



Eco-friendly approach to synthesize selenium nanoparticles: Photocatalytic degradation of sunset yellow azo dye and anticancer activity

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Abstract:

This report has two principal goals. First, to synthesis Se nanoparticles (Se-NPLs) via a green approach. Secondly, to explore the photocatalytic activity of Se-NPLs towards the decolorization of sunset yellow (SSY) azo-dye and to test its activity against some types of human cancers. Green synthesis of Se-NPLs from the leaf extracts of Drumstick was developed. Bio-synthesized Se-NPLs were characterized using FTIR, UV-vis, photoluminescence (PL), X-ray powder diffraction (XRD), scanning electron microscopy (SEM), energy dispersive analysis Xray (EDAX) and transmission electron microscopy (TEM) analyses. The UV-vis absorption maximum between 200 and 400 nm was due to the formation of SPR of Se-NPLs. FTIR revealed the Se-NPLs were synthesized, capped and stabilized with biomolecules present in the plant extracts. Se-NPLs exhibited an excitation peak at 399 nm and produced an emission peak at 599 nm. EDAX profile provided a signal of atomic Se (1.45 Kev). XRD confirmed the crystalline nature of Se-NPLs. SEM and TEM observations show that spherical Se particles appeared with diameters ranging from 23 to 35 nm. A possible mechanism of the reduction of (SeO₃²⁻) to (Se⁰) was discussed. The electrical conductivity was measured with temperature and the activation energy was calculated. The photocatalytic study conducted that Se-NPLs have the efficiency to degrade sunset yellow dye and the mechanism of degradation has been proposed. Se- NPLs have been shown to be effective against three types of human cancers (Caco-2 cells, HepG2 cells, and Mcf-7 cells). Se- NPLs are potent anticancer and inhibit the growth of the three cancer cells as indicated by the IC₅₀ values. To conclude, the green-synthesized Se-NPLs may be a candidate for further evaluation as a chemotherapeutic agent for some human cancer treatment.

Keywords:

Selenium Nanoparticles: Photocatalytic Degradation of Sunset Yellow Azo Dye and Anticancer Activity

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