Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Selectively Structural Determination of Cellulose and Hemicellulose in Plant Cell Wall[1] SHIH-CHUN HUANG, Department of Chemical Engineering, Pennsylvania State University, YONG BUM PARK, DANIEL COSGROVE, Department of Biology, Pennsylvania State University, JANNA MARANAS, Department of Chemical Engineering, Pennsylvania State University, JANNA MARANAS TEAM, DANIEL COSGROVE TEAM — Primary plant cell walls support the plant body, and regulate cell size, and plant growth. It contains several biopolymers that can be categorized into three groups: cellulose, hemicellulose and pectin. To determine the structure of plant cell wall, we use small angle neutron scattering in combination with selective deuteration and contrast matching method. We compare the structure between wild Arabidopsis thaliana and its xyloglucan-deficient mutant. Hemicellulose in both samples forms coil with similar radii of gyration, and weak scattering from the mutant suggests a limited amount of hemicellulose in the xyloglucan-deficient mutant. We observe good amount of hemicellulose coating on cellulose microfibrils only in wild Arabidopsis. The absence of coating in its xyloglucan-deficient mutation suggests the other polysaccharides do not have comparable interaction with cellulose. This highlights the importance of xyloglucan in plant cell wall. At larger scale, the average distance between cellulose fibril is found smaller than reported value, which directly reflects on their smaller matured plant size.

[1]U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, Center for LignoCellulose Structure and Formation

Shih-Chun Huang
Department of Chemical Engineering, Pennsylvania State University

Date submitted: 09 Nov 2012 Electronic form version 1.4