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Development of Long, Stiff DNA Tubes as Nanopatterned Substrates for Protein Binding ASHISH KUMAR, AXEL EKANI-NKODO, Department of Physics, University of California, Santa Barbara, PAUL ROTHEMUND, ERIC WINFREE, Computer Sciences, Computations and Neural Systems, California Institute of Technology, DEBORAH FYGENSON, Department of Physics, University of California, Santa Barbara, DEPARTMENT OF PHYSICS, UNIVERSITY OF CALIFORNIA, SANTA BARBARA TEAM, COMPUTER SCIENCES, COMPUTATIONS AND NEURAL SYSTEMS, CALIFORNIA INSTITUTE OF TECHNOLOGY TEAM — We describe progress towards developing DNA Nanotubes into a tool for nano-patterning and assaying protein binding. DNA nanotubes are uniquely accessible equilibrium polymers made of motifs known as double- crossovers (DX units). They are typically 10 nm in diameter, up to 100 microns in length and correspondingly stiff (persistence length longer than 5 microns). We have predicted and thereby manipulated the tube-structure to selectively decorate the tubes along the interior or the exterior surface. This ability allows us to use DNA tubes as protein-binding substrates with unusually high density of binding-sites (around 500 within a micron), arrayed along the exterior of a tube in a regular lattice of 14.5 nm x 4 nm. We describe results showing the use of DNA Nanotubes as substrates for proteins such as ligase, restriction enzymes and regulatory proteins.

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