구두발표 3

Growth of *c*-axis oriented barium ferrite film on (111) MgO underlayer

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Barium hexaferrite (BaM) film with perpendicular *c*-axis orientation was successfully deposited on silicon substrates with an MgO (111) underlayer by rf sputtering and *in-situ* heating at 920 °C. The magnetic and structural properties of 0.27 μm thick BaM films, deposited on MgO (111) underlayers, were compared to films of the same thickness deposited onto single-crystal MgO (111) and Al_2O_3 (000*l*) substrates by vibrating sample magnetometry (VSM), x-ray diffraction (XRD), and atomic force microscopy (AFM). The thickness dependence of MgO (111) underlayers was found to have a large effect on both magnetic and structural properties of the BaM film. It was determined that 15 nm thick MgO (111) underlayers produced BaM films with almost identical magnetic and structural properties as the single-crystal substrates, this can explained by the lower surface roughness for thinner underlayers. The magnetization saturation (M_S) and the ratio $H_{c\parallel}/H_{c\perp}$ for the BaM film with a 15 nm MgO (111) is 217 emu/cc and 0.24, respectively. This is similar to the results for the BaM films deposited on the single-crystal MgO (111) and Al_2O_3 (000*l*) substrates of 197 emu/cc and 0.10, 200 emu/cc and 0.12, respectively. The proposed MgO (111) underlayer, therefore, can be used in many applications to promote *c*-axis orientation without the cost of expensive substrates.