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Spin transport in $LaAlO_3/SrTiO_3$ heterostructures THACH D. N. NGO, Korea Research Institute of Standards and Science, JUNGWON CHANG, Korea University, KYUJOON LEE, Sogang University, SEUNGJU HAN, JOONSUNG LEE, Korea University, YOUNGHEON KIM, Korea Research Institute of Standards and Science, MYUNGHWA JUNG, Sogang University, YONGJOO DOH, MAHN-SOO CHOI, Korea University, JONGHYUN SONG, Chungnam National University, JINHEE KIM, Korea Research Institute of Standards and Science — Since the discovery in 2004, the 2-dimensional electron gas at the $LaAlO_3/SrTiO_3$ heterointerfaces has attracted considerable attentions because of the fascinating physical phenomena and their strong tuneability. However, the manipulation of the spin degree of freedom in this oxide structure is still unattainable. Here, we report the spin-dependent electrical transport in hybrid magnetic tunnel junctions based on the ferromagnetism at the oxide interface. The Ohmic spin injection into the $LaAlO_3/SrTiO_3$ heterostructure is feasible due to the insertion of an approximately thin Ti layer between the oxide and ferromagnetic metal (Co). The observed tunnel magnetoresistive effect shows such a strong anisotropy that the magnitude and even sign of the tunneling magnetoresistance ratio are dramatically modulated by a rotational, in-plane magnetic field. This is attributable to the strong Rashba-type spin-orbit coupling in the oxide structure. In addition, the spin transport is also associated with the tetragonal domain configuration of the $SrTiO_3$ substrate. These results provide a further support for the existence of the macroscopic ferromagnetism at $LaAlO_3/SrTiO_3$ interface.

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