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Magnetization reversal in compositionally modulated Tb/Fe multilayers (abstract)

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We have prepared compositionally modulated Tb($X \text{ \AA}$)/Fe(5 \AA) thin film multilayers with X ranging from 3.5 to 7 \AA by magnetron sputtering on glass substrates. Magnetization measurements using SQUID and alternating gradient force magnetometers show that these samples have uniaxial anisotropies (K_u) up to 10^7 erg/cm^3 and saturation magnetizations (M_s) between 50 and 350 emu/cm^3 . Constant field magnetization reversal measurements at room temperature show that these samples reverse by slow nucleation followed by relatively rapid domain wall motion. The samples with larger uniaxial anisotropies and smaller saturation magnetizations reverse completely for applied fields less than the coercivity, while those samples on the other end of the spectrum do not. The magnetization reversal curves are correlated with the shapes of the hysteresis loops, and the experimental results are interpreted using a recently developed uniaxial anisotropy model of magnetization reversal.¹

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¹R. D. Kirby, J. X. Shen, R. J. Hardy, and D. J. Sellmyer, Phys. Rev. B (to be published).