

Synthesis and Characterization of Bi-substituted YIG

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Bi-substituted yttrium iron garnet phases having the compositions of $Y_{3-x}Bi_xFe_5O_{12}$ were synthesized by the solid state reaction using precursor powder of Y_2O_3 , Fe_2O_3 , and Bi_2O_3 (all 99.9% purity) in the temperature range of 850~1200°C. While a normal synthesis temperature is 1200°C in air for the $Y_3Fe_5O_3$ ($x = 0$), it should be lowered with increasing the amount of Bi-substitution x . The solubility limits at 950°C were $x = 1.2$ and 1.3 in air and pure Ar atmospheres, respectively. Over the Bi solubility limit, non-garnet phases of $BiFeO_3$ and $Bi_2Fe_4O_9$ were formed. The effect of Bi-substitution for the Y site on their magnetic properties and microstructures will be presented for a discussion.

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