

# Synthesis and Characterization of MgO Nanoparticles by Sol-Gel Method.

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**Abstract:** Magnesium oxide (MgO) nanoparticles have gained significant interest due to their wide range of applications in catalysis, sensors, ceramics, and antimicrobial materials. In this study, MgO nanoparticles were synthesized using a facile sol-gel technique. Magnesium nitrate hexahydrate was used as a precursor, and citric acid acted as a chelating agent. The gel obtained was dried and subsequently calcined at 500 °C. The synthesized MgO nanoparticles were characterized by X-ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and UV-Vis spectroscopy. XRD confirmed the crystalline cubic phase of MgO with an average crystallite size of ~20 nm. FTIR exhibited characteristic Mg–O vibrational bands, while SEM revealed a relatively uniform particle morphology. Optical studies showed a direct bandgap of ~5.2 eV. The results indicate that the sol-gel method is effective for producing high-quality MgO nanoparticles with potential applications in advanced materials.

**Keywords:** MgO nanoparticles, Sol-gel synthesis, Characterization, XRD, Optical properties

