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Examining the Structural and Optical Properties of Co₃O₄ Nanostructures Prepared in Different Solvents

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Abstract:

The focus of the present work is based on the study of the structural and optical characteristics of Co₃O₄ nanostructures prepared using the hydrothermal approach in distilled water, methanol, acetone, and isopropyl alcohol solvents. Various solvents were employed to prepare Co₃O₄ nanostructures to investigate their influence on the morphology, crystallinity and optical properties of the samples. Scanning electron microscopy (SEM), X-ray diffraction (XRD) and UV-Vis spectroscopy analysis techniques were used to investigate these properties. The spinel cubic structure of Co₃O₄ was observed from XRD results, and different crystallite sizes were calculated from XRD results. The SEM images revealed that the obtained samples consists of different morphologies ranging from spherical to rod like depending on the type of solvent used. Different types of solvents also resulted to different particle size distribution as well as the physical and chemical properties of the samples. The Uv-Vis data revealed that the optical properties also depend on the solvent used when synthesizing the samples, hence variation in the optical band gap was observed. The results obtained in this study indicates the significance of the solvents during sample preparation and that the desired properties can be controlled and obtained depending on the solvent used.

Notes

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