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Antiferromagnetic domain dynamics observed in Fe/CoO/MgO(001) system QIAN LI, JIE ZHU, Department of Physics, Fudan University, Shanghai, China, GONG CHEN, NCEM, Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA Department of Physics, TIAN PING MA, YAN HUO, YI ZHENG WU, Department of Physics, Fudan University, Shanghai, China — Antiferromagnetic (AFM) domain dynamics has rarely been researched in spite of its importance in the magnetic recording application and fundamental physics studies. Usually, the magnetic properties of the AFM layer can be studied by detecting the adjacent ferromagnetic (FM) layer due to the exchange coupling at the FM/AFM interface. In this contribution, we studied the AFM domain flipping process in a FM/AFM exchange-coupled system. Single-crystalline Fe/CoO/MgO(001) was prepared by molecular beam epitaxy and its magnetic properties were measured with magneto-optic Kerr effect. With magnetic field scanning along CoO[1-10] at 143K after field cooling along CoO[110], the hysteresis loop gradually changes from a double-split loop to an easy square loop, which indicates AFM spin rotating by 90 degrees during this process. Two mechanisms, AFM domain nucleation (DN) and domain wall motion (DWM), are clearly separated by analyzing remanence signal as a function of loop sequential number, and meanwhile the flipping rates are also obtained. For the first time, AFM DN and DWM energy barriers are quantitatively determined by temperature dependence measurement. Systematic results are got that energy barriers increase linearly with CoO thickness and decrease in larger magnetic field.

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