Static and dynamic magnetic properties of $SrZn_xFe_{(2-x)}Fe_{16}O_{27}$ ($0.0 \leq x \leq 2.0$) synthesized in a low oxygen pressure

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Strontium W-type hexaferrite ($SrFe_{18}O_{27}$, SrW) is a ferromagnetic material possessing high saturation magnetization (M_s) about 80 emu/g and high anisotropy field (H_a) about 19 kOe. Due to its cost effectiveness and suitable magnetic properties, W-type hexaferrite has attracted attention for permanent magnet application and microwave application especially for microwave absorber in the large frequency range of 8–40 GHz. In this report, we tried to prepare Zn-substituted SrW bulk samples with the compositions of $SrZn_xFe_{(2-x)}Fe_{16}O_{27}$ ($SrZn_xFe_{(2-x)}W$) where x value was $0.0 \leq x \leq 2.0$ for the first time in a reduced oxygen atmosphere, and identify the effect of Zn^{2+} substitution on their magnetic properties. Furthermore, static and dynamic magnetic properties of $SrZn_xFe_{(2-x)}W$ with varying x were investigated. For these purposes, the samples with different x values were annealed at the temperature region of 1125–1350°C for 2 h in the PO_2 of 10^{-3} atm. As a result, single phase of $SrZn_xFe_{(2-x)}W$ could be obtained for x values of 0.0, 0.5, and 1.0. Static and dynamic magnetic property measurements revealed that anisotropy field value of the samples decreased with increasing x from 0.0 to 1.0. In the contrast, saturation magnetization value increased with increasing x value. And also, It was found that real permeability value increased and ferromagnetic resonance frequency decreased with increasing x value which is attributable to increased saturation magnetization and decreased anisotropy field. Detailed properties of $SrZn_xFe_{(2-x)}W$ will be presented for a discussion.