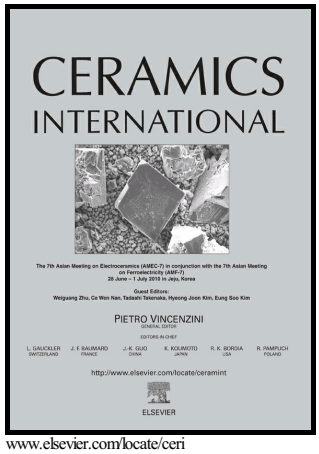

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PZT-nickel ferrite and PZT-cobalt ferrite comparative study: structural, dielectric, ferroelectric and magnetic properties of composite ceramics

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Abstract

Comparative study of different PZT-based composite materials ((x)$PbZr_{0.52}Ti_{0.48}O_3$ + (1-x)$CoFe_2O_4$ and (x)$PbZr_{0.52}Ti_{0.48}O_3$ +(1-x)$Ni_{0.7}Zn_{0.3}Fe_2O_4$ (x=0.8 and 0.9)) is presented in the frame of structural, dielectric, ferroelectric and magnetic properties. PZT and NZF/CF powders were synthesized by auto combustion technique. The composites were synthesized by mixing the appropriate amount of individual phases using conventional sintering. XRD data indicated the formation of well crystallized structure of PZT and NZF/CF, without the presence of undesirable phases. SEM micrographs revealed a uniform grain distribution of both, ferroelectric and ferromagnetic phases. Non-saturated hysteresis loops are evident in all samples due to the existence of non-ferroelectric ferrite phase. All the samples exhibit typical ferromagnetic hysteresis loop, indicating the presence of the order magnetic structure. Dielectric investigations revealed that ferrites are the main source of charge carriers, which must be of electronic origin. The activation energy of effective electrical resistivity is heavily influenced by the ferroelectric phase.

Keywords: Composites materials, Di-phase multiferroics, Dielectric response, Auto-combustion synthesis

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