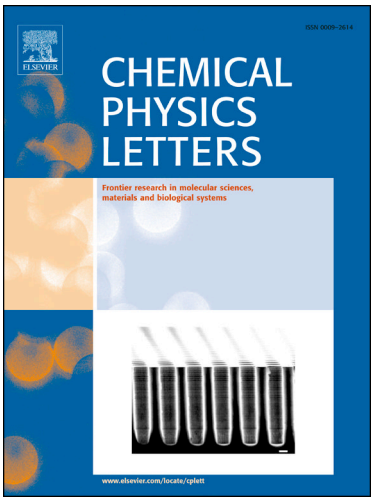

Research paper

Micelles entrapped Cresyl Violet can selectively detect copper and mercury ions in solution: A Fluorescence Correlation Spectroscopy investigation

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Micelles entrapped Cresyl Violet can selectively detect copper and mercury ions in solution: A Fluorescence Correlation Spectroscopy investigation

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Abstract

The dynamic interaction of Cresyl Violet (CV) in different micellar systems has been demonstrated in single molecular level by FCS studies. The SDS micelle entrapped CV efficiently detected Cu^{2+} ions in solution with a limit of detection (LOD) of 70 nM, which is further substantiated with the gradual enhancement of the translational motion. The CV entrapped in the DTAB micelles could selectively detect Hg^{2+} ions in solution with a LOD of 35 nM. The micelle encapsulated CV was effective in detecting these metal ions in real water samples from different sources.

Keywords: Cresyl Violet, Copper ions, Fluorescence Correlation Spectroscopy, Lifetime, Mercury, Metal ion Sensing, Surfactants.

Surfactants are self-assembled dynamic nanostructures which are formed above the critical micellar concentration (CMC) [1]. These self-organized assemblies [1-3], have been widely studied in terms of their structure-function relationships [1,3-6], and occupy a seminal position in contemporary science. The inherent compositional and functional diversities associated with real biological membranes promote researchers to investigate the relatively simpler micellar model systems which mimic such complex environments. The fluorescent dye, Cresyl Violet (CV) (Scheme 1) has been used as a 'histological strain' in studying samples of biological importance [7,8]. As a promising photo-sensitizer probe, CV [9,10] also has significant medicinal prospects as it can regulate the adverse effect of c-KIT expression in human gastric carcinoma cells [8,11]. Several techniques, like UV-visible [3], fluorescence [2], Isothermal Titration Calorimetry (ITC) [4], tensiometry [12] etc. were used to explore the interactions between micelles and the bio-active molecules. However, Fluorescence Correlation