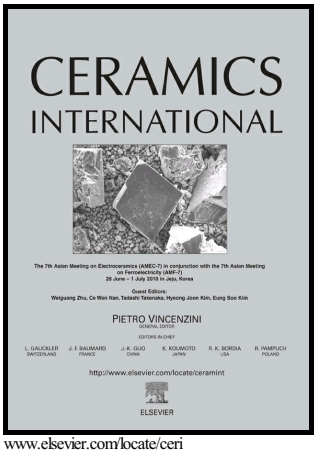

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Abstract

Different doses of γ-radiation can be used to modify the structural and magnetic properties of a host of materials. The $Mn_{0.5}Zn_{0.5}Fe_2O_4$ ceramics samples prepared by the solution combustion route were exposed to different doses of γ-radiation in order to study stability and phase transformations. The creation of defects and building up of strain was observed after medium doses of γ-irradiation (up to 25 kGy) into the single phase pristine samples. However, after 50 kGy of γ-irradiation the locally generated heat drives atomic diffusion, as indicated by the morphological changes in the sample. Furthermore, the sample decomposed into two new stable crystalline phases, α-Fe_2O_3 and $ZnFe_2O_4$, along with amorphous MnO phase. Besides the structural transformations we have observed the deterioration of magnetic properties at higher doses. Our results are important for understanding the stability and performance of the ferrite based devices used near intense high energy radiation sources.

Keywords: Mn-Zn ferrite, Nanocrystalline Ceramics, γ-irradiation, Phase transformations, Mossbauer spectroscopy.