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Origin of the Anisotropy in Soft Nanocrystalline CoFe-HfO Thin Films

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As-deposited CoFeHfO films by RF-sputtering exhibited good soft magnetic properties with not only high M_s (1400 emu/cm³) but also small H_c (0.6 Oe). We found out the anisotropy in CoFeHfO films was mainly contributed by the magnetoelastic energy. In this case, the magnitude of a magnetoelastic anisotropy constant (K_u) was positive and greater than an onset value, an in plain magnetically anisotropic behavior and good soft magnetic properties were achieved. On the other hand, after 300° annealing, the K_u became negative, the perpendicular anisotropy appeared, accompanying the presence of strip domains. The coercivity was reduced to 0.3 Oe but the films became magnetically isotropic, which was attributed to the stress release during the annealing process.

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UA02

Structure and Magnetic Properties of Co₁₉Fe₅₂Hf₁₀O₁₉ Annealed under Longitudinal Magnetic Field

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The effect of longitudinal magnetic field applied during the heat treatment on the structure and magnetic properties of Co₁₉Fe₅₂Hf₁₀O₁₉ with various temperatures has been investigated. After annealing during 1h, all of samples was annealed higher at 200°C became nanocrystalline completely. Magnetic anisotropy is induced strongly after annealing, increase quickly up to 70 Oe at 400°C and remain stable after that. On the other hand, the lowest coercivity values of 0.2 Oe at 250°C have been obtained and increase slowly along other temperatures. The influence of treatment conditions on the microstructure and magnetic properties of Co₁₉Fe₅₂Hf₁₀O₁₉ is discussed in detail.

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