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Preparation and investigation of the structural properties of $\text{SmFeAsO}_{0.7}\text{F}_{0.3}$ compound

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Abstract

$\text{SmFeAsO}_{0.7}\text{F}_{0.3}$ polycrystalline bulk iron-based compound were prepared by one-step solid state reaction method at low sinter temperature. The aim was: to find the optimum preparing method for the compound and then to study its structural properties. The X-ray diffraction spectrum of the samples was analyzed using MAUD software. XRD measurements were used to characterize the crystal structure, phase purity, lattice parameters, unit cell volume and bonding angles and intervals of the samples. The results were compared with JCPDS reference pattern and the reports in the literatures, to ensure the accuracy of the synthesis. The XRD analyses revealed an increase in the phase purity above 80%, by lowering the sinter temperature down to 900 °C. Also, the samples have a tetragonal crystal structure with $P4/nmm$ symmetry, at room temperature. The SEM images show the samples are almost homogeneous with some porosity. The porosity decrease and the grain size grow by decreasing the sinter temperature. These results show the preparation of good quality samples at low temperature of 900 °C compared to 1200 °C which usually is used for preparation of this family of compound.

Keywords: iron based compound, solid state reaction, $\text{SmFeAsO}_{0.7}\text{F}_{0.3}$.

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