Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

The Structural Change of Buckling Depending on the Directional Mechanical Heterogeneity of Top Thin Films DOKYEONG KWON, Seoul Natl Univ, HYOSEON SUH, University of Chicago, DOMIN KIM, KOOKHEON CHAR, Seoul Natl Univ — Buckling of thin films on elastomeric substrates such as polydimethylsiloxane (PDMS) is the well-known phenomenon in buckling instability originating from the moduli mismatch between a substrate and a thin film placed on the top. Recently, many studies on the microstructure created by the buckling with flat top films have been reported and physics behind them has almost been well received. However, only a few work has been done for the buckling structure with micropatterned top films and buckling mechanics for patterned top film-PDMS bilayers has not yet been studied in detail. Here, we present the buckling of mechanically heterogeneous, patterned top films placed on top of elastomeric PDMS substrates. Mechanically heterogeneous top films were prepared by polystyrene (PS) films with topographic patterns. Buckling instability was induced by applying mechanical stresses to the PS-PDMS bilayer. Resulting buckling structure showed the structural change depending on the alignment of the top films with respect to the buckling direction. The structural change was analyzed with finite element method calculation, giving insights on the buckling mechanics of top film with complicated patterns placed on PDMS substrates.

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Date submitted: 14 Nov 2014 Electronic form version 1.4