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A sensitive fluorescence sensor for organophosphate pesticides detection by controlling the surface passivation of carbon quantum dot

Jyoti Korram and **Manmohan L Satnami**
Pt Ravishankar Shukla University, India

The organophosphorus pesticides (OP) induced inhibition of acetylcholinesterase (AChE) was monitored using carbon quantum dots (CQD). Tunable fluorescence CQDs originated from citric acid were synthesized and characterized. The fluorescence emission was quenched by gold nanoparticles (Au NPs) *via* fluorescence resonance energy transfer (FRET). Thiocholine, produced from acetylthiocholine hydrolysis by the of AChE, could cause the aggregation of Au NPs and the corresponding recovery of FRET-quenched fluorescence emission. The catalytic activity of AChE could be irreversibly inhibited by OPs, thus, the recovery effect was reduced. By evaluating the fluorescence emission intensity of CQDs, a FRET-based sensing platform for OPs determination of paraoxon was established. The sensing platform showed linear relationship with the paraoxon concentrations in the nM range and the limit of detection (LOD) was very low. Real sample study revealed the applicability of this sensing platform. The results show that the OP sensor is promising for applications in food safety and environmental monitoring.

Biography

Jyoti Korram is pursuing PhD under supervision of Manmohan L Satnami at the school of studies in chemistry, Pt Ravishankar Shukla University, Raipur, India. She has completed her MSc in the year 2013 and MPhil degree in the year 2014. She is working on the development of nanomaterial-based biosensors for the detection of stimulants of chemical warfare agents and organophosphorus pesticides. Her research interest includes nanoparticles, core/shell nanoparticles and quantum dot nanomaterials.

jyotichem90@gmail.com

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