The 8th International Conference on Advanced Materials and Devices

ICAMD 2013

December 11~13, 2013 Ramada Plaza Jeju Hotel, Jeju, Korea

Organized by

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THU-SP-P12

High frequency properties of $Ba_2CoZnFe_{12}O_{22}$ depend on synthesis condition

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The polycrystalline sample of $Ba_2CoZnFe_{12}O_{22}$ was synthesized by solid state reaction methods. The $BaCO_3$, CoO, ZnO, and Fe_2O_3 of commercial grade powders were used as the starting materials, and mixed by using ball-mill. The mixture were mixed with polyvinyl alcohol, and pressed into the toroids. The toroids were sintered with various sintering temperature at 1050, 1100, 1150, and 1200 ^oC for 3 h in air. The crystal structure and magnetic properties of $Ba_2CoZnFe_{12}O_{22}$ sample was characterized by using x-ray diffractometer (XRD), vibrating sample magnetometer (VSM), network analyzer, and Mössbauer spectrometer. From the XRD patterns analyzed by Rietveld refinement, we confirmed to be rhombohedral structure with space group of *R-3m*. The density of samples increased with increasing sintering temperature. From the magnetic hysteresis curves up to 10 kOe at 295 K, the saturation magnetization (M_s) of $Ba_2CoZnFe_{12}O_{22}$ samples in various sintered at 1050, 1100, 1150, and 1200 ^oC were found to M_s = 33.0, 33.6, 32.9, and 33.0 emu/g, respectively. The coercivity (H_c) of samples decreased with increasing sintering temperature. Complex permeability and permittivity of $Ba_2CoZnFe_{12}O_{22}$ samples in various sintering temperatures were measured by network analyzer between 100 MHz to 4 GHz. The permeability and tan δ of samples increased with increasing sintering temperature. Our study shows that the permeability of sintered 1050 ^oC sample is 3.20 at 1.20 GHz with tan δ 0.1.