

Submission Date: MM/DD/2020

2019 Academic Year Bio-SPMs Collaborative Research Research Report Summary

Title of the research project		Kinetics of actin-myosin I and actin-myosin II interaction studied by HS-AFM	
PI (Person in charge of the research project)	Name	Dr. Dilson Rassier / Dr. Oleg Matusovsky	
	Affiliated Institution and Department/Division/etc.	McGill University, Department of Kinesiology and Physical Education	
	Position	Prof / Staff Research Associate	
Bio-SPMs that you used (Check the boxes)		<input type="checkbox"/>	Super-resolution AFM (FM-AFM/3D-AFM)
		<input checked="" type="checkbox"/>	High-speed AFM
		<input type="checkbox"/>	SICM
Collaborative NanoLSI Faculty Members		Prof. Toshio Ando, Prof. Noriyuki Kodera	
<p>We visualized the skeletal actin-myosin complex in real time, and at high temporal resolution (up to ~25 frames per second), unprecedented in myosin II studies. We quantified the lever-arm movement and head displacements of myosin double-headed proteolytic fragment (HMM) in the different nucleotide conditions. Our standard experimental conditions when each of two HMM heads interacted with one actin filament brought a high variability to the data and complicated the conclusion about coupling the HMM lever-arm movement, HMM displacement and the power stroke. Thus, we approached different experimental design that allowed us to precisely analyze the HMM head displacements and correlate the data with the lever-arm movement. The observed two-step working stroke size: 6.4 nm (P_i release) and 2 nm (ADP release) correlated with other single-molecule studies and was remarkably close to the one reported by Kaya et al., 2017 (5.5 nm and 2.5 nm). The degree of lever-arm movement during P_i release was ranged from ~27° and 41.5°, depending on temporal resolution (10 fps vs. 17 fps). In the presence of free P_i the fraction of HMM with the pre-power stroke lever-arm configuration was significantly increased which, along with other findings, strongly supports the idea that power stroke precedes the P_i release.</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)