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Nanomechanical Characterization of Finite-Size Constrained Relaxation Processes in Optoelectronic and Photonic Thin Films TOMOKO GRAY, RENE OVERNEY, Department of Chemical Engineering, University of Washington, MARNIE HALLER, JINGDONG LUO, ALEX JEN, Department of Material Science and Engineering, University of Washington — In this talk, macroscopically determined optoelectronic phenomena will be linked to nanorheologically deduced structural conformation and molecular dynamics in polymer thin films. We explore molecular relaxation properties of structurally constraint electronic materials using two recently developed scanning force microscopy (SFM) based methods; (i) a method that explores local transition temperatures in ultrathin films [1], and (ii) a method that deduces energy values and critical time scales from inter- and intramolecular relaxation processes [2]. In particular, the two techniques have provided insight into the molecular reorientation process of dendronized nonlinear optical (NLO) polymers, and finite-size effects on the photoluminescent efficiency of a blue light emitting poly(9, 9-dioctylfluorene) (PFO). [1] T. Gray et al., *Nanorheological Approach for Characterization of Electroluminescent Polymer Thin Films*, Appl. Phys. Lett. **83**, 2563-2565 (2003). [2] S.E. Sills et al., *Creeping friction dynamics and molecular dissipation mechanisms in glassy polymers*, Phys. Rev. Lett. **91**(9), 095501 (1-4), (2003).

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