

عنوان مقاله:

The effect of different substitutions (Eu, Ce, Al, and Bi) on the structural and magnetic properties of Fe_3O_4

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خلاصه مقاله:

In this study, the effect of different substitutions (Eu, Ce, Al, and Bi) on the structural and magnetic properties of Fe_3O_4 is investigated. All samples were synthesized with the cathodic electrochemical deposition method. The structural properties and surface morphology are investigated by XRD and FESEM analyses. Structural analysis of the samples showed the formation of a single-phase structure with an Fd- $\bar{3}m$ space group. The results also showed that the lattice constant and the cell volume increase by increasing the substituted ion's radius. The results of surface morphology of the samples also showed that with increasing substituted ion radius, the average diameter of the samples increases. For $BiFe_2O_4$, $EuFe_2O_4$, $CeFe_2O_4$, and $AlFe_2O_4$ samples, the mean diameter was obtained at $50.38 (\pm 13.60)$ nm, $47.95 (\pm 9.62)$ nm, $36.06 (\pm 8.29)$ nm, and $45.72 (\pm 5.39)$ nm, respectively. And, the magnetic properties of the samples were investigated by VSM analysis. The study of the magnetic properties of the samples shows the superparamagnetic behavior for all samples. (Also, the results show that substituting Fe ions with larger radii ions leads to a decrease in saturation magnetization (Ms) and residual magnetization (Mr

کلمات کلیدی:

Fe_3O_4 ferrite, Substitutions, Cathodic electrical deposition method, Magnetic properties

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