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A Facile Novel Synthesis of Cadmium oxide Nanoparticle Decorated Oleic acid with Enhanced Photocatalytic activity for the Degradation of Crystal Violet under Solar Light Irradiation

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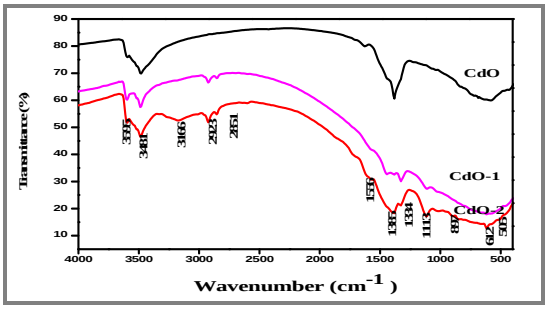
ABSTRACT

Oleic acid coated CdO nanoparticles were synthesized using a facile, rapid, efficient and mild ultrasonic method. The structural, optical and surface morphological properties were proved by various techniques of X-ray diffraction (XRD), UV-Vis-Diffuse reflectance spectroscopy (UV-Vis-DRS), Fourier transform infrared spectroscopy (FT-IR), scanning electron microscopy (SEM) with an energy dispersive X-ray (EDX) spectroscopy and high resolution transmission electron microscope (HR-TEM).The X-ray diffraction (XRD) shows that face centered cube structure of oleic acid coated CdO and the average crystallite sizes were calculated to be 53.66 nm. FT-IR spectra confirmed the presence of metal oxides bands (band at 612 cm^{-1} corresponds to CdO vibration) and the bands corresponding to oleic acid. The absorption maximum of CdO nanoparticles was shifted to visible region after coating of oleic acid. The visible light photocatalytic performances of the oleic acid coated CdO nanoparticles were evaluated by photodegradation of Crystal Violet dye as model organic pollutant. The result showed that oleic acid coated CdO (91 %) exhibited much higher visible light photocatalytic activity than CdO (75 %). As a result, it can be seen that the addition of oleic acid as a surface modifier improves the photocatalytic activity, prevents particle agglomeration and provides a very stable CdO nanoparticles.

Graphical Abstract



FT-IR spectrum ofCdO, CdO-1 and CdO-2 NPs.

Keywords: CdO, Oleic acid, Photocatalysis, Crystal Violet, Solar light.