

# Engineering Tilted Magnetic Anisotropy in Crystalline Permalloy and Amorphous Cobalt Thin Films

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Magnetic anisotropy plays a crucial role in deciding both static and dynamic behaviour of magnetic thin films [1]. It controls various phenomena, such as magnetization reversal, domain formation, domain-wall motion, spin-wave generation, and spin-wave propagation etc. We investigate the mixed anisotropies in face-centred-cubic Permalloy (fcc-Py) and amorphous Cobalt (a-Co) thin films deposited via rf magnetron sputtering on Si (100) substrate with thicknesses,  $d = 5\text{-}125$  nm and  $t = 5\text{-}150$  nm, respectively. X-ray diffraction technique, atomic force microscopy, and vibrating sample magnetometry are employed to study the structural, morphological, and magnetic properties. We adopt a qualitative approach to understand the thickness-dependent nature of the mixed anisotropies for both materials. The role of growth conditions in the emergence of specific anisotropies is discussed in detail [2]. An alteration of the magnetization easy axis from the conventional in-plane orientation is evidenced due to the collective influence of these mixed anisotropies. Based on the dominance of anisotropy components, their origin, and the direction of magnetization tilt, we categorize our samples into specific regimes. The one-to-one comparison between a sputter-deposited crystalline and an amorphous magnetic material may provide a stronger foundation for understanding technologically important tilted anisotropy [3].

## References:

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