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ABSTRACT

The effects of synthesis methods such as sol-gel (SG), self combustion (SC) and modified conventional mixed oxide (MCMO) on the structure, morphology and magnetic properties of the ($Y_3Fe_5O_{12}$) garnet ferrites have been studied in the present work. **The samples of $Y_3Fe_5O_{12}$ were sintered at 950 °C and 1150 °C (by SG and SC methods). For MCMO route the sintering was done at 1350 °C for 6 h.** Synthesized samples prepared by various routes were investigated using X-ray diffraction (XRD) analysis, Field emission scanning electron microscopy (FESEM), Impedance network analyzer and transmission electron microscopy (TEM). The structural analysis reveals that the samples are of single phase structure and shows variations in the particle sizes and cells volumes, prepared by various routes. FESEM and TEM images depict that grain size increases with the increase of sintering temperature from 40 to 100 nm. Dielectric measurements reveal that garnet ferrite synthesized by sol gel method has high initial permeability (60.22) and low magnetic loss (0.0004) as compared to other garnet ferrite samples, which were synthesized by self combustion and MCMO methods. The M-H loops exhibit very low coercivity which enables the use of these materials in relays and switching devices fabrications. Thus, the