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***Electro-Optic Effects in Colloidal Dispersion of
Metal Nano-Rods***

In modern transformation optics, one explores metamaterials with properties that vary from point to point in space and time, suitable for new applications such as an “optical cloak”. Colloidal dispersions of metal nano-rods in dielectric fluids are appropriate to construct spatially varying and electrically reconfigurable optical metamaterials. An applied electric field controls the orientation and concentration of nano-rods, and thus modulates the optical properties of the dispersion. For example, by using gold nano-rods dispersed in toluene, we demonstrate electrically induced change in refractive index on the order of 0.1.

References:

- [1]. A.B. Golovin, O.D. Lavrentovich, “*Electrically Reconfigurable Optical Metamaterial Based on Colloidal Dispersions of Metal Nano-Rods in Dielectric Fluid*”, Applied Physics Letters, 95, 254104 (2009).
- [2]. A.B. Golovin, J. Xiang, Y.A. Nastishin, and O.D. Lavrentovich, “*Electrically Reconfigurable Optical Metamaterials Based on Orientationally Ordered Dispersions of Metal Nano-Rods in Dielectric Fluids*”, SPIE 7775, p.777502 (2010).
- [3]. A.B. Golovin, J. Xiang, H-S. Park, L. Tortora, Y.A. Nastishin, S.V. Shyanovskii, and O.D. Lavrentovich, “*Electro-Optic Effects in Colloidal Dispersion of Metal Nano-Rods in Dielectric Fluid*”, Special issue on "Next Wave of Metamaterials", Materials, 3 (2010), doi: 10.3390/ma30x000x.
- [4]. A.B. Golovin, J. Xiang, and Y.A. Nastishin, O.D. Lavrentovich, “*Nanorods in an Electric Field Create Liquid Crystals for Transformation Optics*”, SPIE Newsroom, January 2011.

**Host:
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