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Displacer Effects on Pre-adsorbed Polystyrenes In Nanoporous Silica[1] CHANG Y. RYU, CHANSU KIM, JOEL BATSON, Rensselaer Polytechnic Institute, SANAT KUMAR, Columbia University — The addition of low molecular weight displacers has been used to probe the nature of adsorbed polymer chains on surfaces, and we have employed the displacers to understand the adsorption of polystyrene (PS) onto nanopores of silica particles in cyclohexane. When the radius of gyration (Rg) of PS is smaller than the pore radius (Rp) of the nanoporous silica, the displacement behavior of PS on nanopore surfaces is in quantitative agreement with that of PS on flat surfaces. However, when Rg of PS is larger than Rp of nanopores, the addition of displacers after preadsorbing PS in nanopores has increased the surface access of PS by a factor as large as 100% -200%, depending on the relative size ratio of Rg/Rp. On the contrary, when the displacers are mixed with cylcohexane prior to the PS adsorption in small nanopores, the surface access of PS is monotonically dependent of the composition of displacers. This suggests that the larger PS chains adsorbed in smaller pores are kinetically entrapped with severely limited mobility, and the addition of displacers will facilitate the diffusion of PS in nanopores by inducing a weaker surface binding and swelling of the congested PS chains in nanopores.

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