

# Electro-optics of nematic/gold nanoparticles composites: the effect from dopants

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We studied the change of electro-optic properties of room-temperature nematic pentylcyanobiphenyl (5CB) when this liquid crystal is mixed with a small amount (~ 0.5 wt.%) of gold nanoparticles (Au-NPs). The polymer-coated Au-NPs are spherical-shaped, with a mean diameter of about 12 nm. Besides electroconvective domains on frequency-dependent domain morphology with well defined threshold and period,<sup>[1]</sup> stationary parallel stripes oriented along the rubbing of the cells are also observed in planarly-aligned cells with 5CB when only static electric field is applied on the cells and the voltage exceeds a distinct threshold. Instead of well pronounced longitudinal domains electrically-formed in planar 5CB nematic layers, a hybrid longitudinal texture pattern clearly visible under a microscope take place in identical 5CB cells, but doped with Au-NPs.<sup>[2]</sup> Thus, when mixing 5CB with Au-NPs the wide-formed electrically-induced longitudinal stripes (ascribed to flexoelectric domains) intrinsic to planar 5CB nematic are largely destroyed and this effect reflects on the electro-optic response of Au-NPs/5CB composites. The effect from Au-NPs dopants is elucidated by detailed investigation (optical, thermo-optical, electrical and electro-optical measurements).

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