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Evolution of superconductivity and weak magnetism in inclination interfaces of Bi, Sb and Bi_{1-x}Sb_x (0.07 ≤ x ≤ 0.2) alloys

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Abstract

Using Quantum Design SQUID magnetometer, we studied the magnetic and superconducting properties of high quality inclination bicrystal interfaces of Bi, Sb and 3D topological insulator Bi_{1-x}Sb_x (0.06 ≤ x ≤ 0.2). One or two superconducting phases with $T_c \leq 21$ K and magnetic hysteresis loops on a

diamagnetic background typical for strong type II superconductors were identified in Bi and some Bi-Sb nano-width interfaces. However, the other interfaces of $\text{Bi}_{1-x}\text{Sb}_x$ ($0.06 \leq x \leq 0.2$) as well as of Sb with a higher carrier density exhibit a superconducting transition and a ferromagnetic hysteresis loop or a dual loop (superimposed ferromagnetic and superconducting loops) against a paramagnetic background and thereby indicate the occurrence of superconductivity and weak ferromagnetism.