Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Observation of glassy physics within surface-bound organic molecular monolayers L.I. CLARKE, D.R. STEVENS, M.C. SCOTT, J.R. BOCHINSKI, Dept. of Physics, NC State University, Raleigh, NC — Monolayer systems are an alternative approach to study glass transitions in confined geometries. In a sub-monolayer, where uniformly distributed molecules are covalently bound to the substrate, intermolecular interactions can be controlled by altering the areal density of the film. Thus the transition from simple rotations within an isolated molecule to more complex cooperative motion in a glassy system can be experimentally observed. We studied sub-monolayer collections of surface-bound alkyl chains (substituted alkylsilanes) with highly sensitive narrow-band dielectric spectroscopy, and observed a transition from independent dynamics to glassy motion as the density was increased. We identified the glassy relaxation [1] as similar to the poly-ethylene-like glass transitions previously observed in alkyl-side-chain polymers. Furthermore, we studied the fragility as a function of density, and molecular conformation (packing efficiency). At high densities, we observed the emergence of a sub-T_g relaxation.

[1] *ACS Nano* **2**, 2392 (2008).

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Date submitted: 09 Dec 2009 Electronic form version 1.4