Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Interplay between polymer and nanopore sizes for polymer adsorption in nanopores CHANSU KIM, CHANG Y. RYU, Rensselaer Polytechnic Institute — We investigated the adsorption and desorption of monodisperse polystyrene (Mw: 4K $\sim$ 3M) in cyclohexane into nanoporous silica (Rp, radius of pore: 4, 7, 14, and 24nm; particle diameter: 7 micron) to understand the interplay between polymer coil size and nanopore size for the polymer adsorption in nanopores. Regardless of the pore sizes, two regimes of polymer nanopore adsorption have been identified to universally describe the surface access (adsorbed mass per unit area) in terms of the relative size interplay, Rg/Rp. When polystyrene is much smaller than pore, the surface access increases with the radius gyration, Rg, essentially following the adsorption behavior on the flat surface. When polystyrene is similar or larger than pore, the surface access in nanopore surface is smaller than that on the flat surface. From SEM, we found morphological evidence to support that the steric crowding of polystyrene chains occurs at the nanopore entrance to offer the limited accessibility of polymers into the pore surfaces.

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Date submitted: 30 Nov 2005 Electronic form version 1.4