Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Viscoelastic and poroelastic relaxations of polymer-loaded gels EDWIN CHAN, National Institute of Standards and Technology, BLESSING DEEYAA, University of Maryland, PETER JOHNSON, CHRISTOPHER STAFFORD, National Institute of Standards and Technology — Gel layers are prevalent in many applications including water purification, fuel cells, tissue engineering and drug delivery. In these materials, their performance is closely linked to controlling transport of solutes such as solvent or polymer. Thus, understanding the critical time- and length-scale that regulate solute transport will enable development of membrane materials with the desired performance. In this contribution, we present the Poroelastic Indentation Relaxation (PRI) approach in quantifying the viscoelastic and poroelastic relaxations of geometrically-confined hydrogel layers. We demonstrate this indentation-based measurement approach in characterizing several materials properties including diffusion coefficient, shear modulus, and average pore dimensions of the hydrogel independent of the extent of geometric confinement. Additionally, we present a relaxation model that accounts for the viscoelastic and poroelastic contributions to the total relaxation process. Finally, we show that the PRI approach can quantify diffusion of solvent and polymer solution in a single test simply by changing the extent of deformation.

Edwin Chan
NIST

Date submitted: 11 Nov 2011 Electronic form version 1.4