



Novel green route to synthesize cadmium oxide@graphene nanocomposite: optical properties and antimicrobial activity

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Abstract:

The first-time synthesis of cadmium oxide@graphene (CdO@Gr) nanocomposite by a green approach based on Onion extracts and its antimicrobial activity has been developed. The structural, optical and morphological properties of CdO@Gr and controls were investigated. FT-IR confirmed the formation of the CdO NPs by the presence of strong and sharp peaks at 555 and 602 cm^{-1} (Cd-O vibrational stretching). CdONPs showed an absorption peak at 260 nm with a wide direct bandgap (3.11 eV). PL spectra showed an emission peak at 400 nm for CdO@Gr nanocomposite. XRD demonstrated the cubic structure of CdO@Gr nanocomposite. EDX analysis revealed the nanocomposite to contain 28.19% carbon, 34.45% oxygen, and 37.36% cadmium. SEM images display polygonal particles (mainly cubic) deposited on graphene. TEM observations show that the as-produced CdO@Gr nanocomposite is spherical in shape with different diameters in the range 19–38 nm. TGA/DSC analysis was employed to investigate the thermal stability and thermal behavior of the samples. The antimicrobial activity of CdO NPs and CdO@Gr nanocomposites exhibited toxic effects against the bacterial and fungal cells. The antibacterial activity of the nanocomposites imparted high potentiality than CdONPs. This study is focused on the green synthesis of CdO@Gr nanocomposite of great promise for applications in optoelectronics, catalysis, and biomedicine.

Keywords:

graphene, composite, cadmium oxide, green synthesis, optical, antimicrobial

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