In this study, we deposited MgO/CoFeB/Nb, Nb/CoFeB/MgO and MgO/CoFeB/Nb/CoFeB/MgO by sputtering and grew synthetic antiferromagnetic structures. These three structures were changed by varying the thickness of the material, and hysteresis curves were measured after annealing to explore the perpendicular magnetic anisotropy and magnetic coupling. Studies have shown that the structure after annealing found that the perpendicular magnetic anisotropy (PMA) of the top structure only exists in a CoFeB thickness range from 1.2 to 1.6 nm. Squarness, coercivity field ($H_c$) and magnetic anisotropy field ($H_k$) were decreased when thickness increased. In the top structure, showing that the thickness of the CoFeB structure for perpendicular anisotropy has a great influence. But, in the bottom structure after annealing, almost all thicknesses are perpendicular anisotropy, and in addition to the value of the coercive field increases with Nb thickness, squareness and anisotropic magnetic field is extremely stable, Nb infer the structure changes in the thickness of the perpendicular anisotropy has little effect. In full structures, perpendicular magnetic anisotropy decreases when thickness increases. Nb = 1.0 nm, 1.5 nm, 2.0 nm trends are consistent with results showing both the upper and lower CoFeB layers produce magnetic dead CoFeB layer is very similar. Nb = 2.0 nm, annealing temperature in between 255°C and 345°C, $m_1$ increase with temperature increase, but $m_2$ decrease as temperature increase, as shown in the hysteresis curve of this annealing temperature is different to Nb = 1.0 nm and 1.5 nm. Our experimental data are compared with the reference literature, we found that coupling energy, anisotropy energy and annealing temperature value toNb as spacer layer synthetic antiferromagnetic structure are lower than with Ru as the spacer layer synthetic antiferromagnetic structure.

Keywords: Synthetic Antiferromagnet, Perpendicular Magnetic Anisotropy, Coercivity, anisotropy constant