# Growth of YIG films by solid phase epitaxy and their properties

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Epitaxial YIG films are very interesting from fundamental point as well as application point of view. For epitaxial growth of YIG film by sputtering, methods of both direct growth and solid phase epitaxy (SPE) were compared. For SPE, amorphous Fe-Y-O films were sputtered on GGG (111) at ambient temperature and then subsequently annealed at temperature higher than 650°C in the air. However, it was very inconvenient to sputter at high temperature for direct growth of epitaxial YIG film. Instead, solid phase epitaxy is very useful and convenient [1]. It was very effective to add small amount of oxygen to suppress formation of $YFeO_3$ phase in SPE. Crystallization temperature of Fe-Y-O amorphous films on GGG (111) substrate was much lower than that of Fe-Y-O powder. Excellent epitaxial growth of YIG films could be conformed in XRD by both very high intensity and very low value of full width at half maximum of YIG (888) plane as shown in Fig. 1. It was necessary to anneal the films at higher temperature for an excellent epitaxy. This could be also confirmed by the results of VSM and FMR. Films annealed at higher temperature shows M-H loop with perpendicular anisotropy which was due to .15% lattice mismatch between YIG and GGG.

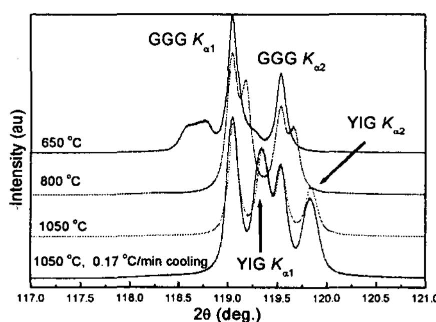


Fig. 1 Variation of x-ray peaks diffracted from (888) plane of YIG films

[1] ] Pyung Woo Jang and Ji Young Kim, IEEE Trans. Magn. 37, (2001), p.2438