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Optical Switching of Nematic Liquid Crystal Film based on Localized Surface Plasmon Resonance[1] MAKIKO QUINT, SILVERIO DELGADO, ZACHARY NUNO, LINDA HIRST, SAYANTANI GHOSH, University of California, Merced — We have demonstrated an all-optical technique to reversibly switch the spatial orientation of nematic liquid crystal molecules from homeotropic to planar in a few micron thick films. Our method leverages the highly localized electric fields that are generated in the near-field of a densely packed gold nanoparticle layer when the samples are excited by light resonant with the localized surface plasmon absorption. We present simulations and control measurements for off-resonance excitation, where the switching behavior is not observed. Using polarized microscopy and transmission measurements, we observe this switching over a temperature range starting several degrees below and up to the isotropic transition, and at on-resonance excitation power less than 10 μW. In addition, we controllably vary the in-plane directionality of the liquid crystal molecules in the planar state by altering the linear polarization of the incident excitation.

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