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Growth of Bismuth onto Bismuth Selenide and Bismuth Telluride[1] HAOSHAN ZHU, WEIMIN ZHOU, JORY YARMOFF, Univ of California - Riverside — A topological insulator (TI) behaves as an insulator in the bulk, but conducts along the surface via topologically protected surface states. TI's have the potential for applications in areas such as spintronics and quantum computation. The surface termination of the prototypical TIs, Bismuth Selenide and Bismuth Telluride, has been an area of recent debate. Although some studies have demonstrated that the cleaved surface is terminated with Se or Te, as expected from the bulk crystal structure, there are other reports of a surface covered with an additional Bi bilayer. We are using low energy ion scattering (LEIS), in conjunction with other surface analysis tools, to investigate the surface composition and atomic structure of Bi films intentionally grown onto Bi_2Se_3 and Bi_2Te_3 substrates via molecular beam epitaxy (MBE). It is found that the first Bi bilayer grows commensurate with the underlying material, but contains triangular patches in which the substrate is revealed. Additional bilayers form an incommensurate film that has the lattice constant of bulk Bi. Exposure of these materials to molecular halogens shows a preference for bonding to the surface Bi atoms.

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