

Self-assembly of predesigned optical materials in nematic codispersions of plasmonic nanorods

GHADAH H. SHEETAH,^{1,2} QINGKUN LIU,^{1,2} AND IVAN I. SMALYUKH^{1,2,3,4,*}

¹Materials Science and Engineering Program, University of Colorado, Boulder, Colorado 80309, USA

*Corresponding author: ivan.smalyukh@colorado.edu

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Optical metamaterials and other nanostructured metal-dielectric composites hold great potential for designing and practically realizing novel types of light-matter interactions. Here we develop an approach to fabricate composites with tunable pre-engineered properties via self-assembly of anisotropic nanoparticles codispersed in a nematic liquid crystal host. Orientations of plasmonic nanorods of varying aspect ratios are controlled to align parallel or perpendicular to the nematic director and retain this relative orientation during a facile electric switching. The ensuing dynamic reconfigurability of the surface plasmon resonances of a composite enables a previously inaccessible means of controlling light and may enable tunable plasmonic filters and polarizers. © 2016 Optical Society of America

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