

Sintering temperature dependence of optimized microstructure formation of BaFe₁₂O₁₉ using sol-gel method

ABSTRACT

In an attempt to obtain the best possible properties of barium hexaferrite (BaFe₁₂O₁₉), the sol-gel synthesis method was chosen and, the optimum sintering conditions were established. The effects of the sintering temperature on the structural, morphological and magnetic properties of hexaferrite were studied. X-ray analysis indicates that the sintered samples (1,000-1,150 °C) remained in the hexagonal structure. From this analysis, no secondary phases are identified. The effect of sintering temperature on the grain growth of BaFeBaFe₁₂O₁₉ is confirmed by the microstructure using HR-SEM and is in good agreement with the XRD analysis based on the peak intensity of the (107) plane. The samples sintered at 1,150 °C showed the densities as ~93 % of theoretical density. Sintering temperature affected the grains in compact samples. The results show that homogeneous and dense BaFeBaFe₁₂O₁₉ ceramics obtained at a lower sintering temperature of 1,150 °C which is lower than the normally reported sintering temperature of ~1,200 °C. The thermal treatment can markedly affect the grains in compact samples.

Keyword: BaFe₁₂O₁₉; Sintering temperature; Sol-gel method