

Spinel Co₃O₄ from a Complexed Intermediate

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Spinel Co₃O₄ has potential applications in catalysis, high density magnetic storage, and in magneto-optical materials. Synthesis usually involves hydrothermal methods where high temperature degradation of precursors leads to the formation of highly ordered and monodisperse nanoparticles (NPs). Our proposed alternative here is the use of scaffold templated metal salt precursors that only require the use of UV irradiation to generate the same particles at room temperature in water. Poly(ethyleneimine) (PEI) binds metal ions in aqueous. Binding cobalt to PEI results in the uptake and binding of dissolved oxygen between two cobalt metal centers. UV irradiation of this coordinated complex splits bridging oxygen atoms resulting in the formation of the rod shaped metal oxide particles. The possible mechanism for this process is discussed.