Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Temperature dependence of proximity-induced supercurrent in single and multi-layer graphene[1] AKINOBU KANDA, HIDENORI GOTO, HIKARI TOMORI, SHO TANAKA, YOUITI OOTUKA, University of Tsukuba, KAZUHITO TSUKAGOSHI, MANA-NIMS, MASAHIKO HAYASHI, Akita University, HIDEO YOSHIOKA, Nara Women's University — Graphene is an attracting material for the superconducting proximity effect. In single layer graphene (SLG), the peculiar band structure leads to the relativistic Josephson effect, while in multi-layer graphene (MLG), the layered structure with large modulation of carrier density from negative to positive values provides a novel situation of conventional proximity effect. Here we present experimental study on superconducting proximity effect in SLG and MLG. For SLG with junction length of 220 nm, we observed gate-voltage dependent critical supercurrent I_c, and its temperature dependences for all gate voltages were well explained by a conventional theory for short and dirty junctions (KO1 theory). On the other hand, in MLG junctions, $I_c(T) \propto \exp(-(T/T_0)^2)$, where T_0 is a sample- and gate- dependent constant. This behavior can be explained by a successive transition model, in which a graphene layer with larger carrier density has a higher temperature for the onset of supercurrent.

[1]Supported by the CREST project, JST.

Akinobu Kanda
University of Tsukuba

Date submitted: 20 Nov 2009 Electronic form version 1.4