



Magnetic properties of bi-, tri- and multicrystals of 3D topological insulator $\text{Bi}_{1-x}\text{Sb}_x$ ($0.06 \leq x \leq 0.2$)

F. M. Muntyanu, A. Gilewski, K. Nenkov, K. Rogacki, A. J. Zaleski, G. Fuks, V. Chistol

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Abstract

The magnetic properties of bi-, tri- and multicrystals of 3D topological insulator $\text{Bi}_{1-x}\text{Sb}_x$ ($0.06 < x < 0.22$) were studied in the temperature range 1.6–300 K and fields up to 70 kOe using an SQUID magnetometer. Two superconducting phases associated with adjacent and central layers of the crystallite interfaces of the bicrystals are identified. It has been found that due to the different stress structure the transition temperature T_c for one superconducting phase changes considerably, from 8.3 to 36 K, while for another superconducting phase, T_c remains within the range 3.7–4.6 K. In tricrystals and bicrystals with high contents of structural disorder and topological defects, ferromagnetic hysteresis loops and magnetic field expulsion have been observed simultaneously.