

Abstract Submitted
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Dynamics of Polymer Blend Film Formation During Spin Coating¹ YOUNNA MOUHAMAD, NIGEL CLARKE, RICHARD A.L. JONES, MARK GEOGHEGAN, University of Sheffield — Spin casting is a process broadly used to obtain a uniform film on a flat substrate. A homogeneous film results from the balance between centrifugal and viscous forces. Here we revisit the Meyerhofer model of the spin casting process by taking in account the centrifugal forces, a uniform time dependent evaporation rate, and account for the changes in viscosity using the Huggins intrinsic viscosity. Time resolved light reflectometry is used to monitor the thickness changes of a polystyrene-poly(methyl methacrylate)(which we denote as PS and PMMA) film initially dissolved in toluene and spin cast for ten seconds at 1000 rpm. The experimental data are in good agreement with the model. We also investigate how the volume fraction of PS and PMMA influences the thinning of the film during spin casting. A distinct change in the temporal evolution of thickness as a function of time delimits the first phase of the spin casting process where centrifugal forces are dominant from a second phase dominated by the solvent evaporation. This hypothesis is supported by in-situ off specular scattering data. The time at which this change from centrifugal to evaporation-dominated behaviour is delayed as the volume fraction of PMMA increases.

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