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Surface Shubnikov-de Haas oscillations of the topological hole conduction in the bulk insulator $\mathbf{Tl_{1-x}Bi_{1+x}Se_2}$ GAKU EGUCHI[1], Kyoto Univ, KENTA KURODA[2], KAITO SHIRAI[3], AKIO KIMURA[4], Hiroshima Univ, MASASHI SHIRAISHI[5], Kyoto Univ — Three-dimensional (3D) topological insulator is a new series of matters which exhibit the surface-metallic state of Dirac fermions. The surface state has several unique characteristics such as lifted spin degeneracy, and novel electronic and spin transport is expected. However, most of the 3D topological insulators also involve bulk-metallic conduction, making it difficult to separate the surface-metallic conduction [1]. Recently, Fermi-level tuning and bulk-insulating behavior are reported in the self-doped $Tl_{1-x}Bi_{1+x}Se_2$ [2]. We report the electric transport properties of the bulk insulator $Tl_{1-x}Bi_{1+x}Se_2$. The electron-hole inversion by the doping was revealed by the Hall resistivity measurements. The two-dimensional Shubnikov-de Haas oscillations and the π Berry phases, arising from the surface Dirac hole state, were also observed [3]. We compare the results with those reported in other 3D topological insulators, and discuss the surface transport properties.

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