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Molecular Tilt on Monolayer-Protected Nanoparticles

XU MA, Department of Physics, Syracuse University, Syracuse, New York, USA, LUCA GIOMI, School of Engineering and Applied Sciences, Harvard University, Cambridge, Massachusetts, USA, MARK BOWICK, Department of Physics, Syracuse University, Syracuse, New York, USA, APALA MAJUMDAR, Oxford Centre for Collaborative Applied Mathematics, University of Oxford, OX1 3LB, UK — We present a simple Ginzburg-Landau model to describe the order of ligands coating small metal nanoparticles (NPs). Two dimensionless parameters are introduced: a preferential tilt angle and a ratio epsilon between the energy cost due to spatial variations in the tilt of the coating molecules and that of the van der Waals interactions which favors uniform tilt. Even for the ground state, topological defects are present due to the topology of the NPs. The ground state for spherical particles is an ordered bipolar defective texture (B) for small epsilon and an untilted phase (U) for large epsilon. Octahedral particles have an additional phase (6V) at small epsilon characterized by the presence of six topological defects.

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[X] Prefer Oral Session
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