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Temperature Dependence of Current Induced Magnetic Domain Wall Motion in a Multilayered Co/Ni Nanowire with MgO Cap KOHEI UEDA, RYO HIRAMATSU, KABJIN KIM, ICR, Kyoto University, DAICHI CHIBA, ICR, Kyoto University/PRESTO, JST, TAKAHIRO MORIYAMA, ICR, Kyoto University, HIRONOBU TANIGAWA, EIJI KARIYADA, TETSUHIRO SUZUKI, RENESAS Electronics Corp., YOSHINOBU NAKATANI, University of Electro-communication, TERUO ONO, ICR, Kyoto University — Current-induced magnetic domain wall motion (CIDWM) has been investigated not only for the fundamental physics but also for its potential application for nonvolatile magnetic random access memory. Our group reported that adiabatic spin transfer torque (STT) dominates the DW motion in nanowires made of a perpendicularly magnetized Co/Ni multilayer with symmetrical top and bottom non-magnetic layers (Ta/Pt and Pt/Ta). Recently, new aspect of the DW motion was reported that DW moves against electron flow direction in asymmetric AlO/Co/Pt system, which is in contrast to STT theory that predicts the DW motion along electron flow direction. We found, in a nanowire made of an Co/Ni multilayer with asymmetric top (MgO) and bottom (Pt/Ta) layers, that the DW moves against electron flow direction as reported in AlO/Co/Pt system. We also investigated the temperature dependences of the threshold current density for DW displacement (Jth). It was found that Jth increases with decreasing device temperature whereas it is almost independent of temperature in a symmetric Co/Ni system, suggesting that the observed DW motion was not simply dominated by the adiabatic STT brought by the electron flow in the Co/Ni multilayer.

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