



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 **Master of Science** of

EDICON TZE SHUN CHAN

On Thursday, March 31, 2022 at 9:30 a.m. (online)

Thesis Title: Characterization of microbial enzymes involved in the reduction of patulin

Examination Committee:

Dr. Joseph Yankulov, Dept. of Molecular and Cellular Biology (Exam Chair)
Dr. Stephen Seah, Dept. of Molecular and Cellular Biology
Dr. Jennifer Geddes-McAlister, Dept. of Molecular and Cellular Biology
Dr. Steffen Graether, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Stephen Seah (Co-Advisor)
Dr. Ting Zhou (Co-Advisor)
Dr. Jennifer Geddes-McAlister

Abstract: Patulin is a mycotoxin that primarily contaminate apples and apple products. Biological methods of detoxification, involving microbial enzymatic transformation of patulin to less toxic byproducts have shown promise. To determine potential biocontrol candidates, several microbial strains were screened for their activity to transform patulin. The most promising candidate, *Gluconobacter oxydans* ATCC 621 was able to transform patulin to E-ascladiol using whole cells or cell-free extract. Proteins from cell free extract were separated by anion exchange chromatography and fractions with patulin transformation activity were subjected to peptide mass fingerprinting, enabling the identification of two NADPH dependent short chain dehydrogenases, GOX0525 and GOX1899 with the requisite activity. The genes encoding these enzymes were expressed in *E. coli* and purified. Kinetic parameters for patulin reduction, as well as pH profiles and thermostability were established to provide further insight on the potential application of these enzymes for patulin detoxification.

Curriculum Vitae: Edicon completed his BSc (Hons.) in Biomedical Sciences at the University of Waterloo in Spring 2017. He began his MSc of Molecular and Cellular Biology in the lab of Dr. Seah in Fall 2019.