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Anomalous Sorption of Carbon Dioxide in Polymer Thin Films
XIAOCHU WANG, ISAAC SANCHEZ, University of Texas — Unusual sorption has been reported in thin polymer films exposed to near-critical CO2. When the supercritical fluid approaches the critical point the film appears to thicken, but it is not clear whether the film swells or if there is adsorption on the film surface A combination of the gradient model of inhomogeneous systems and the lattice fluid model have been used to investigate this phenomenon. It is shown that gas surface adsorption on an attractive surface is proportional to the compressibility of the fluid. We have also investigated numerically the sorption of supercritical CO2 on PDMS and PIB, and supercritical 1,1-difluorethane on PS. By calculating the Gibbs adsorption and adsorption layer thickness of the supercritical fluids, we found in all cases that maximum adsorption occurred when the supercritical fluid was near its compressibility maximum.

Isaac Sanchez
University of Texas

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