

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Surface instabilities of elastic bilayers with patterned stiff films

TETSU OUCHI, RYAN HAYWARD, University of Massachusetts Amherst — Wrinkles and creases represent two fundamental modes of elastic instability for surfaces under compression. Wrinkles usually form on bilayers of a stiff film on a soft foundation, while creases usually form on the surface of a single soft layer. Although both modes have been widely studied on their own, the interplay between these two phenomena for bilayers with patterned stiff films is poorly understood. Here, we fabricated laterally-patterned films of stiff material laminated on an elastomer substrate, and analyzed the effects of the pattern geometries on surface instability modes. We have characterized the formation and propagation of wrinkles on ‘islands’ of the stiff film, as well as the formation of creases at the edges of islands and in-between neighboring islands. At sufficiently high strains, neighboring islands may come into contact, and wrinkle troughs may also serve as nucleation sites for formation of creases that channel across the elastomer surface.

Tetsu Ouchi
University of Massachusetts Amherst

Date submitted: 10 Nov 2016

Electronic form version 1.4