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## ACCEPTED MANUSCRIPT

# Evolution of structural and magnetic properties of nickel oxide nanoparticles: Influence of annealing ambient and temperature

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#### Abstract

Nickel oxide (NiO) nanoparticles (NPs) are synthesized using the sol-gel method. The effect of annealing atmosphere type, including air,  $O_2$  and annealing temperature ( $T_A$ ) on the structural, morphological and magnetic properties of NiO NPs was investigated using X-ray diffraction (XRD), transmission electron microscopy (TEM), and vibrating sample magnetometer (VSM) analysis. For this purpose, NiO NPs are annealed at 400, 500, 600, 700 and 800 °C. The magnetic properties of the NPs change as a result of increasing crystallite size in terms of  $T_A$  in both atmospheres. These variations are different according to the type of the annealing atmosphere. At lower temperatures ( $T_A < 600^{\circ}$ C), the NPs that annealed in the O<sub>2</sub> atmosphere have higher crystallinity, larger lattice constant, and lower magnetization and coercivity. At higher temperatures, the structural and magnetic properties of the samples in both atmospheres are more similar.

Keywords: NiO nanoparticle, Annealing, Air, O2, Magnetic properties

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