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## **Growth of Nanocrystalline Barium Ferrite Thin Films by Sol–Gel Method**

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Nanocrystalline Ba-ferrite thin films with particles of 40–60 nm size range have been prepared by a sol–gel method. The crystal structures were measured by XRD. Thermal analysis such as thermogravimetry analysis (TGA) and differential thermal analysis (DTA) were performed on the dried powder obtained from the Ba-ferrite precursor solution. Magnetic properties were measured using a vibrating sample magnetometer (VSM) at a maximum applied field of 15 kOe. The patterns for the sample annealed at temperature above 973 K indexed well on the *M*-type hexagonal structure with lattice constants  $a = 5.891 \text{ \AA}$  and  $c = 23.200 \text{ \AA}$ . BaFe<sub>12</sub>O<sub>19</sub> (BaM) thin film was epitaxially grown on single crystalline sapphire (001) substrate with BaM(00 $l$ )/sapphire(001) relation. The full width at half maximum of the rocking curve of the (008) peak is 0.28°. AFM was used to detect the grain size and surface morphology. Surface roughness of the films was between 2 and 4 nm. The perpendicular coercivity  $H_{C\perp}$  was 4.9 kOe at room temperature under an applied field of 15 kOe annealed at 1023 K for 2 h.