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Simulation of Epitaxial Growth of DNA-nanoparticle Superlattices on Pre-patterned Substrates[1] SAIJIE PAN, TING LI, MONICA OLVERA DE LA CRUZ, Northwestern Univ — DNA self-assembly is a well-developed approach towards the construction of a great variety of nanoarchitectures. E-beam lithography is widely used for high-resolution nanoscale patterning. Recently, a new technique combining the two methods was developed to epitaxially grow DNA-mediated nanoparticle superlattices on a pre-patterned surface[1]. Here we use multi-scale simulations to study and predict the formation and defects of the absorbed superlattice monolayer. We demonstrate that the epitaxial growth is enthalpy driven and show that the anisotropy of the DNA-mediated substrates leads to structure defects. We develop design rules to dramatically reduce defects of the attached layer. Ultimately, with the assist of our simulation, this technique will open the door for the construction of well-ordered, three-dimensional novel metamaterials. [1] H. Atwater, et al. Nano Lett. 2013, 13, 6084.

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