9.7 cm

STOICHIOMETRY AND MAGNETIC AND STRUCTURAL PROPERTIES OF PURE BISMUTH IRON GARNET

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Pure $Bi_3Fe_5O_{12}$ (BIG) is only obtainable as a thin film by direct vapor-phase epitaxial growth during deposition. As the crystal growth is taken place on a garnet substrate kept at around $500°C$ in a reduced atmosphere and Bi is highly volatile, the stoichiometric composition of BIG ($Bi/Fe = 0.6$) may be hardly assured. In addition, it is very difficult to distinguish the compositional ratio of BIG phase from that of the whole film. Therefore we tried to evaluate the quality of BIG phase by comparing the physical properties of the films grown using sputtering targets with various Bi/Fe ratio. Among the films in which only BIG phase is observed by XRD means, the film with $Bi/Fe = 0.53$ is revealed to have the best quality from the following point of view; the narrowest FWHM of X-ray rocking curve and FMR line width, and the largest magnetization and Faraday rotation angle. This result suggests that BIG phase contains a considerable amount of vacancy at Bi sites.

13.4 cm

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