

Five papers in *Cellulose* showcase power of neutron scattering

Objective:

- Special Issue: 100 Years of Cellulose Fiber Diffraction and the Emergence of Complementary Techniques
 - Guest Editors: P Langan, AD French, Y Nishiyama, WT Winter

Approach:

- Four papers and the cover show techniques and insights from neutron scattering for biomass structure and degradation.

Results:

- “Controlled incorporation of deuterium into bacterial cellulose”
 - J He, SV Pingali, SPS Chundawat, A Pack, AD Jones, P Langan, BH Davison, V Urban, B Evans, H O’Neill
- “Structural coarsening of aspen wood by hydrothermal pretreatment monitored by small- and wide-angle scattering of X-rays and neutrons on oriented specimens”
 - Y Nishiyama, P Langan, H O’Neill, SV Pingali, S Harton
- “Morphological changes in the cellulose and lignin components of biomass occur at different stages during steam pretreatment”
 - SV Pingali, HM O’Neill, Y Nishiyama, L He, YB Melnichenko, V Urban, L Petridis, B Davison, P Langan
- “Solid–solvent molecular interactions observed in crystal structures of b-chitin complexes”
 - D Sawada, Y Ogawa, S Kimura, Y Nishiyama, P Langan, M Wada
- “Simulation analysis of the cellulase Cel7A carbohydrate binding module on the surface of the cellulose I β ”
 - EM Alekozai, PK GhattayVenkataKrishna, EC Uberbacher, MF Crowley, JC Smith, X Cheng

Significance:

- Demonstrated that deuterium incorporation into cellulose did not affect overall structure
- Demonstrated microfibril coalescence after hydrothermal pretreatment
- Lignin aggregation observed in situ during steam pretreatment
- Solvent interactions rearranged H-bonding in chitin, another solid biopolysaccharide
- The CBM prefers the hydrophobic fiber face as confirmed by MD and BD simulations

