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Thickness-Independent Transport Channels in Topological Insulator Bi2Se3 Thin Films NAMRATA BANSAL, Rutgers University, YONG-SEUNG KIM, Sejong University, MATTHEW BRAHLEK, ELIAV EDREY, NIKESH KOIRALA, SEONGSHIK OH[1], Rutgers University — With high quality Bi2Se3 thin films grown on Al2O3(0001), we report thickness-independent transport properties over wide thickness ranges. Low temperature conductance remained nominally constant as the sample thickness changed from 256 to ∼8QL (where QL refers to quintuple layer, 1QL≈1nm). Two surface channels with very different behaviors were identified. The sheet carrier density of one channel remained constant at ∼3x10^{13}cm^{-2} down to 2QL, while the other, which exhibited quantum oscillations, remained constant at ∼8x10^{12}cm^{-2} only down to ∼8QL. The weak antilocalization effect also exhibited similar thickness independence. These two channels are most consistent with the topological surface states and the surface accumulation layers, respectively. We will also discuss surface signatures present in Bi2Se3 thin films grown on Si(111) and amorphous SiO2.

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