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Optical helicity control of surface current in SmB_6[1] SANJAY ADHIKARI, West Virginia University, YANJUN MA, CHANG-BEOM EOM, University of Wisconsin-Madison, CHENG CEN, West Virginia University — SmB_6 is a promising candidate for topological Kondo insulator. One hallmark signature of topological states is the helical Dirac dispersion with perfect momentum-spin lockage. Here, we report current injection in SmB_6 thin film with circularly polarized light at oblique incidence. A polarization-independent photovoltage was also detected. Both signals exhibited strong temperature dependences. While the polarization-independent photovoltage is likely due to thermoelectric effects, the circular photogalvanic effect (CPGE) has two possible origins: topological surface states or regular surface states with strong Rashba type spin-orbit coupling. The drastically different penetration depths of topological and regular surface states in SmB_6 provide an opportunity to distinguish them by investigating films with different thicknesses. The strong correlation observed between the film thickness and CPGE photovoltage strongly supports the topological origin of the surface states. This research enhances our knowledge in controlling the spin and orbital degrees of freedom at SmB_6 surface, and can also lead to exciting spintronic applications using optical tools.

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