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**Crystal growth and physical property of Bi-Sb-Te-Se topological insulator and  $Cu_xBi_2Se_3$  topological superconductor materials**<sup>1</sup> GENDA GU, ALINA YANG, JOHN SCHNEELOCH, ZHIJUN XU, JOHN TRANQUADA, J.G. ZHOA, Z.H. PAN, H.B. YANG, W.D. SI, T. VALLA, CMP&MS, Brookhaven National Laboratory — The discovery of 3D topological insulator and topological superconductor materials opens up a new research field in the condensed matter physics. In order to exploit the novel surface properties of these topological insulators, it is crucial to achieve a bulk-insulating state in these topological insulator crystals. Unfortunately, all available topological insulator crystals are not bulk-insulating. We have grown a number of Bi-Se, Bi-Te, Sb-Te-Se, Bi-Sb-Se, Bi-Sb-Te-Se and Bi-Sb-Te-Se-S topological insulator single crystals by using 5N and 6N pure elements. We have measured the physical properties on these single crystals. We have studied the effect of growth condition and impurity on the bulk electrical conductivity of these single crystals. We try to answer two questions if it is possible to grow the bulk-insulating topological insulator single crystals and which maximum resistivity of these topological insulator single crystals we can grow. We have also grown a number of  $Cu_xBi_2Se_3$  topological superconductor single crystals.

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