Abstract Submitted
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Field-directed assembly of nanoparticles[1] ERIC FURST, University of Delaware — The use of external fields to direct the assembly of colloidal suspensions, combined with new particle shape symmetries that couple strongly to such fields, is a powerful means for creating and tailoring materials with unique mechanical, optical and electronic properties [1]. I will present the evaporative assembly of nanostructured thin films from ellipsoidal titania nanoparticles. The deposition process is directed by an electric field. As the evaporation front recedes, a uniform film with thicknesses of 1-10 μm is deposited on the substrate. The films exhibit a large birefringence and high packing fraction due to the orientation of the particles. When the frequency is lowered, the particle orientation undergoes a parallel-random-perpendicular transition with respect to the field direction. The orientation dependence on field frequency and strength is explained by the polarizability of ellipsoidal particles. Particle orientation in the films also leads to anisotropic mechanical properties, which are manifested in their cracking patterns. In all, field-directed assembly of anisotropic particles provides a powerful means for tailoring nanoparticle film properties *in situ* during the deposition process.

[1] Grzelczak et al. Directed Self-Assembly of Nanoparticles. ACS Nano 4, 3591-3605 (2010).

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Eric Furst
University of Delaware

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