

Riddhi Shah received 1st place poster award at UTK Women in STEM symposium



Riddhi Shah, a University of Tennessee graduate student, was awarded 1st Poster Prize at the 4th Annual Women in STEM Research Symposium held at University of Tennessee, Knoxville, TN on March 1, 2018.

Poster Topic: “Insights into hemicellulose-cellulose interactions from thermochemical pretreatment of model composite materials”

Scientific Achievement

Structural analysis, using Small Angle Neutron Scattering (SANS) and X-ray diffraction (XRD), of model hemicellulose – cellulose composites highlighted differences in cellulose coalescence during dilute acid pretreatment. These differences could be related to how xyloglucan (XG) and glucomannan (GM) interact with the growing cellulose network.

Significance and Impact

Our data show that XG interacts directly with the cellulose microfibrils as they are formed while GM most likely interacts only at the surface of the macrofibrils. This study provides insight into cellulose-hemicellulose interactions that may help in studies related to understanding accessibility to enzymes for biofuels, developing cellulosic bioproducts, and engineering plants with increased digestibility.

Research Details

Deuterating cellulose (produced from *Gluconacetobacter* sp.) enabled us to directly measure the structural changes in cellulose during pretreatment.

Model hemicellulose-cellulose composites were prepared by synthesizing bacterial cellulose in presence of XG or GM dissolved in growth media.

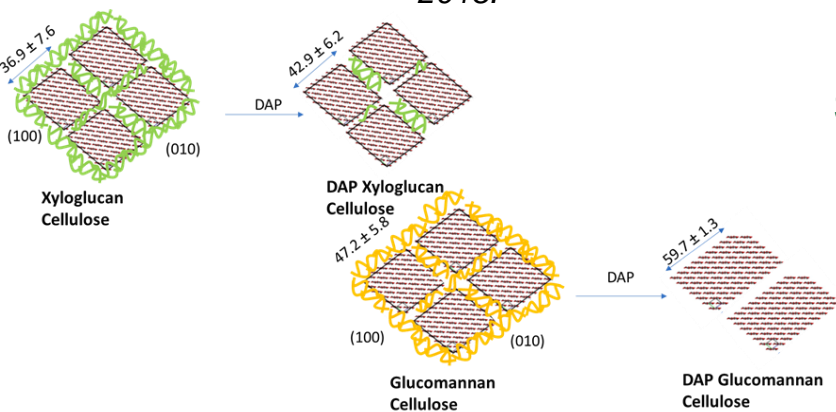


Figure: Schematic showing changes in crystallite size due to bound xyloglucan (XG, green) or glucomannan (GM, orange) of XG-Cellulose and GM-cellulose composites on dilute acid pretreatment

Shah et al, Insights into hemicellulose-cellulose interactions from thermochemical pretreatment of model composite materials (in preparation)

This research is funded by the Genomic Science Program, Office of Biological and Environmental Research (OBER), U.S. Department of Energy (DOE). The Bio-SANS beam line is supported by OBER, DOE. The ORNL High Flux Isotope Reactor and Spallation Neutron Source are supported by the Scientific User Facilities Division, Office of Basic Energy Sciences, US Department of Energy.