Dynamics of Ordering of Block copolymer Thin Films Constrained to lie on a Curved Substrate

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In the last decade there has been a growing interest in the process of phase separation in self-organized thin films, mainly driven by their nanotechnological applications. Although important advances have been made to obtain ordered patterns into the nano-scale, the slow kinetics of ordering prevents the use of thermal treatments to obtain patterns with long range order [Gómez et al., Phys. Rev. Lett. 97, 188302 (2006)]. Then, different experimental methods have been employed to control the degree of order. Recently, there has been an increasing interest in the study of 2D modulated phases on curved surfaces [D. R. Nelson, Nano Lett. 2, 1125 (2002)]. One of the main differences between planar and curved 2D modulated phases is the nature of topological defects. On flat backgrounds, at low temperatures, the topological defects are non-trivial excitations of the ground equilibrium state. On the other hand, the curvature of the substrate can impose a topological requirement that includes defects in the ground state. In this talk we discuss the process of phase separation in thin film systems of cylinder forming block copolymers confined to lie on a curved substrate. We observe a coupling between defects and geometry that induces unbinding and self organization of disclination pairs. This open the possibility of a robust mechanism for an accurate control of smectic textures with potential applications to nanotechnology.