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Circular photocurrent response of a topological insulator thin film probed by scanning photocurrent microscopy DONG-XIA QU, Lawrence Livermore National Lab, XUFENG KOU, MURONG LANG, University of California, Los Angeles, JONATHAN CROWHURST, MICHAEL ARMSTRONG, JOSEPH ZAUG, Lawrence Livermore National Lab, KANG L. WANG, University of California, Los Angeles, GEORGE CHAPLINE, Lawrence Livermore National Lab — The remarkable nature of surface states in topological insulators is expected to have a unique photocurrent response to electromagnetic radiation. However, the surface and bulk photo-excited charge transport mechanisms, in relation to the band bending at the electrode-topological insulator interface, have not been well understood. Here, we present scanning photocurrent microscopy measurements on a gated topological insulator microdevice and show that the spin-polarized photocurrent displays direction reversal near the electrical contact interfaces. We discuss two possible mechanisms, which alternatively play dominant roles in the helicity-dependent photocurrent map. Our analysis determines the magnitude of each contribution, and reveals the governing process under different gate conditions.

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