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Bias current effect on inverse spin-switch behavior in Permalloy/Nb/Permalloy trilayers DONG HO KIM, TAE-JONG HWANG, Yeungnam University — We investigated the effect of bias current on the inverse spin-switch (ISS) effect in Permalloy(Py)/Nb/Permalloy trilayers. Samples grown by using dc magnetron sputtering methods were patterned in the bar shape of $5\ \mu\text{m}$ wide and $120\ \mu\text{m}$ long, and their magnetoresistance (MR) in the superconducting transition region were measured in sweeping magnetic fields. The MR measured in the transition region of Nb at the antiparallel domain (AD) states of two outer Py layers showed a rapid increase compared to the MR at the parallel (P) states with increasing current density. At high enough bias current densities exceeding $10^5\ \text{A}/\text{cm}^2$, we found a temperature window where the MR at the AD states returned to the normal state resistance whereas the MR at the P state remained superconducting. This ideal ISS effect is assumed to be originated in massive flux flow triggered by the onset of flux motion inside Nb layer due to the large Lorentz force exerting on flux lines where the magnetic flux were induced by the normal component of the stray field from the domain walls in the AD state of Py layers.

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