

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Effect of the Pattern Curvature on Thin Film Stability GUIDUK YU, Seoul National University, JUNE HUH, Yonsei University, KYUSOON SHIN, KOOKHEON CHAR, Seoul National University — By taking advantage of mesoscopically concave and convex patterns, we investigated the effect of pattern curvature on the stabilities of polystyrene (PS) films. The PS thin films were found to rupture on the patterns driven by the Laplace pressure. The dewetting of PS films was found to start from the peaks of each pattern, followed by the underfills in the valleys. In spite of the similar rupture behavior at the early stage, the dewetting morphologies at the later stage exhibited the pattern curvature dependence. The films placed on the substrates with concave patterns mostly wetted the substrates whereas PS films transferred to the substrates with convex patterns accompanied the micron-scale ruptures by exposing most area of the patterns to air. By scratch experiments, the film rupture was analogously observed to be localized in the vicinity of scratches on the concave patterns while propagating in much wider area in the case of the convex patterns. The dissimilar behavior based on the pattern curvature was found to originate from the opposite gradient of each pattern, associated with the local contact instability of dewetted films.

Guiduk Yu
Seoul National University

Date submitted: 20 Dec 2012

Electronic form version 1.4