

Influence of annealing temperature on the structural and magnetic properties of FeGaSiB thin films

ABSTRACT

Understanding the relationship between the structure and magnetic properties of soft magnetic thin films is important in the development of magnetic sensors and electronic devices. This work has systematically studied how the annealing temperature changes the morphology and hence the magnetic properties of 60 nm FeGaSiB thin films. The as-grown and 100 °C annealed films were amorphous/nanocrystalline with soft magnetic properties. As the annealing temperature increased, so did the coercive field of the films, which was found to be due to the formation of polycrystalline grains, with random texture. The grain size increased with increasing annealing temperature, while the Curie Temperature and magnetostriction constant decreased. For the saturation induction, there was a large decrease between the 100 °C annealed film and the 250 °C annealed film, due to the film morphology changing from amorphous to polycrystalline. Thus there is strong correlation between the crystallinity and the soft magnetic behaviour of FeGaSiB films.