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Dynamics of very thin polymer films on supported surface CHUNHUA LI, State University of New York at Stony Brook, HYUNJUNG KIM, Sogang University, Korea, JUN JIANG, CLIVE LI, TADANORI KOGA, State University of New York at Stony Brook, LAURENCE LURIO, Northern Illinois University, SUNIL SINHA, University of California San Diego, JONATHAN SOKOLOV, MIRIAM RAFAILOVICH, State University of New York at Stony Brook, STATE UNIVERSITY OF NEW YORK AT STONY BROOK TEAM, SOGANG UNIVERSITY, KOREA COLLABORATION, NORTHERN ILLINOIS UNIVERSITY COLLABORATION, UNIVERSITY OF CALIFORNIA SAN DIEGO COLLABORATION — In this work, we study the effect of solid substrate surface on the viscosity of polymer thin films. We found that the viscosity of polymer thin film increased about two orders of magnitude near the solid substrate. Measurements performed on split layer substrates indicated that this layer was responsible for trapping the subsequent layers, and propagating the effect of the surface interactions to the chains without direct contacts to the surface. If this layer was applied prior to the rest of the film, it in fact screened the surface interactions and even caused auto-dewetting of the other layers in the film. These results will be discussed in terms of the “two fluid” hypothesis. This surface interaction was also found to induce the “melt fracture” of the polymer thin film during the dewetting process where we see the cracks in the less viscous bottom layer.

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