

GIANT OPTICAL RESPONSE OF AZO-DYE  
DOPED LIQUID CRYSTALS: SURFACE  
AND BULK EFFECTS

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S u m m a r y

We report an experimental study on the origin of the giant optical response in azo-dye doped nematic liquid crystals. We show that a very large response is obtained for extremely low input light intensity, of the order of a few tens of  $\mu\text{W}/\text{cm}^2$ , and that it is mediated by the action of the photo-induced voltage on the specific surface coupling agent which is an ionic surfactant. We report a characterization of the nonlinear optical response as a function of different azo-dye concentrations in the liquid crystal host. Then, by performing circular polarization experiments, we show that, during the reorientation, the nematic director follows a three-dimensional trajectory composed by in and out-of-plane motions with respect to the incidence plane of the light, indicating that the bulk contribution is dominated by the photoisomerization of azo-dye molecules.