**Abstract**

In this work, Sr-substituted samples of single-phase spinel monoferrites with chemical formula Ba1−xSrxFe2O4Ba1−xSrxFe2O4 (*x* = 0.00, 0.33, 0.67, 1.00) were synthesized using sol–gel auto-combustion method. In order to confirm the single-phase formation of these samples, a sample (*x* = 0.00) was chosen for heat treatment at different temperatures (100, 300, 400, 600 and 700∘C700∘C) for 4 h. The heat treated sample was then investigated by X-ray diffraction (XRD) analysis and results showed that a single-phase sample can be successfully synthesized at a temperature of 600∘C600∘C, which is much lower than that reported in earlier literature for synthesis of same structured samples. All the synthesized samples were then sintered at 700∘C700∘C for 4 h to achieve better crystallinity. From XRD patterns, lattice parameters, cell volume and XRD density as a function of Sr-substitution were calculated. Scanning electron microscopy (SEM) results showed that the grain size increased as the temperature was increased. Fourier transform infrared spectroscopy (FTIR) results confirmed the single-phase spinel monoferrites at 700∘C700∘C. From M–H loops (*x* = 0.0, 0.33, 0.67 and 1.00), different magnetic parameters such as saturation magnetization (Ms)(Ms), remanance (Mr)(Mr), coercivity (Hc)(Hc) and magnetic moment (nB)(nB) were calculated. Magnetocrystalline anisotropy constant and Y–K angles of Sr-doped Ba monoferrites were also calculated. In addition, the variation of different dielectric parameters (real permittivity, imaginary permittivity, real permeability, imaginary permeability, ac conductivity and loss tangent) as a function of frequency (1–6 GHz) has been discussed in this work. The results suggest that the synthesized materials have many advantages over previously reported single-phase spinel monoferrites.