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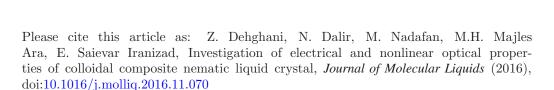
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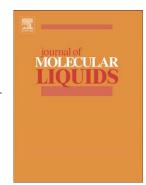
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## **ACCEPTED MANUSCRIPT**

Investigation of electrical and nonlinear optical properties of colloidal

composite nematic liquid crystal

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**Abstract:** 

The synthesized TiO<sub>2</sub> nanoparticles (NPs) doped to nematic liquid crystals (NLCs) with 1% wt.

for both alignments (homeotropic and homogeneous). Dielectric permittivity of samples was

measured by LCR meter at different temperatures. TiO2 NPs doped into NLCs show higher

permittivity than pure NLCs. According to the obtained results, the permittivity of  $\varepsilon_{\perp}$  increases

more than  $\varepsilon_{II}$  in samples. The magnitude and temperature dependence of the refractive indices of

TiO<sub>2</sub> NPs doped into NLCs are reported. Investigated electrical behavior of the sample was

studied over a wide range of frequency using a complex impedance spectroscopy (CIS)

technique. The third-order nonlinear optical properties of TiO<sub>2</sub> NPs doped into NLCs which

tested by a Z-scan method with continuous wave (CW) He: Ne laser beam, are reported. The Z-

scan results revealed that the TiO<sub>2</sub> NPs in NLCs exhibit self-focusing nonlinearity and saturable

absorption effect for both alignments. The results showed that NLCs doped with a small amount

of TiO<sub>2</sub> NPs can have significantly improved electro-optic properties.

Keywords: TiO<sub>2</sub> nanoparticles, Sol-gel method, Nematic liquid crystals, Optical properties,

Impedance spectroscopy, Permittivity

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