Jinsha Li started her Ph.D study with Dr. Narsimhan after completed her M.S. thesis in the same year with Dr. Engelberth's in August 2015. In 2013, she graduated from Michigan State University with B.S. in Biosystem Engineering. While at Purdue, Li served as President and Professional Development Coordinator of ABEGSA. She was a Leadership Team member for the Graduate Women in Engineering Network (GWEN) from 2015 to 2017. Li is a recipient of Frederick N. Andrews Fellowship, Whistler Center for Carbohydrate Research Scholarship and the 2018 College of Engineering Outstanding Service Award. She has been an active member of Confucius Institute at Purdue Performing Arts Troupe performing traditional Chinese dances at Greater Lafayette Area. Upon graduation, Li is seeking for opportunities in industry where she can apply her knowledge in carbohydrate research and engineering.

Agricultural & Biological ENGINEERING

Dissertation Defense

Speaker: Jinsha Li

Title: **Volume Fraction Dependence of Linear Viscoelasticity of Starch Suspension**

Major Professor(s): **Dr. Ganesan Narsimhan**

Date: **Thursday, January 31, 2019**

Time: **10:00 AM**

Location: **NLSN 2187(Morgan Room)**

Abstract:

The material properties of starch vary widely depending on the physical and chemical properties of the granules, which allows starch to find use in a wide range of applications including food stabilizers, gelling agents, liquid creams, and binders for pharmaceuticals and paper products. Motivated by a need to develop rational guidelines for processing such products, we investigate the rheology of maize and rice-based starch dispersions in this study. The evolution of volume fraction φ and linear viscoelasticity starch suspension were characterized by particle size distribution and G', G'' in the frequency range of 0.01 to 10 Hz respectively. The pastes exhibited elastic behavior with G' being much greater than G''. G' increased with time for waxy maize and rice starch at all times. For normal maize and rice starch, however G' reached a maximum and decreased at longer times for temperatures above 80℃ due to softening of granules as evidenced by peak force measurements. A mechanistic model for starch swelling that is based on Flory Huggins polymer swelling theory was employed to predict the evolution of volume fraction of swollen granules. The master curve for normalized G' was employed to predict the evolution of G' with time for different starches which was found to agree well with experimental data of storage modulus.

Application:

The mechanistic model developed from this study can quantify the physical and chemical properties of starch on its pasting behavior. It provides a rational guidelines for processing starch-based material to obtain desirable texture and rheological properties.

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