

Submission Date: 05/31/2020

## 2019 Academic Year Bio-SPMs Collaborative Research Research Report Summary

Title of the research project		
PI (Person in charge of the research project)	Name	Bryan G. Alamani
	Affiliated Institution and Department/Division/etc.	Department of Chemical Engineering, University of the Philippines Diliman
	Position	Assistant Professor
Bio-SPMs that you used (Check the boxes)		<input checked="" type="checkbox"/> Super-resolution AFM (FM-AFM/3D-AFM)
		<input checked="" type="checkbox"/> High-speed AFM
		<input type="checkbox"/> SICM
Collaborative NanoLSI Faculty Members		
<p>Kidney stone diseases (nephrolithiasis) affect 12% of the world population and can occur on all ages, sexes and races. Of all the cases, calcium stones are the most prevalent and 20% of these are calcium phosphates (CaP). Brushites, or dicalcium phosphate dihydrate, are one of the types of CaP stones and known to induce calcium oxalate mineralization, and to be converted to less soluble form hydroxyapatite. Kidney stone incidence has increased about three times for the past decades. Efforts in identifying alternative inhibitors of stone growth remain one primary strategy in preventing the increasing occurrence of kidney stones. Once identified and obtained clinical clearance, this may provide patients more choices for therapeutics against pathological calcification. Fundamentally, carboxylates are known to inhibit crystal growth of these minerals. Recent research has shown that hydroxycitrate (HCA) with carboxylic moieties have effectively curbed calcium oxalate mineralization. To understand the mechanism of inhibition of HCA on CaP growth, interfacial studies were done. AFM studies show that roughness have increased through time in the presence of the inhibitor as more rounded step corners are formed along the intersection of <math>[10\bar{1}]_{cc}</math>, and <math>[101]_{cc}</math>. A change in the periodic features at near atomic resolution was also observed in the presence of the inhibitor implying possible interaction of HCA onto the crystal surface. Results obtained in this study may serve as a step in understanding the inhibitors' effect on CaP crystals and in designing preventative drugs for kidney stone disease.</p>		

\*This form (Form 3) 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, 2020 (Friday). **Submit it as a PDF file.**

\*Submission Destination: the person in charge of Bio-SPMs collaborative research at WPI-NanoLSI, Kanazawa University ([Bio-spmscr\\_nano@ml.kanazawa-u.ac.jp](mailto:Bio-spmscr_nano@ml.kanazawa-u.ac.jp))