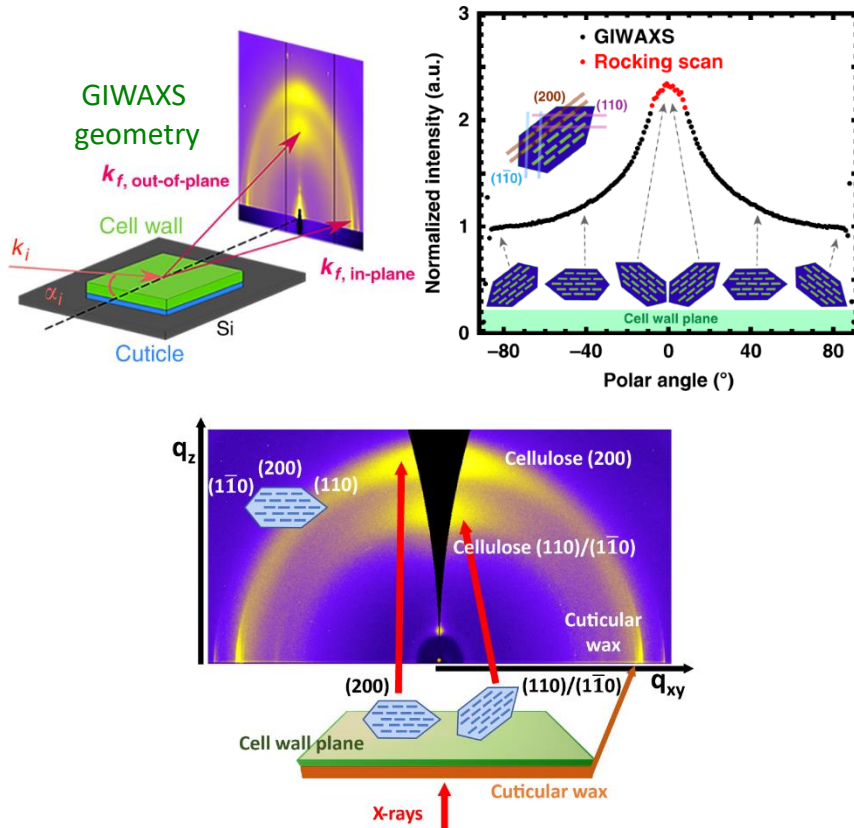


# Preferred crystallographic orientation of cellulose revealed from grazing incidence wide angle X-ray scattering (GIWAXS)

## Scientific Achievement

Uncovered a new aspect of cellulose organization



## Significance and Impact

GIWAXS reveals orientational order of cellulose crystallites normal to the plane of the cell wall, or cellulose crystal texture. This unexpected orientational order is inconsistent with previously predicted twisting of cellulose crystals in primary cell walls and implies specific microfibril interactions during cellulose network assembly. GIWAXS provides a new way to examine the organization of cellulose in plant cell walls.

## Research Details

- Orientational ordering of cellulose is observed in onion, Arabidopsis, and moss.
- GIWAXS can decouple diffraction from cellulose and epicuticular wax crystals in cell walls.
- Multiple populations leads to (200) and (110)/(1 $\bar{1}$ 0) planes packed parallel to the cell wall.

Scattering was performed at the Advanced Light Source (LBNL) and Stanford Synchrotron Light Source (SLAC). Ye D, Rongpipi S, Kiemle SN, Barnes WJ, Chaves AM, Zhu C, Norman VA, Liebman-Peláez A, Hexemer A, Toney MF, Roberts AW, Anderson CT, Cosgrove DJ, Gomez EW, Gomez ED (2020) Preferred crystallographic orientation of cellulose in plant primary cell walls. *Nature Communications* 11: 4720. DOI: 10.1038/s41467-020-18449-x