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Measuring spatially distributed rheology of thin polymer films by non-contact shearing. MITHUN CHOWDHURY, Chemical and Biological Engineering, Princeton University, NJ 08544, USA, YUNLONG GUO, University of Michigan Shanghai Jiao Tong University Joint Institute, Shanghai 200240, P.R. China, RODNEY D. PRIESTLEY, Chemical and Biological Engineering, Princeton University, NJ 08544, USA — For nearly two decades, a great detail of research has been devoted to understand the impact of nanoscale confinement on the glassy and viscoelastic properties of thin polymer films. Prior works in supported films mostly used indirect mechano-rhelogical means, due to the complexity associated to probe such small volume. Here we present a non-contact shearing method 'blow-off', induced by the laminar flow of an inert gas through a narrow channel in order to generate a well-defined shear stress on a rectangular edge of a properly placed polymer thin film on a solid substrate. By appropriate control of temperature/ time during shearing, we explored effective viscosity and shear mobility, spatially from free surface to the material interior. In general, we found film surface has higher shear mobility and lower effective viscosity in comparison to its interior.

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