aggregates formed during dilute acid pretreatment of biomass are known to contribute to lower sugar yields for bio-fuel production. This work provides evidence that formation of pseudo-lignin from hemicellulose occurs and also contributes to decreased enzyme accessibility and biomass recalcitrance.

Research Details

- Structural changes in switchgrass (native and extractives) during DAP were measured *in situ* using time-resolved small-angle neutron scattering (TR-SANS).
- Hemicellulose (red) forms pseudo-lignin aggregates between 80-130°C.
- Lignin (blue) aggregates form at 130°C and higher temperatures.

Top: Time course for structural features in DAP treated biomass observed during TR-SANS. Bottom left: SANS reaction cell. Bottom right: Plot shows time/temperature dependent formation of lignin and pseudo-lignin particles observed by SANS

Yang, et al., *ACS Sustainable Chem. Eng.* (2021) **10**: 314-322.
<https://doi.org/10.1021/acssuschemeng.1c06276>

This work is supported by DOE Office of Science, Office of Biological and Environmental Research (ERKP291,ERKP752), It used neutron scattering resources at the High Flux Isotope Reactor, a DOE Office of Science, Scientific User Facility operated by the Oak Ridge National Laboratory.