Transport properties of defect-controlled Bi_2Te_3 single crystals: fingerprint of surface Dirac electrons

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We report synthesis and characterization by electrical transport measurements of defect-controlled Bi_2Te_3 single crystals. By adding extra Te, which reduces naturally-formed antisite defects, we have succeeded in growing Bi_2Te_3 single crystals, covering heavily hole-doped to heavily electron-doped metals, where intermediate region corresponds to the topological insulator. We have carefully investigated p-doped, insulating, and n-doped samples by magnetoresistance and Hall effect measurements up 55 T. These data are quantitatively compared with a single Dirac theory, revealing nontrivial character of the insulating samples. We will also discuss these results based on surface and bulk conduction channels.