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Controlling orientational order of multivalent prisms in superlattice assemblies KEVIN L. KOHLSTEDT, MONICA OLVERA DE LA CRUZ, GEORGE C. SCHATZ, Northwestern University — Multivalent nanostructures are an increasingly important player in the self-assembly of optically responsive superlattices. Understanding the role nanostructure coordination plays in the ordering of superlattice assemblies is crucial for the plasmonic response of the material. We developed a simple design rule for the assembly of multivalent DNA-Au triangular nanoprisms into 1D ordered superlattices based on both the length of the valent DNA and the size of the prism. Using MD simulations, we describe an order parameter that captures the short-range order of the mesoscale assembly controlled by the design rule. The order parameter shows that even short chains of prisms have a high-degree of orientational order when 1D superlattices are formed. Unlike isotropic polyvalent nanostructures, we find the highly oriented prism superlattices lose orientational order in a multistage fashion through loss of coordination during melting.

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