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Observation of Current induced Optical Kerr Rotation in Topological Insulators NIRAJAN MANDAL, IREK MITKOWSKI, YONG CHEN, Purdue University — Topological insulators (TIs) are an unusual phase of quantum matter with an insulating bulk gap and gapless spin-momentum locked Dirac surface states (SS), showing exotic topological quantum properties. However, optical identification of the spin-momentum locked SS is still challenging. Here, we report room-temperature, current induced magneto-optical Kerr rotation effect observed from various TI bulk crystals grown by the Bridgman method. The Kerr rotation was measured while a square wave bias current was applied across the samples. We find that the Kerr angle increases linearly with the applied bias current and reverses its sign as the polarity of the current is reversed. Such an observation is consistent with the spin-momentum locking of the surface states. The largest Kerr rotation we measured is 4×10^{-6} radians/(A/cm²) from Bi₂Te₂Se₁.

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