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Spreading of dispersions of lipid nanoparticles on hydrophobic and superhydrophobic surfaces[1] GURUSWAMY KUMARASWAMY, MANOJ KUMAR, MAYURESH KULKARNI, CSIR-NCL, CG NARENDIRAN, IITM, ASHISH ORPE, CSIR-NCL, ARUN BANPURKAR, Univ of Pune — Glycerol monooleate is a hydrophobic lipid that exhibits a rich phase behavior. At high water concentrations, it organizes to form a bicontinuous phase with Pn3m symmetry that is stable with excess water. It is therefore possible to obtain stable aqueous dispersions of polymer stabilized, lipid nanoparticles with internal Pn3m symmetry. Such particles, termed cubosomes, can carry payloads of both hydrophobic as well as hydrophilic molecules and hold promise for delivery of pharmaceuticals, agrochemicals, etc. We describe the behaviour of aqueous drops of cubosome dispersions as they impinge on hydrophobic and superhydrophobic surfaces. On impingement, the spreading of these drop is similar to that of water drops. However, while water drops retract and rebound from the surface, cubosome dispersions do not retract. We demonstrate that this can be attributed to rapid adsorption of cubosomes on the surface and their reorganization to form a thin, approximately 3 nm layer on the substrate. Remarkably, we show that while drops of water roll off inclined superhydrophobic lotus leaf surfaces, drops of cubosome dispersions do not. These results have implications for the delivery of agrochemicals to plant surfaces.

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