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Biochemically Selective Nanoarrays: From Protein-DNA Interactions to Bio-Inorganic Nanoscale Assembly JUSTIN ABRAMSON, MATTEO PALMA, ALON GORODETSKY, COLIN NUCKOLLS, MICHAEL SHEETZ, SHALOM WIND, JAMES HONE — The ability to control the arrangement of both biomolecules and bio-inorganic structures on surfaces with nanometer resolution is of great interest in the field of nanoscience and nanotechnology. Nanopatterned arrays of biomolecules can offer unmatched sensitivity in molecular diagnostics. Furthermore, templated assembly of bio-inorganic structures at the nanoscale makes possible interesting quantum optical structures, including switchable photonic cavities. Here we describe different strategies to control the immobilization of single- and double-stranded DNA, as well as quantum dots, on nanopatterned surfaces, with features down to the sub-30nm regime. The bio-functional chemistry allows for the formation of non-sterically hindered DNA nanodomains where the dsDNA attached to the nanodots is accessible and maintains its native conformation, as confirmed by restriction enzymes studies at the single molecule level. We will further highlight the broader utility of such nanopatterned surfaces for the self-organization of quantum dots, demonstrating the ability to both biochemically and covalenty assemble single quantum dots on our nanopatterns.

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