Spin wave analysis on magnetic multilayers of Cobalt/Nickel

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Magnon-spintronics is an emerging field of modern magnetism, to illustrate the behaviour of spin waves (SWs) in nanostructure elements, and is considered to be the requirement of future signal processing devices. The magnonic systems can have the possibility to fill the gap between ultra-fast photonic and extremely miniaturized electronic systems, ie; to design energetically efficient devices miniaturized down to 100 nm and operating at relatively high frequencies in the range from a few to tens of GHz. This study reports the spin wave dynamics on the composition consisting of Ti/Au/Co/Ni. Here we examine the quantitative analysis of spin wave energy under a range of wave vectors. To extract the dispersion relations of the magnon and phonon system we used the Brillouin Light Scattering (BLS) method. These measurements were shown to lead to a visible difference in the positions of the modes on the right and left sides of the Brillouin spectrum. This indicates an accurate determination of the existence of Dzyaloshinskii-Moriya Interaction (DMI) in this system. A detailed comparison of phonon analysis is made through COMSOL simulations. The effect of the magnetic field was investigated by means of BLS and Ferromagnetic resonance (FMR) as well.

Keywords: Brillouin Light Scattering, Dzyaloshinskii-Moriya Interaction, Ferromagnetic Resonace.