Membrane-Mediated Self-Assemblies of Spherical Nanoparticles
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of Memphis — The understanding of membrane-mediated interactions between
nanoparticles and their resulting aggregation is important to the use of nanomateri-
als in biomedical applications, their potential nanotoxic effects, and possibly for the
use of biomembranes as a two-dimensional medium for the self-assembly of nanopar-
ticles into structures that might be difficult to achieve otherwise. Using coarse-
grained molecular dynamics simulations, we investigated the self-assembly of spher-
ical nanoparticles on tensionless lipid membranes [1,2]. We found that the nanopar-
ticles aggregate into a variety of structures that depend strongly on the nanoparticle-
lipid adhesion interaction, nanoparticle diameter, and size of nanoparticles aggre-
gates. The sequence of structures observed, with increasing the nanoparticle-lipid
interaction strength, corresponds to linear chains, trenches, rings, and tubes. We also
found that decreasing the number of particles depresses clustering of the nanopar-
ticles, an indication the nature of membrane-mediated aggregation of nanoparticles
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