STRUCTURAL AND MORPHOLOGICAL PROPERTIES OF Fe_3O_4 AND ND-Fe_3O_4 NANOPOWDERS

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Abstract - Iron Oxide (Fe_3O_4) and Neodymium Doped Iron Oxide (Nd-Fe_3O_4) nanopowders, being an important material for many technological applications, were grown by hydrothermal method. Structural and morphological properties of Fe_3O_4 and Nd-Fe_3O_4 nanopowders were studied by using XRD and SEM measurements. XRD spectra for the investigated Fe_3O_4 and Nd-Fe_3O_4 nanopowders revealed that they had cubic structure with lattice parameters a = b = c = 8.3995 Å, belonging to the 227:Fd-3m space group. When the XRD results were analyzed, some diffraction peaks were observed in Nd-Fe_3O_4 nanopowders that were not present in Fe_3O_4 nanopowders. The average crystallite sizes (D) of Fe_3O_4 and Nd-Fe_3O_4 nanopowders were calculated as 53.077 and 34.212 nm, respectively. It is clearly seen that the calculated average crystallite size of Fe_3O_4 nanopowder are greater than that of Nd-Fe_3O_4 nanopowder. The surface images of Fe_3O_4 and Nd-Fe_3O_4 nanopowders were obtained by SEM measurements at different magnifications. The distribution of Nd element doping to iron oxide is clearly seen from SEM images. It was observed that Fe_3O_4 nanopowder consisted of rectangular prism-shaped nanostructures, while the Nd-Fe_3O_4 nanopowder consisted of prism-shaped nanostructures.

Keywords - Fe_3O_4 and Nd-Fe_3O_4 Nanopowders, Particle Size, XRD And SEM.