

Electronic Supporting Information

Electric Field Mediated Elastic Contact Lithography of Thin Viscoelastic Films for Miniaturized and Multiscale Patterns

Abir Ghosh,¹ Dipankar Bandyopadhyay,^{2,3*} and Ashutosh Sharma^{1*}

¹Department of Chemical Engineering, Indian Institute of Technology Kanpur, Uttar Pradesh 208016, India

²Department of Chemical Engineering, Indian Institute of Technology Guwahati, Assam 781039, India

³Centre for Nanotechnology, Indian Institute of Technology Guwahati, Assam 781039, India

*Corresponding Author's Email: dipban@iitg.ernet.in, ashutos@iitk.ac.in

Supporting Video S1: The movie shows the complete *adhesion-debonding cycle* of a thin viscoelastic film in the presence of an external electric field. The film undergoes a *peeling mode* of debonding. The cycle of events shown in the movie are following, (i) columnar-like surface structures develop during the *adhesion cycle*, (ii) the surface structures elongate at the start of the debonding mode, (iii) after that the structures slender and started peeling from the top electrode, (iv) subsequently, they snap-off and get completely separated from the contactor.

Supporting Video S2: The movie shows the dynamics of the surface morphologies of a thin viscoelastic film undergoing controlled debonding in the presence of patterned top and bottom electrodes. The movie shows the following events, (i) formation of the primary structures because of the patterned top electrode, (ii) formation of the secondary structures due to the patterned bottom electrode, (iii) secondary structures collapses because of the lower electric field intensity, (iv) only primary structures remained pinned during debonding and develop higher aspect ratio surface structures.

Supporting Video S3: The movie shows the formation of higher aspect ratio nanostructures on the free surface of a thin viscoelastic film.

Supporting Video S4: The movie shows the formation of higher aspect ratio multiscale surface patterns during the adhesion-debonding cycle under the external electric field. The cycle of events shown is, (i) formation of primary structures, (ii) formation of secondary structures, (iii) finally, controlled debonding.

Supporting Video S5: The movie shows the formation of higher aspect ratio hierarchical structures on the free surface of a sinusoidally pre-patterned thin viscoelastic film.