

# Tailoring of uniaxial magnetic anisotropy in Permalloy thin films using self-organized nano rippled templates

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In this work we have employed nanopatterned substrates as a template to tailor uniaxial magnetic anisotropy in Permalloy thinfilms deposited on it. Periodic Si ripple substrates having different value of wavelength have been prepared using oblique angle low energy ion beam erosion. Strong uniaxial magnetic anisotropy (UMA) with magnetization in a direction normal to the ripple wave vector has been observed. UMA is found to be gradually decreasing with increasing thickness of Permalloy thin films. Also thin films deposited on low value of (24 nm)ripple wavelength Si substrates are found to be exhibiting strong uniaxial magnetic anisotropy. In order to correlate the structure and morphology of the substrates with observed magnetic anisotropy variation we did a detailed growth study of the films using in-situ grazing incidence small angle x ray scattering. We have found that both periodicity as well as depth of the ripples is crucial in determining the strength of UMA.