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Topological Material-Based Spin Devices MINHAO ZHANG, XUEFENG WANG, Nanjing Univ — Three-dimensional topological insulators have insulating bulk and gapless helical surface states. One of the most fascinating properties of the metallic surface states is the spin-momentum helical locking. The giant current-driven torques on the magnetic layer have been discovered in TI/ferromagnet bilayers originating from the spin-momentum helical locking, enabling the efficient magnetization switching with a low current density.[1]. We demonstrated the current-direction dependent on-off state in TIs-based spin valve devices for memory and logic applications.[2]**.** Further, we demonstrated the Bi_2Se_3 system will go from a topologically nontrivial state to a topologically trivial state when Bi atoms are replaced by lighter In atoms. Here, topologically trivial metal $(Bi_xIn_y)_2Se_3$ with high mobility also facilitates the realization of its application in multifunctional spintronic devices.
.[1]A. Mellnik, et al, Nature **511** (7510), 449 (2014). [2]M. Zhang, et al, IEEE Electron Device Letters **37** (9), 1231 (2016).

Minhao Zhang
Nanjing Univ

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