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Anisotropic Surface and Interfacial Instabilities in Nanoimprinted Polymer Bilayers DAE UP AHN, ZHENG ZHANG, YIFU DING, University of Colorado — We illustrate the spontaneous formation of hierarchical polymer patterns driven by surface/interfacial instabilities at mobile and corrugated polymer-polymer interface. Upon thermal annealing of polystyrene (PS) films deposited on (and also confined in) topographic patterns of poly(methylmethacrylate) (PMMA), the PS/PMMA bilayers underwent a sequential event of morphological changes encompassing uniform pattern decay, simultaneous capillary breakup, anisotropic coarsening, and Rayleigh instabilities. Particularly, depending on the geometry of the bilayer pattern, the simultaneous capillary breakup has occurred in different modes. The morphological evolutions and structure formations are unique to the current system, and are drastically different from the polymer film dewettings on a planar surface, a chemically patterned surface, or a topographically patterned rigid surface. Thus, we demonstrate that the direct participations of the viscous topographic interface in the instabilities or assemblies offer a unique strategy to achieve a rich spectrum of highly anisotropic hierarchical structures.

Dae Up Ahn
University of Colorado

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