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Heterogeneous Dynamics in Thin Films of Glassy Polymers ARLETTE BALJON, Dept. of Physics, San Diego State University, JORIS BILLEN, Dept. of Applied Physics, U. of Eindhoven, The Netherlands, RAJESH KLARE, Dept. of Chemical and Biological Eng., Univ. of Wisconcin — In this talk, we present an analysis of the heterogeneous dynamics in ultrathin polymeric films near the glass transition. Specifically, behavior of polymer films supported by an absorbing structured surface is studied using molecular dynamics simulation. A coarse-grained, bead-spring model is used for the polymer chains. We define a specific criterion to characterize the polymer bead mobility and use this to determine the mobile and immobile beads in the system. The immobile beads are found to occur throughout the film, but their distribution is inhomogeneous, with the probability of their occurrence decreasing with distance from the substrate. Still, enough immobile beads are located near the free surface to cause them to percolate in the direction normal to the substrate surface, at a temperature near the glass transition temperature. The immobile beads block or jam the overall molecular motion in the film and hence cause the type of dynamic arrest, typically associated with glass transition. This result is in agreement with a recent theoretical model of glass transition [D. Long, F. Lequeux, Eur. Phys. J. E 4, 371 (2001)].

Arlette Baljon
Dept. of Physics, San Diego State University

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