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Effect of molecular weight on surface mobility of polystyrene films
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There have been mounting experimental results showing that a two-layer model is appropriate for describing the dynamics of polymer films. The model postulates that a surface mobile layer exists at the free surface and can modify the dynamics of the entire film. In a recent study, we measured the viscosity of unentangled, short-chain polystyrene (Mw=2.4kg/mol) films supported by silicon at different temperatures including the bulk Tg, and found that the data could be fully explained by assuming a surface mobile layer with a constant thickness exists and sits atop a bulk-like layer. In this talk, I will report the result we obtained by measuring the viscosity of polystyrene films with a wide range of molecular weights from 6.4 to 2316 kg/mol supported by silicon. Our result shows that the same two-layer model is applicable in describing the data if the mobility of the surface layer assumes a molecular weight dependence that differs from either the Rouse or Reptation model.

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