Synthesis and Magnetic Properties of Strontium W-type Hexagonal Ferrite

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Since strontium W-type hexagonal ferrite (SrW) is stable at the temperature region of 1350-1420℃ in air, it is hard to synthesize the pure phase of SrW. Many researches on the phase stability and properties of substituted SrW were reported, however not on the pure SrW. In this paper we report a successful synthesis of SrW with the composition of $SrFe_{18}O_{27}$ by the standard solid state reaction in a reduced oxygen atmosphere. When samples were sintered at the temperature region of 1365-1400℃ for 2 h in air, those were composed of the SrW, strontium M-type hexagonal ferrite $SrFe_{12}O_{19}$ (SrM) and Fe_2O_3, which are attributed to a partial decomposition of SrW into SrM and Fe_2O_3 during furace-cooling. Instead, when samples were sintered at 1275 and 1300℃ for 2 h in pure N_2atmosphere (~ 0.5 ppm O_2), those consisted of SrW with a small amount of Fe_3O_4, suggesting that a $SrFe_{18-x}O_{27}$ –type solid solution might be formed. In the oxygen partial pressure of 1000ppm O_2 the pure SrW phase could be successfully synthesized at the temperature region of 1300-1350℃ for 2h. Detailed microstructures and magnetic properties of the pure SrW sample will be presented for a discussion.