

भौतिकशास्त्र विभाग,  
लोकमान्य टिळक भवन,  
विद्यानगरी, सांताक्रुझ (पूर्व),  
मुंबई - ४०० ०९८ (भारत).  
दूरध्वनी : २६५२ ६२५०, २६५३ ३०५१,  
२६५४ ३३५८  
विस्तारीत क्र. ३५८  
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Department of Physics (Autonomous) University of Mumbai

Ph.D. seminar

of

JESSY P. J

Department of Physics, University of Mumbai

Supervisor: **Dr. Nainesh Patel**

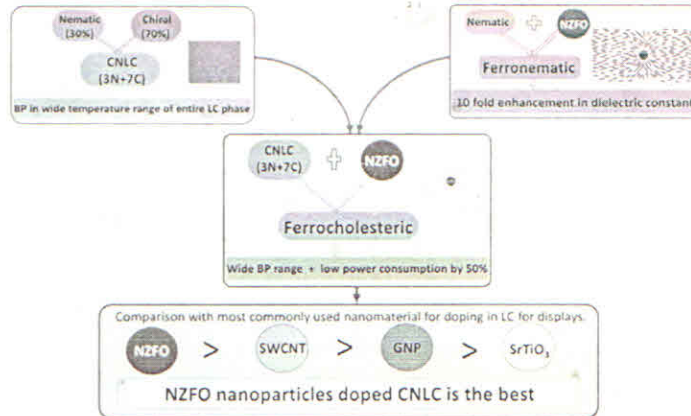
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### Study of Physical Parameters in Doped Liquid Crystalline Materials

The thesis aims to design novel chiral nematic liquid crystal (CNLC) mixture with blue phase (BP) in wide temperature window including room temperature, improved photoluminescent (PL) properties and with reduced power consumption in display applications. By varying nematic to chiral ratio in CNLC, wide temperature window of BP is achieved, in the entire LC range. The low threshold voltage is attained by designing ferrocholesteric nanocomposites. For this, the influence of nickel zinc ferrite (NZFO) magnetic nanoparticles in nematic liquid crystal (NLC) has been explored and found that they are efficient in trapping mobile ions and in improving dielectric properties with 10 fold enhancement in the value of dielectric constant. Using the same NZFO nanoparticles in CNLC mixture, we have achieved significant reduction of threshold voltage of Fredericksz transition by half of that of undoped CNLC with enhanced PL intensity. Also other CNLC nanocomposites with single walled carbon nanotube (SWCNT), gold (GNP) and SrTiO<sub>3</sub> nanoparticles were designed and investigated. Among all nanomaterials used, magnetic NZFO produced best results with drastic reduction of driving power by ~ 50% and thereby pave a way in realizing BP based display applications.



Date: Thursday, 12<sup>th</sup> March, 2020 Time: 11.30 hrs

Venue: Seminar Hall, Department of Physics, 3<sup>rd</sup> Floor, Tilak Bhavan.

Anushy

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