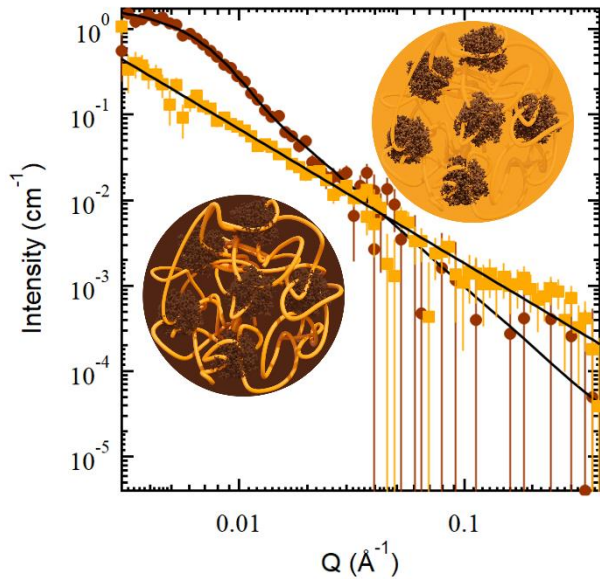


# SANS provides evidence for covalent complexes between lignin and pectin in plant cell walls



## Scientific Achievement

Evidence for lignin-carbohydrate complexes (LCCs) formed between lignin and pectin was obtained by synthesis and biophysical characterization of deuterated lignin-pectin composites.

## Significance and Impact

Engineered plants with reduced pectin exhibit lower recalcitrance towards conversion to biofuels. This work shows that interactions between pectin and lignin may be a previously unidentified contributor to LCCs in plant cell walls, providing insight into pectin knockdown effects.

## Research Details

- Partially deuterated d<sub>5</sub>-coniferyl alcohol was synthesized at the Center for Nanoscale Material Science at ORNL.
- Coniferyl alcohol was polymerized to lignin *in vitro* in the presence of the pectin homogalacturonan to form composites.
- Composites were characterized by contrast matching SANS and by FTIR, solid-state NMR, and SAXS and compared with native and pectin-deficient switchgrasses.

SANS of a lignin – homogalacturonan (pectin) composite at the contrast match points for pectin (40% D<sub>2</sub>O, brown curve) and d<sub>5</sub>-lignin (80% D<sub>2</sub>O, yellow curve). Inset schematic depictions of match points: lignin-brown particles, pectin-orange chains.

R Shah, M Senanayake et. al. (2023) *ACS Sust Chem Eng* 11:15941-15950. <https://doi.org/10.1021/acssuschemeng.3c04322>

Work used the Bio-SANS funded by DOE BER at ORNL's HFIR and the CNMS at ORNL, both DOE Office of Science - BES User Facilities. The SFA led the work; CBI provided switchgrass samples and funded Biswal at UGA.