Spin wave dynamics in CoFeB/Au/Co/Au layers

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The dynamics of spin waves in differentiated thin magnetic structures makes it possible to determine the suitability of a given structure for application purposes. The relationship between the spin wave vector and the direction of the external magnetic field determines the different effects in the same layered structure, especially when the direction of magnetization of the two magnetic layers is different. In the tested case, the thin layer of CoFeB shows PMA, while the Co layer shows in-plane magnetization. Separating these ferromagnetic layers with a gold wedge allows us to study the interrelationships in the dynamics of spin waves in this structure. The Brillouin spectroscopy method (in two measurement geometries: Damon-Eshbach and Backward Volume) and MOKE were used in the research. Spin wave dispersion relations were extracted and studied the nonlinear effect as well as system behaviour as the function of thickness of nonmagnetic film. The dispersion relations between the effective CoFeB-Co magnetic layer and the independent separated magnetic layers was performed. It was found that the presence of single gold layers causes a significant reduction of the effective layer, which results in a strong change in the observed Brillouin shift. A layer of gold with a thickness of more than 1.1 nm causes that we observe a spin wave propagating in the CoFeB layer. The fluctuations of the Brillouin shift in successive points of the wedge structure indicate that there is an interphase interaction of the RKKY type.

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