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Probing surface state conductance of topological insulator Bi_2Se_3 with scanning tunneling potentiometry CHOCKALINGAM SUBBAIAH, Department of Physics, Columbia University, NY, FRANCES ROSS, IBM T. J. Watson Research Center, Yorktown Heights, NY, MATTHEW BRAHLEK, SEONGSHIK OH, Department of Physics & Astronomy, Rutgers, The State University of New Jersey, ABHAY PASUPATHY, Department of Physics, Columbia University, NY — Topological insulators such as Bi_2Se_3 have unique surface states. How do electrons actually flow on the surface of a real Bi_2Se_3 sample? We study this question using scanning tunneling potentiometry. In this measurement, a lateral current flows in the sample while the local potential is mapped on the surface using a scanning tunneling microscope. This technique can be used to identify with atomic resolution the potential drops in the current-carrying pathways at the surface, and is ideally suited to measure the properties of quasi-2D materials such as graphene. Our topological insulator samples are MBE grown films of Bi_2Se_3 on a sapphire substrate. We will describe both the surface morphology and its effect on the current carrying pathways in the material.

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