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**Synthesis, Phase Transformation, and Morphology of Hausmannite Mn3O4 Nanoparticles: Photocatalytic and Antibacterial Investigations**

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**Abstract**

Nano structured Hausmannite (Mn3O4) has efficacious applications in numerous fields, such as catalytic, medical, biosensors, waste water remediation, energy storage devices etc. The potential application in wastewater treatment is due to its distinct structural features combined with fascinating physicochemical properties. Another area of interest is the oxidative properties imparted due to its reduction potential. Larger surface to volume ratio and high reactivity than the bulk form shows great progress as antimicrobial agent to control drug resistant microbial population. The distinct surface morphologies, crystalline forms, reaction conditions and synthetic methods exerts significant impact on the photo catalytic and bactericidal efficiency. Hence, the present paper focuses on a concise review of the multifarious study on synthetic methods of Mn3O4, growth mechanisms, structural forms, phase transformation and phase control, shape and dimensionality. The review also confers its applications towards photo catalytic and bactericidal studies.

**Keywords:**

Nano hausmannite, Methods of synthesis, Morphology, Phase transformation, Photo catalyst Antimicrobial activity, Materials science, Nano materials, Materials application, Materials chemistry Materials property, Chemistry, Environmental science, Biological sciences

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