Submission Date: 19/04/2023

2022 Academic Year Bio-SPMs Collaborative Research
Research Report Summary

Title of the research project		Pore formation of alpha-toxin from *Staphylococcus aureus* and its toxoids investigated by Atomic Force Microscopy
PI (Person in charge of the research project)	Name	Nguyen Duc Hoang
	Affiliated Institution and Department/Division/etc.	University of Science, Ho Chi Minh City, Vietnam (Vietnam National University, Ho Chi Minh City) / Center for Bioscience and Biotechnology
	Position	Director
Bio-SPMs that you used (Check the boxes)	☐	Super-resolution AFM (FM-AFM/3D-AFM)
	☑	High-speed AFM
	☐	SICM
	☐	AFM for Cell Measurement
Collaborative NanoLSI Faculty Members		Dr. Ngo Xuan Kien

Describe the summary of the research project

Staphylococcus aureus is a dangerous pathogen with many virulence factors, the most prominent of which is alpha-toxin (also known as alpha-hemolysin, Hla). Hla is the first bacterial exotoxin identified as pore-forming in lipid membranes. The research project aims to investigate the interaction between Hla and toxoids (Hla variants H35A, H35L, and H35LH48L) and determine the toxin-neutralization mechanism. This project used biochemical experiments and High-speed AFM. Hla and toxoids are successfully constructed, purified, and available for all experiments. We made liposomes composed of different lipid compositions for investigating the pore formation of Hla and toxoids in lipid membranes. We imaged Hla and toxoids on the lipid bilayer surface and observed the transition from pre-pore to pore of Hla. We have not been able to follow the oligomerization into pre-pore of Hla on the lipid bilayer. In the next part of this study, we will continue investigating the oligomeric formation of Hla on supported lipid bilayers by HS-AFM to understand the pore formation process of Hla.

*This form (Form 4) will be open on the NanoLSI website in the following academic year.

*Note that this form should be prepared in one A4-size paper.

*Submission Deadline: May 8, 2023 (Monday). Submit it as a PDF file.

*Submission Destination: the person in charge of Bio-SPMs collaborative research at WPI-NanoLSI, Kanazawa University.

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