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Effect of rare earth substitution on the structural, electrical and magnetic properties on the piezoelectric $A_{1-x}SrxTiO_3$ system

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Ceramic powders $A_{1-x}SrxTiO_3$ (where $x = 0.02$, and $A = Ba^{2+}$, Pr^{3+} , Sm^{3+} , Eu^{3+} , and Er^{3+}) were synthesized by solid-state reaction method and sintered at up to $1400\text{ }^\circ\text{C}$. The phase formation, elemental composition, and microstructure of the sintered samples were investigated by TGA, XRD, EDX and SEM techniques, respectively. The results of the partial substitution of Ba ions by other rare earth ions (Pr, Sm, Eu and Er) showed an improved on piezoelectric and electrical properties of $A_{1-x}SrxTiO_3$ system. This work will provide a relationship between the structural and physical properties of the $A_{1-x}SrxTiO_3$ through doping of various rare earth elements.

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