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Spin-Wave Resonance and Relaxation in CoFeB/Cr Superlattices

YU GONG, ZEHRA CEVHER, YUHANG REN, Physics & Astronomy, Hunter College of the City University of New York, HASSAN IMRANE, NIAN X. SUN, Electrical and Computer Engineering, Northeastern University, PHYSICS & ASTRON-OMY, HUNTER COLLEGE OF THE CITY UNIVERSITY OF NEW YORK TEAM, ELECTRICAL AND COMPUTER ENGINEERING, NORTHEASTERN UNIVERSITY TEAM — We investigated the magnetic anisotropic properties and the spin wave relaxation in ten periods of CoFeB/Cr/CoFeB films grown on seed layers of Cu (~ 5 nm) with Co: Fe: B composition ratio as 2:2:1. The measurements were taken in samples with 50-angstrom layers of CoFeB using both the time-resolved pump-probe magneto-optical sampling and the ferromagnetic resonance techniques. The thickness of the Cr interlayers ranges from 4-angstrom to 40-angstrom for investigating the mechanisms of interlayer coupling and exchange interactions. Both the acoustic branch and the optical branch in spin wave resonance spectra are identified. We determine the magnetic anisotropic parameters by measuring spin wave frequency as a function of external magnetic field in the time domain and by orthogonally rotating the field aligned axis with respect to the spectral field in the frequency domain. Moreover, we estimate the intrinsic Gilbert damping for the in-plane magnetization orientation. When the interlayer coupling is weaker, the damping increases significantly.

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