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Glass Transition Temperature of Polyetherimide: Relationship between Thin Films and Nanoporous Materials[1] RAHMI OZISIK, TONG LIU, RICHARD W. SIEGEL, Materials Science and Engineering Department, Rensselaer Nanotechnology Center; Rensselaer Polytechnic Institute — The glass transition temperature (T_g) of nanoporous polyetherimide (PEI) was investigated using differential scanning calorimetry. Nanosized pores were created by spin coating a solution of PEI and polycaprolactone-diol (PCLD) in their common solvent dichloromethane. The nanoporous structure was created by fast phase separation during spin coating and subsequent removal of PCLD with acetone. Atomic force microscopy, scanning electron microscopy and statistical methods were used to characterize the pore structure. The glass transition temperatures of both the thin PEI films and nanoporous PEI samples were lower than that of bulk PEI. The T_g of nanoporous PEI was found to depend strongly on pore volume fraction. A Monte Carlo simulation was performed to investigate the relationship between thin films and nanoporous systems. The distribution of nearest neighbor distances (h) were obtained from the Monte Carlo simulation, which was biased to create the pore size distribution obtained from experiments. Various moments of h was calculated and used to compare the findings to thin film data.

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