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Magnetization Switching via Giant Spin-Orbit Torque in a Magnetically Doped Topological Insulator Heterostructure YABIN FAN, PRAMEY UPADHYAYA, XUFENG KOU, MURONG LANG, SO TAKEI, ZHENXING WANG, JIANSHI TANG, LIANG HE, LI-TE CHANG, MOHAMMAD MONTAZERI, GUOQIANG YU, WANJUN JIANG, TIANXIAO NIE, YAROSLAV TSERKOVNYAK, KANG WANG, University of California, Los Angeles — The magnetization switching induced by in-plane current in a Chromium-doped topological insulator bilayer heterostructure has been observed and is attributed to a giant spin-orbit toque. The critical current density of around 10^4 A/cm^2 for magnetization switching is nearly three orders of magnitude lower than in the traditional heavy metal/ferromagnetic heterostructures. The effective magnetic field arising from the spin-orbit torque is also increased by three orders. This giant spin-orbit torque and efficient current-induced magnetization switching may lead to innovative spintronics applications such as ultra-low power dissipation memory and logic devices.

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