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Glassy dynamics within surface-bound molecular monolayers

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M.P. ROMAN, D.R. STEVENS, M.C. SCOTT, J.R. BOCHINSKI — Dynamics within a monolayer collection of surface-bound substituted-alkyl chains are studied with narrow-band dielectric spectroscopy. A transition from independent (intra-molecular) motion in low density systems to complex, glassy (inter-molecular) motion as the density is increased is observed. At high density, both the glassy mode [1,2] and the sub-T_g relaxation [3] have direct analogy to equivalent relaxations in polyethylene. Thus this experimental approach enables observation of the formation of a fragile glass as an explicit function of density; in addition by altering the molecular characteristics and surface arrangement, resultant changes in the nature of the glass transition (its glass transition temperature T_g and fragility m) can be determined. The effects of packing efficiency, chain length, and molecule-molecule interactions, as tuned by altering dipoles within the chain, will be discussed.

- [1] M. C. Scott *et al.*, *ACS Nano* **2**, 2392 (2008);
- [2] M. Beiner, and H. Huth, *Nature Materials* **2**, 595 (2003);
- [3] Q. Zhang *et al.*, *J. Phys. Chem. B* **110**, 4924 (2006).

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