

## Structural and Optical Properties of Silver Sulfide/Reduced Graphene Oxide Nanocomposite

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**Abstract :** Nanomaterials have attracted significant attention in research because of their exemplary properties, making them suitable for diverse applications. This paper reports the successful synthesis as well as the structural properties of silver sulfide/reduced graphene oxide (Ag<sub>2</sub>S-rGO) nanocomposite. The nanocomposite was synthesized by the chemical reduction method. Scanning electron microscopy (SEM) showed that the reduced graphene oxide (rGO) sheets were intercalated within the Ag<sub>2</sub>S nanoparticles during the chemical reduction process. The SEM images also showed that Ag<sub>2</sub>S had the shape of nanowires. Further, SEM energy dispersive X-ray (SEM EDX) showed that Ag<sub>2</sub>S-rGO is mainly composed of C, Ag, O, and S. X-ray diffraction analysis manifested a high crystallinity for the nanowire-shaped Ag<sub>2</sub>S nanoparticles with a d-spacing ranging between 1.0 Å and 5.2 Å. Thermal gravimetric analysis (TGA) showed that rGO enhances the thermal stability of the nanocomposite. Ag<sub>2</sub>S-rGO nanocomposite exhibited strong optical absorption in the UV region. The formed nanocomposite is dispersible in polar and non-polar solvents, qualifying it for solution-based device processing.

**Keywords :** silver sulfide, reduced graphene oxide, nanocomposite, structural properties, optical properties

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