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Dewetting Morphology and Dynamics of Ordered Symmetric Block Copolymer Films: Stability of Nanoscopic Liquid Bilayers MATTHEW J. FARRAR, ANDREW B. CROLL, KARI DALNOKI-VERESS, Physics and Astronomy, McMaster University — Symmetric diblock copolymers, which form lamella upon micro-phase separation, can have unique dewetting properties. In this experimental study we explore the effects of the microphase separation on the dewetting of three different systems. We begin with the dewetting of disordered thin poly(styrene)-b-poly(methyl methacrylate) films on poly(dymethyl siloxane) coated Silicon. In this case, the film is not allowed to relax to its lamellar state before dewetting begins. The complex interplay between dewetting and microphase separation leads to hole growth that appears dendritic and deviates dramatically from the conventional circular hole growth. In a second experiment, the thin films are arrange into their lamellar equilibrium before being transferred onto an unfavourable substrate, which initiates dewetting. On an unfavourable substrate, these films show remarkable stability. Holes that do form are cylindrical but grow at a much-reduced rate when compared to a homopolymer system. Finally, hole growth in free-standing ordered lamellar films is explored. Here we again see significant stability and extremely slow dynamics – an ordered free-standing film is stable, or nearly stable, even though the liquid film is well above the glass transition temperature and only of order 1 lamella (∼30nm) thick!

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