Biomedical Engineering Seminar Series

2nd Semester, Academic Year 2018

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Room 6373, 3rd level, Building 3,
Faculty of Engineering; Mahidol University

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"Self-assembly of Biomolecular Materials for Biosensor and Biomedical Applications"

Self-assembly of biomolecular materials has been widely used to construct sophisticated nanostructures that have been applied to many research fields, including nanoelectronics, nanophotonics,biosensors, and therapeutics. In the past decade, structural and dynamic nucleic acid nanoarchitectures have been extensively developed due to its well-defined structures and programmable properties. In this talk, I will present the beauty of nucleic acid nanostructures, in particular DNA and RNA origami, and focus on the use of biomolecular nanostructures for biosensor, nanoelectronic, and biomedical applications. First, we utilize DNA nanostructures for development of multiplexed DNA detection. [1] The dynamic DNA nanostructure-assisted multiplexed DNA detection provides a fast assay with detection time of one minute in one-pot reaction without cross interference. [2] Next, we organize and control a dynamic switching of a conductive DNA-polymer conjugate at nanoscale precision by using DNA origami as 2D and 3D molecular breadboard. This setup may shed the light on future of nanoelectonic and smart devices. [3-4] Lastly, we construct a functional, single-stranded RNA origami tethering with RNA aptamers that offered anticoagulation activity. The RNA origami provides a spatial control of RNA aptamers and show significant improvement of anticoagulation activity over free RNA aptamer. [5] To our knowledge, this is the first time of demonstration of a functional RNA origami. I believe that this talk will offer future perspectives for utilizing of self-assembling biomolecular materials for a wide range of applications.

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