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Synthesis and microwave characteristic of Y and Z type hexaferrite

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We report studies on the structural, magnetic and microwave properties and magnetic phase transitions of polycrystalline Z-type $Sr_3Co_2Fe_{24}O_{41}$ and Y-type hexaferrite $Ba_{0.5}Sr_{1.5}Zn_2Al_{0.08}Fe_{11.92}O_{22}$ synthesized by sol-gel auto-combustion. The results of the ZFC and FC magnetization measurements of polycrystalline Z-type $Sr_3Co_2Fe_{24}O_{41}$ show a change in the magnetization behavior at 295 K, related to the magnetic phase transition from ferrimagnetic to transverse conical spin order. Therefore, the magneto-electric effect can be observed below 295K. The $Ba_{0.5}Sr_{1.5}Zn_2Al_{0.08}Fe_{11.92}O_{22}$ sample shows a triple loop at room temperature, due to the presence of two kinds of ferrimagnetic states. The magnetization at 50 kOe was 47 emu/g. We observed several magnetic phase transitions in the temperature ranging from 4.2 to 300 K for the $Ba_{0.5}Sr_{1.5}Zn_2Al_{0.08}Fe_{11.92}O_{22}$ sample. The magnetic phase transition from collinear ferromagnetic to proper-screw spin allows us to assume that $Ba_{0.5}Sr_{1.5}Zn_2Al_{0.08}Fe_{11.92}O_{22}$ is a multiferroic below 285 K. The microwave properties of both the Z-type and Y-type hexaferrites were studied between 1-20 GHz. A polycrystalline sample of hexaferrite was dispersed in a polymer matrix. The reflection losses of the composite samples were measured in an external magnetic field. A dramatic increase of the attenuation was observed due to the magnetic field influence on the composite samples with Z-type powder as a filler.

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