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Particle/fluid interface replication as a means of producing topographically patterned surfaces: Substrates for supported lipid bilayers ANAND SUBRAMANIAM, Harvard University, SIGOLENE LECUYER, KUMARAN RAMAMURTHI, RICHARD LOSICK, HOWARD STONE — There is intense interest in the role of geometry in the thermodynamics and dynamics of such systems as lipid bilayers, membrane proteins and block copolymers. Topographically patterned surfaces that impose well-defined gradients of curvature on surface adsorbed layers are a potential model to study these geometrical effects. Here we report a method for producing topographically patterned surfaces by replicating a fluid-fluid interface studded with colloidal particles. With this method we have fabricated geometrically simple surfaces, such as arrays of spherical features on planar surfaces and also surfaces with complex geometries such as replicas of whole bacterial cells, tubular nanoclays, and even multi-walled carbon nanotubes. Furthermore, chemically heterogeneous surfaces composed of silica, polystyrene, epoxy or poly(dimethyl)siloxane (PDMS), and chemically homogeneous surfaces composed of PDMS or epoxy can be made. As an example of the potential applications of these surfaces, we show that lipid bilayers that are supported on all-PDMS topographically patterned substrates undergo curvature-modulated phase separation.

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