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Instability of Polymer Films on a Polymer Substrate with Interfacial Heterogeneities BIN WEI, PETER G. LAM, JAN GENZER, RICHARD J. SPONTAK, DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING AND MATERIALS SCIENCE & ENGINEERING TEAM — Incorporation of an AB diblock copolymer into a thin polymer film is found to alter the rate by which the film dewets from an immiscible polymer substrate. Films with little or no copolymer dewet from the substrate by nucleation and growth of circular holes. Increasing the AB content, however, induces dewetting by a different mechanism. The copolymer molecules migrate to the polymer/polymer interface to form a chemically and structurally heterogeneous interface, which promotes spinodal-like dewetting. In this case, the surface of the top layer uniformly perforates and subsequently roughens. At higher AB concentration, dewetting is initially inhibited (>10 h) but eventually proceeds via the formation of flower-shaped holes due presumably to copolymer pinning of the top layer. AFM of the polymer/polymer interface reveals the existence of laterally organized copolymer nanostructural features. On the basis of these observations, we have constructed a dewetting rate/mechanism diagram.

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