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**Effect of Packing Density on the Measurement of Glass Transition Temperatures in Thin Film** GI XUE, Nanjing University, DEPARTMENT OF POLYMER SCIENCE, NANJING UNIVERSITY TEAM — In the measurement of  $T_g$  of polymers, a break or jump in some properties is seen at the transition temperature. For bulk polymer, the measurement of  $T_g$  by different methods has similar result. However, the results reported for thin films have shown quite disagreement among different experimental methods. We used NMR and fluorescence spectroscopy to detect interchain distance and found that the thin film and the freeze-dried polymers show reduced packing densities. And we also found no thickness dependence of  $T_g$  in thin film and no changes of  $T_g$  in the freeze-dried polymer measured by calorimetric method or by dynamic mechanical thermal analysis. However the  $T_g$  in the same samples measured by thermo-mechanical analysis or by positron annihilation lifetime spectroscopy is significantly lower than that in bulk polymers. We argue that the reduction in packing density is a major factor which causes the disagreement among  $T_g$  measured by different methods for thin films. During the processes of some measurements, an unjamming transition is proposed to take place, which reduces  $T_g$ .

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