

Searching for ideal Bi-system topological insulator, Pb-system topological crystalline insulator and their topological superconductor

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The discovery of 3D topological insulator materials and topological superconductor open up a new research field in the condensed matter physics. In order to search for the ideal topological insulator, topological crystalline insulator and topological superconductor, we have grown a large number of the single crystals of Bi-system (Bi-Sb-Te-Se) topological insulator, Pb-system (Pb-Sn-In-Te-Se) topological crystalline insulator and their topological superconductor. We have measured the physical properties on these single crystals by various techniques. We have studied the effect of crystal growth condition, impurity, structural defects and composition on the bulk electrical conductivity of these single crystals. We try to find out which composition and crystal growth condition is the best for the ideal topological insulator, topological crystalline insulator and topological superconductor. We have got the bulk topological superconductor with T_c 4.6K.