

## **Influence of the film thickness and additional elements (Al, O, and N) on the properties of FeCo film structures**

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### **Abstract**

The magnetic properties and domain structure of FeCoAlON thin films with thicknesses varying from 55 to 550 nm have been studied, and conditions favoring preparation of FeCoAlON films with uniaxial anisotropy in the direction normal to the film plane, which is required for designing "perpendicular" super-high-density information recording, have been established. In FeCoAlON films with a thickness up to 300 nm, the domain structure consists of cross-linked domain walls, because strong demagnetizing field suppresses formation of stripe domains. After the film thickness has reached 320 nm, cross-linked domain walls transform into stripe domains, with uniaxial anisotropy in the film plane disappearing, to become replaced by uniaxial anisotropy in the direction normal to the film plane, which can be assigned to magnetoelastic stresses induced by nitrogen atoms filling up interstitial space in the (110) plane. A further increase in the film thickness (up to 550 nm) leads to a rotational anisotropy due to the increase of nitrogen concentration in interstitials and the increase of magnetoelastic stresses. © 2014 Pleiades Publishing, Ltd.

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