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ABSTRACTS

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Morphological, Structural, and Magnetic Properties of Perovskite-type Solid Solutions

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Multiferroics are multifunctional materials, which display two or more ferroic orders simultaneously. The possible control of magnetism via electric field or vice versa leads to potential application in different areas, including solar cells, random access memories, microwave phase shifters, etc [1]. Bismuth ferrite ($BiFeO_3$), rare earth (RMO_3 M = Fe, Mn) ferrites or manganites possesses both ferroelectric as well as (anti)ferromagnetic properties, which makes them ideal candidates for further investigation and plausible commercialization [2].

In this work three perovskite-type: $Y_xGd_{1-x}Mn_{0.97}Fe_{0.03}O_3$ [3], $Y_{1-x}Gd_xFeO_3$ [4], and $Bi_{1-x}Gd_xFe_{0.85}Mn_{0.15}O_3$ solid solutions series were investigated. All compounds were prepared by sol-gel technique, in which solid materials can be obtained through gelation by progressive polycondensation reactions rather than precipitation or crystallization. With the use of ethylene glycol as complexing agent, this method allows stoichiometry control and high degree of homogeneity for the final products. Numerous characterization techniques, like X-ray diffraction, Raman, FT-IR and Mösbauer spectroscopies, were employed to investigate the relationship between the chemical composition and the structure. Furthermore, scanning electron microscopy analysis were performed for surface morphology investigation. Lastly, room temperature magnetization measurements were done for all solid solutions.

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