Accepted Manuscript

Crystal structural, dielectrical properties and high temperature magnetic phase transition of $Sm_{1-x}Ca_xFeO_3$ (x=0–0.3)

G.L. Song, J. Su, S.K. Fang, J.S. Tong, X.R. Xu, F. Yang, N. Zhang, F.G. Chang

PII: S0925-8388(18)31643-8

DOI: 10.1016/j.jallcom.2018.04.309

Reference: JALCOM 45947

To appear in: *Journal of Alloys and Compounds*

Received Date: 24 February 2018

Revised Date: 26 April 2018

Accepted Date: 27 April 2018

Please cite this article as: G.L. Song, J. Su, S.K. Fang, J.S. Tong, X.R. Xu, F. Yang, N. Zhang, F.G. Chang, Crystal structural, dielectrical properties and high temperature magnetic phase transition of $Sm_{1-x}Ca_xFeO_3$ (x=0–0.3), *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.04.309.

Crystal structural, dielectrical properties and high temperature magnetic phase transition of $Sm_{1-x}Ca_xFeO_3$ (x=0-0.3)

G. L. Song*, J. Su, S. K. Fang, J. S. Tong, X. R. Xu, F. Yang, N. Zhang, F.G Chang

(Henan Key laboratory of Photovoltail Materials, College of Physics and Materials Science, Henan Normal University, Xinxiang 453007, China)

Abstract: In the present study, crystal structural, dielectric, ferromagnetic properties and high temperature magnetic phase transition of $Sm_{1-x}Ca_xFeO_3$ (x=0-0.3) by the conventional solid-state reaction method were investigated. The crystalline structure, the microstructure, the dielectric property of the $Sm_{1-x}Ca_xFeO_3$ samples was characterized by x-ray diffraction (XRD) and field emissions canning electron microscopy (FESEM). The dielectric property measurement was performed by a precision impedance analyzer with the frequency range from 40 to 110MHz. The coexistence of $Fe^{3+/2+}$ ions in $Sm_{1-x}Ca_xFeO_3$ samples was investigated with X-ray photoelectron spectroscopy (XPS). The magnetic property of $Sm_{1-x}Ca_xFeO_3$ was measured with Physical Property Measurement System (PPMS). The result shows that all the peaks for $Sm_{1-x}Ca_xFeO_3$ samples can be indexed according to the crystal structure of pure $SmFeO_3$ and has a fine crystal structure by XRD. The SEM images indicate that Ca^{2+} doping significantly increases the grain sizes of $SmFeO_3$ ceramic. The average grain sizes of $Sm_{1-x}Ca_xFeO_3$ samples range from 0.5 to 2μm with Ca^{2+} doping. ε_r of $Sm_{1-x}Ca_xFeO_3$ measured at 1kHz is about 5, 3 and 2.6 times greater than that of $SmFeO_3$, respectively, and the dielectric loss increases by an order of magnitude. The increase of ε_r is mainly caused by the interaction between the dipole and the space charge orientation polarization. Magnetic measurements show that the M-H of $Sm_{1-x}Ca_xFeO_3$ samples exhibit saturated magnetic hysteresis loops with the increase of Ca^{2+}, and the M_r of $Sm_{1-x}Ca_xFeO_3$ (x=0-0.3) is 20, 31, and 68 times of that of $SmFeO_3$, respectively, suggesting the weakly