SELF-ASSEMBLING DNA MOLECULAR MATERIALS FOR APPLICATIONS IN BIONANOFABRICATION AND MEDICINE

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We are developing bioinspired materials, designed to self-assemble using programmed molecular recognition, for a variety of biomedical applications as well as for fabrication of nanoelectronic devices\textsuperscript{1}. We use structural DNA nanotechnology to organize proteins, peptides, inorganic nanoparticles (metals, oxides, carbon, and semiconductors), nucleic acid aptamers, and chemical moieties into materials with micron-scale dimensions and nanometer-scale feature resolution. Recent results will be presented showing our ability to regulate blood coagulation\textsuperscript{2}, affect cell signaling pathways\textsuperscript{3}, and probe cell adhesion forces. We will also demonstrate a new chemical quenching method for monitoring supramolecular folding pathways\textsuperscript{4}, and describe diblock polypeptides capable of solution compatibilization of diverse building blocks to maximize assembly yields\textsuperscript{5,6}. Finally, we will introduce preliminary aerogel materials containing imbedded device networks being developed for eventual use as 3D integrated neural-like networks for information processing.

Keywords: molecular assembly, DNA nanotechnology, bionanoscience

References:


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