

Abstract Submitted
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Equilibrium Pathway of Spin-coated Polymer Films¹ OPHELIA TSUI, Physics Department, Boston University, Boston, MA02215, YONG JIAN WANG, Physics Department, Hong Kong University of Science & Technology, Clear Water Bay, Hong Kong, FUK KAY LEE, Physics Department, Boston University, Boston, MA02215, C.-H. LAM, Department of Applied Physics, Hong Kong Polytechnic University, Hung Hom, Hong Kong, ZHAOHUI YANG, Physics Department, Boston University, Boston, MA02215 — Spin-coating is a common method of making thin polymer films. Recent experiments show that polymer films produced by this method are highly non-equilibrated. By monitoring the temporal evolution of the surface structure of freshly sin-cast polystyrene films on Si with molecular weights, $2.3 \leq M_w \leq 393$ kg/mol, we find that the relaxations can be fully accounted for by thermal excitations of surface capillary waves on the film surface. Modeling of the data based on this relaxation scheme leads to excellent agreement between the viscosity of the films and that of the bulk polymers. Our results provide compelling evidence that thickness uniformity is the major cause of the non-equilibration of the films.

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