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Spin manipulation at the interface of a topological insulator/GaAs heterostructure[1] DONGXIA QU, Lawrence Livermore National Laboratory, XIAOYU CHE, XUFENG KOU, MURONG LANG, University of California, Los Angeles, JONATHAN CROWHURST, MICHAEL R. ARMSTRONG, JOSEPH ZAUG, Lawrence Livermore National Laboratory, KANG L. WANG, University of California, Los Angeles, GEORGE F. CHAPLINE, Lawrence Livermore National Laboratory, LAWRENCE LIVERMORE NATIONAL LABORATORY TEAM, UNIVERSITY OF CALIFORNIA, LOS ANGELES TEAM — One primary goal of spintronics is to discover materials and devices, which enable efficient electrical control of spins. The emerging field of topological insulator (TI) provides intriguing opportunities for spin generation and manipulation, owing to its strong spin-orbit character. Here we report that spins can be driven from a topological insulator thin film $(Bi_{0.5}Sb_{0.5})_2Te_3$ into an adjacent semiconductor GaAs at room temperature. In a TI/GaAs heterostructure, a photo-induced spin current flows across the interface and induces an electrical current via the inverse spin Hall effect, which converts the spin current into a charge current. We find that the magnitude and direction of the helicity-dependent photocurrent can be controlled by gate-voltage, indicative of electric tuning of the spin configuration.

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Dongxia Qu
LLNL

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