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Elastic Moduli of Polymeric Thin Films of Nanocomposites and Blends via Buckling on Elastomeric Substrates

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TEEK VERMA, School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, GA 30332, ALAMGIR KARIM, Department of Polymer Engineering, The University of Akron, Akron, OH 44325, THE UNIVERSITY OF AKRON TEAM, GEORGIA INSTITUTE OF TECHNOLOGY TEAM — Mechanical properties are important for the long term durability of polymeric thin films. Unfortunately, there are very few methods for mechanical characterization of sub-micron thin films with high accuracy and repeatability. The technique of Strain-Induced Elastic Buckling Instability for Mechanical Measurements (SIEBIMM) was employed to determine the elastic moduli of nanocomposite and blend films, which were calculated from the buckling patterns generated by applying compressive stresses. In this study, polylactic acid (PLA) / Cloisite 30B nanocomposite thin films and polycaprolactone (PCL) / PLA blend thin films were prepared via spin-coating and then transferred to crosslinked polydimethylsiloxane (PDMS) flexible substrates. Results showed the strengthening effect of Cloisite 30B on PLA systems. The effect of nanoparticle concentrations and the influences of crystallinity and phase separation of blends will be presented.

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