

## **Influence of pH adjustment parameter for sol-gel modification on structural, microstructure and magnetic properties of nanocrystalline strontium ferrite**

### **ABSTRACT**

Synthesis of nanocrystalline strontium ferrite (SrFe<sub>12</sub>O<sub>19</sub>) via sol-gel is sensitive to its modification parameters. Therefore, in this study, an attempt of regulating the pH as a sol-gel modification parameter during preparation of SrFe<sub>12</sub>O<sub>19</sub> nanoparticles sintered at a low sintering temperature of 900 °C has been presented. The relationship of varying pH (pH 0 to 8) on structural, microstructures, and magnetic behaviors of SrFe<sub>12</sub>O<sub>19</sub> nanoparticles were characterized by X-ray diffraction (XRD), field emission scanning microscope (FESEM), and vibrating sample magnetometer (VSM). Varying the pH of precursor exhibited a strong effect on the sintered density, crystal structure and magnetic properties of the SrFe<sub>12</sub>O<sub>19</sub> nanoparticles. As the pH is 0, the SrFe<sub>12</sub>O<sub>19</sub> produced relatively largest density, saturation magnetization, Ms, and coercivity, Hc, at a low sintering temperature of 900 °C. The grain size of SrFe<sub>12</sub>O<sub>19</sub> is obtained in the range of 73.6 to 133.3 nm. The porosity of the sample affected the density and the magnetic properties of the SrFe<sub>12</sub>O<sub>19</sub> ferrite. It is suggested that the low-temperature sintered SrFe<sub>12</sub>O<sub>19</sub> at pH 0 displayed Ms of 44.19 emu/g and Hc of 6403.6 Oe, possessing a significant potential for applying in low-temperature co-fired ceramic permanent magnet.

**Keyword:** Sol-gel; pH; Structural; Microstructure; Magnetic behavior; Strontium hexaferrite (SrFe<sub>12</sub>O<sub>19</sub>)