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Nanoparticle Arrays via Self Assembled Peptide Templates
NIKHIL SHARMA, MATTHEW LAMM, DARRIN POCHAN, University of Delaware — The bottom up approach towards nano-scale patterning presents the possibility of creating hierarchical architectures through simple self-assembly strategies. Herein, we demonstrate the use of a peptidic template for the construction of parallel, linear arrays of inorganic nanoparticles. A 20 amino acid peptide, consisting of alternating hydrophilic (lysine) and hydrophobic (valine) residues flanking a central diproline turn sequence (VKVKVKVKVPPTKVKVKVKV-NH_2) was employed as a nano-scale template for the organization of 2nm gold particles. This peptide self assembles into a laminated fibrillar morphology in solution and has a periodic nanostructure consisting of alternating hydrophobic and hydrophilic layers with a lateral periodicity of 2.5 nm. Negatively charged gold nanoparticles are templated into the positively charged lysine layer through electrostatic interaction and are aligned within the template that itself swells to a periodic spacing of 4.0 nm in order to accommodate the particles. These 1D nanoparticle arrays have potential applications in fields like nano-electronics, and we are currently attempting to create arrays of quantum dots and hetero-structures of metal and semiconductor particles.

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