



**University
of Victoria**

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Science

of

VICTOR SUN

BSc (University of British Columbia, 2017)

**“Monitoring Early Stages of Bacterial Adhesion at Silica Surfaces
through Image Analysis”**

Department of Chemistry

Wednesday, August 28, 2019

1:00 P.M

Elliott Building

Room 226

Supervisory Committee:

Dr. Dennis Hore, Department of Chemistry, University of Victoria (Supervisor)

Dr. Alex Brolo, Department of Chemistry, UVic (Member)

External Examiner:

Dr. Stephanie Willerth, Department of Mechanical Engineering, UVic

Chair of Oral Examination:

Dr. Raad Nashmi, Department of Biology, UVic

Abstract

Understanding bacterial adhesion and biofilm formations on abiotic surfaces are important biological processes that affect the growth of bacteria, with its far-spreading impacts on in everyday life, either as a benefactor or as an inhibitor. To study these bacterial interactions, tools to probe these interfaces are also important to provide further means for discovery of the adhesion mechanisms. In this thesis, a flexible imaging platform was developed, utilizing brightfield microscopy to study *E. coli* K12 on silica surfaces over the stages of bacteria growth. Results observed bacteria adhering onto silica surfaces in a preferential pattern to already existing bacteria-adhered colonies. This suggest that bacteria, once adhered to the surface, enhance attraction of other planktonic bacteria. Raman microscopy was also used to provide chemical composition information of adhered bacteria, to identify if there were specific EPS biomarkers that may contribute to this adhesion. Preliminary results from Raman microscopy showed no significant EPS contribution to bacterial adhesion on silica surfaces, further supporting a model where new cells adhere to existing colonies.