UNIVERSITY of GUELPH

COLLEGE of BIOLOGICAL SCIENCE

DEPARTMENT OF MOLECULAR AND CELLULAR BIOLOGY

Announcement: All interested members of the university community are invited to attend the Final Oral Examination for the degree of **Doctor of Philosophy** of

YOU WANG, on Friday, November 3, 2017 at 9:00 a.m. in SSC 1504

(Co-Advisors: Dr. Michael Emes and Dr. Ian Tetlow)

Thesis Title: **The Role of SNF1-Related Protein Kinase 1 (SnRK1) in Regulating Intermediary Metabolism in *Arabidopsis thaliana*.**

Examination Committee:

Dr. A. Bendall, Dept. of Molecular and Cellular Biology (Chair)
Dr. I. Tetlow, Dept. of Molecular and Cellular Biology
Dr. R. Mullen, Dept. of Molecular and Cellular Biology
Dr. P. Pauls, Dept. of Plant Agriculture
Dr. G. Moorhead, Biological Sciences, University of Calgary

Abstract: The Sucrose Non-fermenting-1-Related Protein Kinase 1 (SnRK1) is a highly conserved heterotrimeric protein kinase in plants. It possesses a catalytic subunit (α) and two regulatory subunits (β and γ). This research project focuses on understanding the role of AKINβ1 on metabolism in Arabidopsis.

The effects of altered expression of *AKINβ1* on carbohydrate metabolism in plants was investigated in an Arabidopsis mutant. The contents of key intermediates in the TCA cycle of the mutant leaves were markedly reduced throughout the diurnal cycle, and this was coupled with a decrease in measurable respiration rate. The subcellular localization of SnRK1 subunits and the regulatory function of N-myristoylation on the subcellular localization of AKINβ1 were investigated in plant leaves, indicating that AKINβ1 binds to the Golgi stack, and that the N-terminal 74-amino acids of AKINβ1 possesses a putative nuclear localization signal. Recombinant fusion proteins of SnRK1 subunits were expressed in *E. coli* and used as bait to identify their putative interacting proteins in plant leaf cells. LHCB1 protein(s) were identified as putative interacting protein(s) of AKINα1. Finally, the effect of altered expression of *AKINβ1* on transcriptional regulation was studied. Compared to WT, 2485 genes and 188 genes were expressed differentially in the *akinβ1* mutant leaves in response to light and darkness respectively. The RNA-Seq results also indicated that the AKINβ subunit plays a significant role in modulating various metabolisms. A model is hypothesized to explain the effects of AKINβ1 on metabolism in Arabidopsis.

Curriculum Vitae: You obtained his B.Sc. from Liaoning University (China) in 2000 and M.Sc. from the University of Wollongong (Australia) in 2005. He began his Ph.D. studies in the lab of Dr. Michael Emes and Ian Tetlow in January 2012.