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Ligand free surface of CdS nanoparticles enhances the energy transfer efficiency on interacting with Eosin Y dye – Helping in the sensing of very low level of chlorpyrifos in water

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Abstract:

With an aim to sense the presence of chlorpyrifos (CP) pesticide in water, fluorescence resonance energy transfer (FRET) between the chemically synthesized ligand free CdS nanocrystals (donor) and Eosin Y dye (acceptor) has been studied in presence and absence of CP in the FRET pair system. This prepared water soluble CdS nanocrystals have been characterized by Transmission Electron microscopy (TEM), which shows that CdS nanocrystals are spherical in shape with an average size of 5 nm approximately. Further, Fourier Transform Infrared Spectroscopic (FTIR) study confirms that these CdS nanocrystals are ligand free stable nanocrystals. It has been observed that this CdS nanocrystals and Eosin Y FRET pair can strongly sense the presence of chlorpyrifos (CP) pesticide in water up to a very low concentration of 10 ppb, which is the sensitivity of detection or detection limit. This FRET pair is found to be very simple and cost effective for the sensing of toxic pesticide CP.

Keywords: CdS nanocrystals; Ligand free; FRET; Sensing; Chlorpyrifos pesticide.