Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

**Plasmonic Gold Nanorod Dispersions with Electrical and Optical Tunability** CHRISTOPHER GRABOWSKI, CLARE MAHONEY, KYOUNGWEON PARK, ALI JAWAID, TIMOTHY WHITE, RICHARD VAIA, Air Force Research Laboratory, WPAFB — The transmissive, absorptive, electrical, and thermal properties of plasmonic gold nanorods (NRs) have led to their employment in a broad range of applications. These electro-optical properties - governed by their size, shape, and composition - are widely and precisely tunable during synthesis. Gold NRs show promise for large scale optical elements as they have been demonstrated to align faster than liquid crystal films ($\mu$s) at low fields (1 V/$\mu$m). Successfully dispersing a high volume fraction of gold NRs requires a strategy to control particle-particle separation and thus avoid aggregation. Herein, we discuss the role of theta temperature and the ability to swell or collapse the chains of polymer-grafted gold NRs to alter the interaction potential between particles. UV-Vis spectroscopy, scattering, and electrical susceptibility characterization methods were employed to determine nanoparticle dispersion along with the degree of gold NR alignment. The development of new agile photonic materials, controllable with both light and electric fields, will help address emerging needs in laser hardening (agile filters) and variable transmission visors.

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Date submitted: 06 Nov 2015 Electronic form version 1.4