

# Superconducting and magnetic properties of large-angle bismuth bicrystals

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9.7 cm

Magnetic moment measurements in large-angle ( $\Theta > 30^\circ$ ) bicrystals of bismuth with crystallite interface (CI) of twisting type were performed by use of a Cahn balance, PPMS and SQUID magnetometers. Bicrystals were obtained by zone recrystallization method using double seed technique. The magnetic properties of bicrystals essentially differ from well-known results on single-crystal bismuth (the paramagnetism of charge carriers become stronger, the diamagnetism rise, etc). Two superconducting phase at CI of bicrystals with  $T_c \sim 8.4$  K (for some bicrystals  $T_{onset} \sim 16$  K) and  $T_c \sim 4.3$  K was observed (ordinary rhombohedral Bi is not a superconductor). It was shown that one of them (phase with  $T_c \sim 8.4$  K is localized in central part of CI and have an upper critical field  $\sim 2.5$  T, and a coherence length  $\sim 12$  nm. Also it was found that in adjacent layers (width of layer  $L_a \sim 20$  nm) of CI the density of electrons is lower than in central part and is significant the proximity effect.

13.4 cm

## Subject category :

2. Magnetic Films, Surfaces and Multilayers

## Presentation mode :

poster

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