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Superconducting Proximity Effect in Graphite Films MASAHIKO

HAYASHI, Akita University, HIDEO YOSHIOKA, Nara Women's University, AKINOBU KANDA, University of Tsukuba — Theoretical analysis of superconducting current in graphite films (or graphen)in proximity to superconductors is presented. In this work, the band structure of the graphite film is treated seriously: because of the delicate band structure of graphite, the actual band structure of the film, which undergoes the effects of various external factors such as leads and gates, can show a wide variety. We introduce following three models: 1) graphen-like Fermi points, 2) semi-metal, 3) electron (or hole) pockets, and 4) semiconducting gap. The superconducting critical current $I_c = \exp \{- L/xi(T)\}$ is studied where L is the distance between two leads and $xi(T)$ is the coherence length in the graphite film. The temperature dependence of $xi(T)$ is largely affected by the band structure and by examining this dependence the electronic properties of the graphite film can be estimated. The results are compared with actual experiments.

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