

# SAABIQ MOHAMMAD

## MASTERS FINAL EXAM DEFENSE CHEMICAL ENGINEERING

### *Spectroscopic Characterization and Oxidation on Catalytic Surfaces of Amino Acids Present in Viral Proteins*

#### Abstract

This work focuses on the decomposition of amino acids present in viral proteins on  $\alpha$ -alumina ( $\alpha$ -Al<sub>2</sub>O<sub>3</sub>) and an  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> supported silver catalyst (Ag/ $\alpha$ -Al<sub>2</sub>O<sub>3</sub>) in oxygen atmosphere by in situ Fourier Transform Infrared (FTIR) spectroscopy coupled with Two-Dimensional Correlation analysis (2D-COS). The goal of the research was to devise an effective and in situ non-complex characterization method to monitor amino acid reaction dynamics relevant for virus deactivation. Amino acid+catalyst samples were prepared by wet impregnation and characterized by Thermogravimetric Analysis which confirmed that amino acids decomposed at 200–300 °C. In situ FTIR spectra of the samples during a temperature programmed oxidation showed a significant decrease in amino acids decomposition temperature over the Ag/ $\alpha$ -Al<sub>2</sub>O<sub>3</sub> catalyst. Additionally, 2D-COS further provided a simple and qualitative mean for identifying relevant chemical functional groups, their interrelation, and dynamic changes identifying their corresponding kinetic lags (i.e., relative order of disappearance). More specifically, it was found that during catalytic oxidation, amino acid functional groups typically followed the decreasing order of reactivity: carbonyl > amine > hydroxyl. Overall, the results of this work provide a basis for future in situ and real time characterization of interactions between biomolecules and metal/metal oxides for understanding virus deactivation on surfaces.

Wednesday  
May 11,  
2022

Presentations  
starts @  
3:30PM

CEBC  
Seminar Room  
104,  
Bldg. B

Zoom Meeting  
Details:

[MEETING  
HYPERLINK](#)

Meeting ID:  
947 9280 2074

Password:  
947885

Research Advisor  
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Professor Juan  
Bravo Suárez**