Features of Superconductor-Insulator Transition in PbTe/PbS and PbTe/YbS Heterostructures

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Peculiarities of the magnetic field induced superconductor-insulator transition (SIT) in PbTe/PbS i PbTe/YbS heterostructures with different topology of the superconducting interface are investigated. Superconductivity of such $A^{IV}B^{VI}$ heterostructures ($T_c \leq 6.5$K) is determined by the band inversion along the continuous misfit dislocation grid which arises between epitaxial semiconductor layers of a sufficient thickness ($d > 80$nm). While d decreases, the superconducting interface becomes discontinuous, T_c decreases, and conductivity changes from metallic to a semiconductor type [1].

Discontinuity of the superconducting interface is found to be a necessary condition for the magnetic field induced SIT. It has a drastic influence on SIT realization: fan-like set of *R(T)* curves, crossing of *R(B)* curves, maximum on *R(B)* curves and negative magnetoresistance. No sign of SIT found in heterostructures with the perfect interface [2]. So, SIT realization in these heterostructures is determined by the percolation phenomena which are inherent to granular superconductors.

Thus, semiconductor heterostructures of $A^{IV}B^{VI}$-type with the superconducting interface are good model objects for the localized superconductivity effects investigation.

1. O.I. Yuzephovich et al. // *Low Temp. Phys.* – 2008. – v.34. – pp.985-991.
2. S.V. Bengus, A.Yu. Sipatov; S.I. Yuzephovich // *Low Temp. Phys.* – 2013. – v.39. – pp.695-700.