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Localization in an Idealized Heterogeneous Elastic Sheet BEKELE GURMESSA, ANDREW B. CROLL, North Dakota State Univ — Localized deformation is ubiquitous in many natural and engineering materials. Often times such deformations are associated to non-homogeneous strain fields in the materials. In this work we demonstrate the response of idealized non-homogenous elastic sheets to uniaxial compression. The idealized/patterned surface layers are created by selective ultraviolet/ozone (UVO) treatment of the top surface of polydimethylsiloxane (PDMS) using TEM grid mask. By controlling the exposure time of the UVO, samples ranging from continuous thin films to sets of isolated small plates were created. We show how local strains vary with location in a patterned sample, leading to a complex localization process Even at low strains. We also see that continuous regions form isotropic undulations upon compression which persist to high strains, well beyond where localization is observed in the patterned regions. Despite the complexity, the localized deformation profile can be adequately described with a simple elastic model when appropriate local boundary conditions are considered.

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