The 145th iCeMS SEMINAR

Tue 29 October 2013 15:00-17:00

Programming Nucleic Acids Self-Assembly

Lecturer:

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Venue: 2nd Floor Seminar Room (#A207) iCeMS Main Building (#70), Kyoto University

I will discuss my lab's research on engineering synthetic, nucleic acid-based nanostructures and applications. We have recently invented a general framework for programming the self-assembly of short synthetic nucleic acid strands into prescribed target shapes or demonstrating their prescribed dynamic behavior. Using short DNA strands, we have demonstrated the modular construction of sophisticated 2D and 3D structures on the 100-nanometer scale with nanometer precision. Using reconfigurable DNA hairpins, we have demonstrated diverse, dynamic behavior such as catalytic circuits, triggered assembly, and autonomous locomotion. By interfacing these synthetic, nucleic acid nanostructures with functional molecules, we are developing a diverse range of applications. In biosensing, we have constructed robust and specific probes for detecting single-base changes in a single-stranded DNA/RNA target. In bioimaging, we have engineered geometrically encoded fluorescent barcodes for highly multiplexed single-molecule imaging. In nanofabrication, we have developed a versatile framework for producing inorganic materials (e.g. graphene, silicon dioxide, silver, gold) with arbitrarily prescribed nanometer scale shapes. Finally, I'll discuss our ongoing work to move the nanostructures from test tubes to living cells.







