

Impedance behavior of NiFe/Cu/Co Pseudo Spin Valve

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The magneto impedance (MI) behavior of NiFe/Cu/Co pseudo spin valve (PSV) was investigated at room temperature in the frequency ranged from 100 Hz to 15 MHz. The PSV was fabricated by an E-gun evaporator with base pressure of better than 10^{-7} torr. The MI behavior is determined by using a HP 4194A impedance analyzer with 16047D fixture, and together with an electromagnet which can supply a field up to ± 100 Oe. The MI consists of a real part, MR, and an imaginary part MX. In the frequency range of 100 Hz to 15 MHz, MR varied between 105.7 and 98.5 Ohm, while MI varied between 98.8 and 112.4 Ohm. The minima of both MR and MI occurred at 2 MHz, however, the resonance frequency of the system at the zero value of MX observed at 400 kHz. These are related to the parasitic effect of the measurement system. The MX ratio showed a transition region to change sign across zero. For instance, MX ratio changed from 71 % at 400 kHz to -30 % at 500 kHz respectively. S/N ratio decreases abruptly near the resonance frequency of 400 kHz. In a field up to ± 100 Oe, when the magnetic moments are in parallel, we observed high inductance and low resistance. By contrast, low inductance and high resistance were measured due to the magnetic moments were in anti-parallel. Therefore, we observed that the shape of MX loop is reverse to the MR loop. In conclusion, our experimental data demonstrates that the PSV can be regarded as serial combination of a resistor, an inductor and a capacitor, and the AC parameters of the PSV sample were observed to exhibit frequency dependent hysteresis property.