Dr. Ranjana Singh

Assistant Professor

Department of Physics

HD Jain College

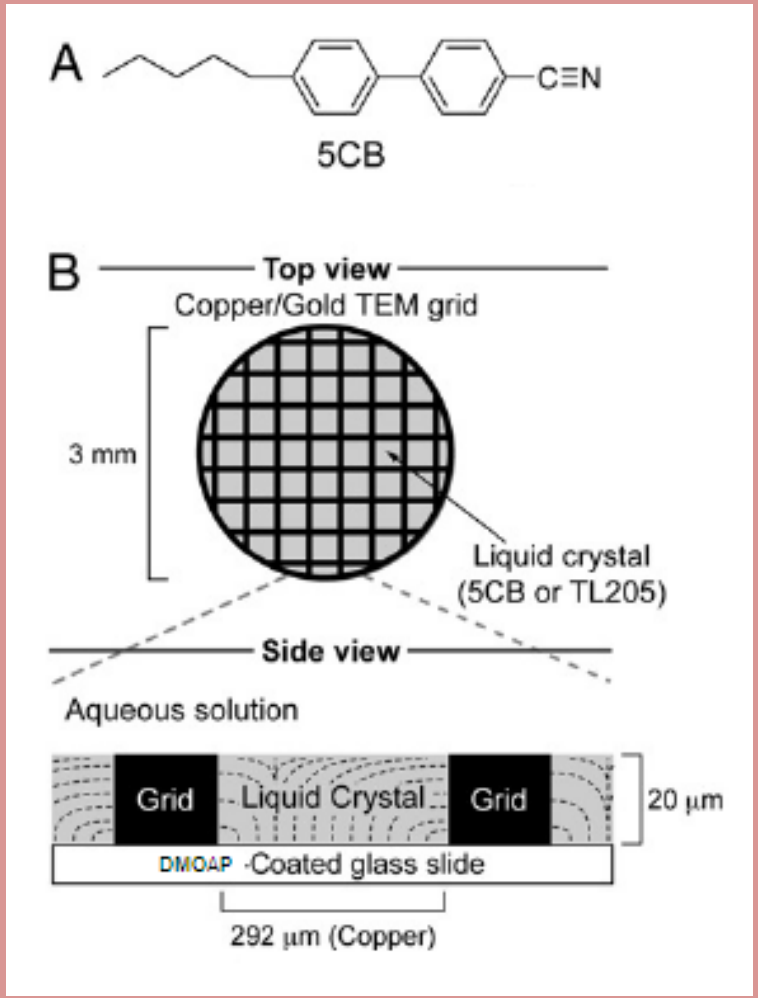
Ara, Bihar, India

Date: 06/11/2025

Time: 10: 00 am

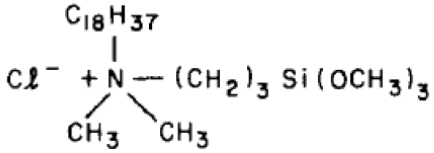
III/MPHYCC10 Atomic and Molecular Physics

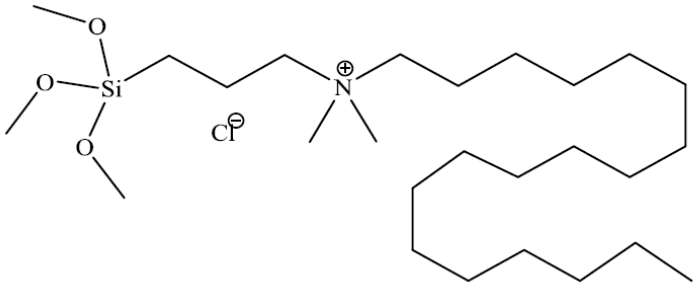
Liquid Crystal sensors for detection of hazardous chemicals and bio-molecules by using Polarizing Optical microscopy and Raman Spectroscopy

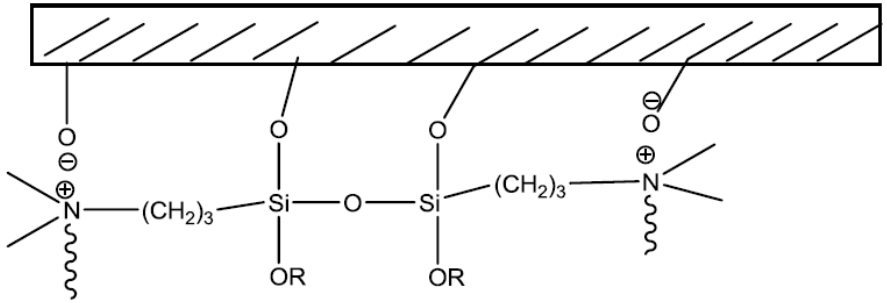


(A) Schematic illustration of the experimental system used to study the detection of chemicals and bio-molecules at aqueous–liquid crystal interfaces.

N,N-Dimethyl-N-octadecyl-3-aminopropyltrimethoxysilyl chloride (DMOAP)

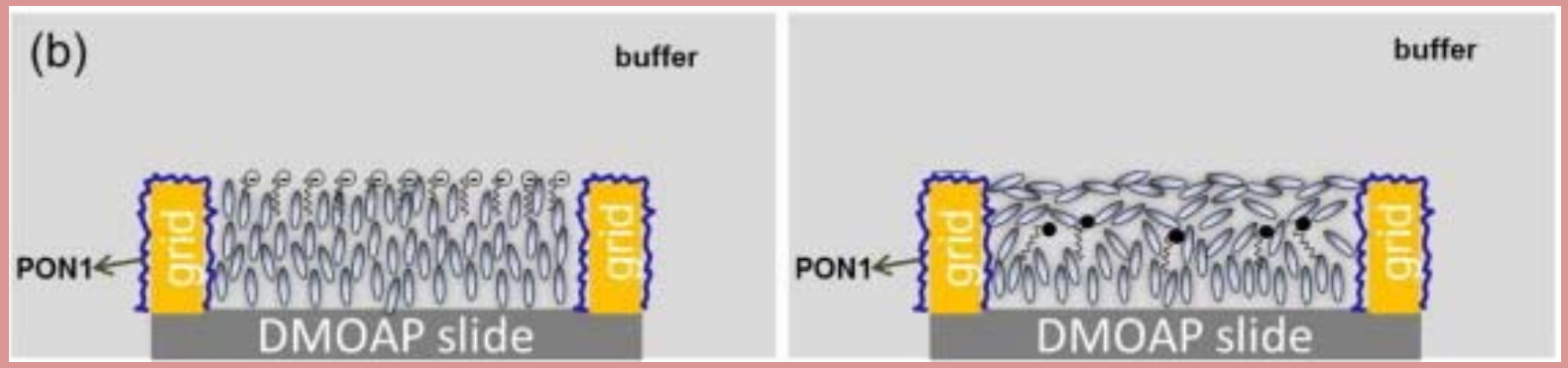






Structure of surfactant DMOAP

Homeotropic arrangement of DMOAP on glass slides helps to arrange LCs (5CB here) isotropically



(a) Isotropic arrangement of 5CB on DMOAP coated glass slide before interaction to Target molecule

(b) After interaction to Target molecule

FABRICATION OF LIQUID CRYSTAL BASED SENSOR FOR DETECTION OF HYDRAZINE VAPOURS

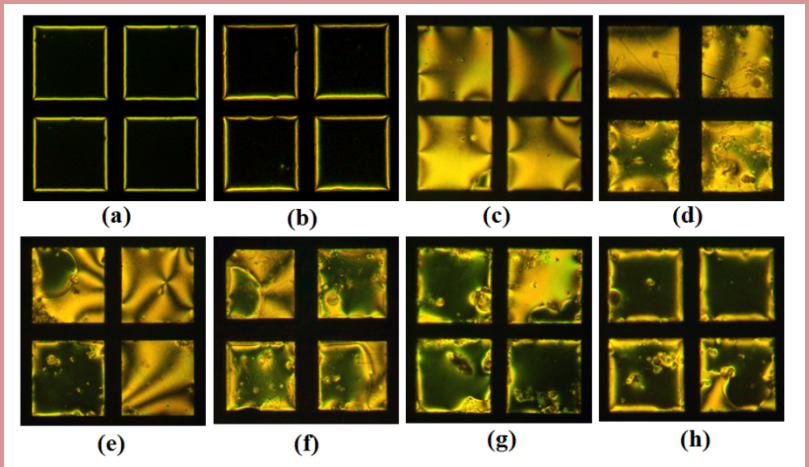


Figure 1. Polarizing optical images of (a) pure 5CB and (b) 5CB doped with 0.5 wt% DBA. Optical images of 5CB doped with 0.5 wt% DBA when they were exposed to hydrazine vapours at concentrations (c) 500 ppm, (d) 300 ppm, (e) 200 ppm, (f) 100 ppm, (g) 50 ppm and (h) 30 ppm. All images were taken on stabilization after 30 min at temperature 28°C.

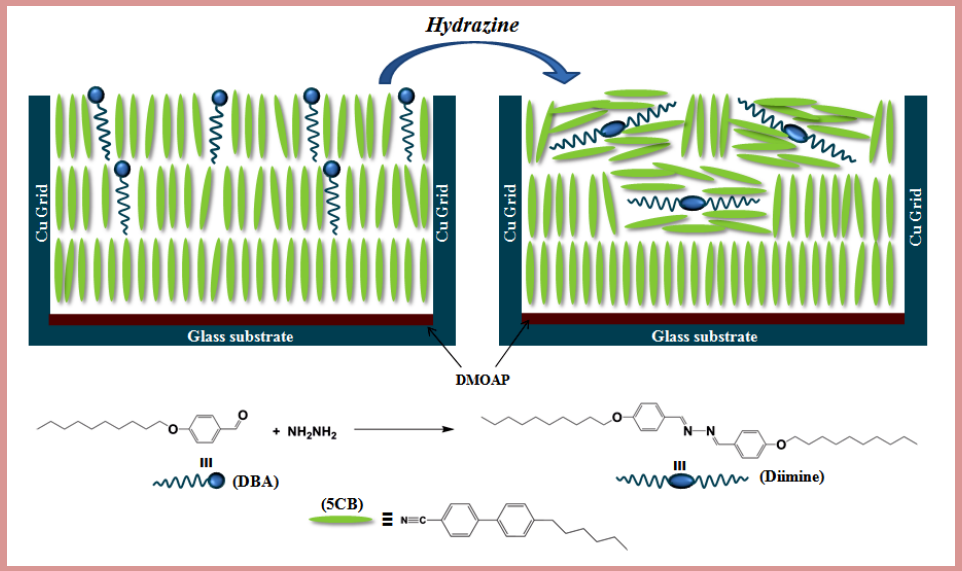


Figure 2. Schematic illustration of orientational transitions of the 5CB molecules doped with DBA after exposure of hydrazine vapour into the optical cell from homeotropic orientation to planar/tilted orientation.

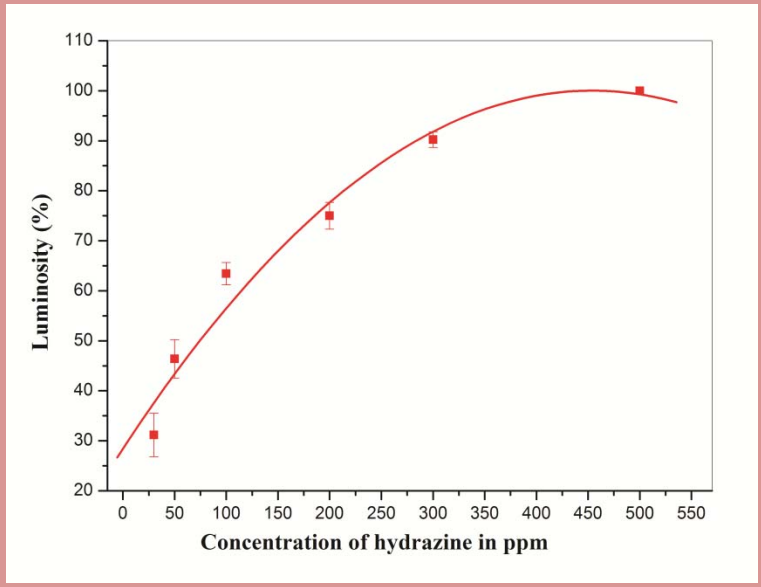


Figure 3. Luminosity (L) of the optical images of 0.5 wt% DBA doped 5CB upon exposure of hydrazine vapours at different concentrations.

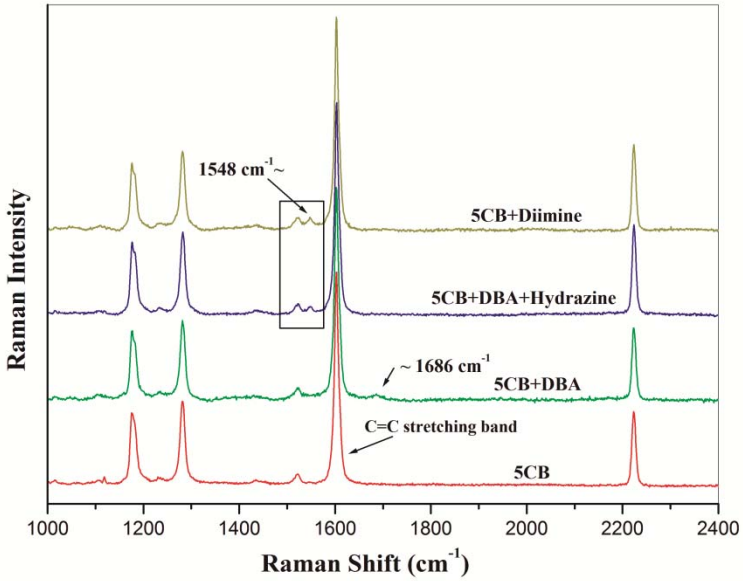


Figure 4. The Raman spectra of pure 5CB, 5CB doped with DBA, 5CB doped with DBA after exposure of hydrazine vapours (500 ppm) and externally prepared pure diimine product doped (0.25 wt%) in 5CB.