

Abstract Submitted
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Realization of short ballistic vertical graphene Josephson junction GIL-HO LEE, HU-JONG LEE, POSTECH — We realized short ballistic vertical graphene Josephson junctions (vGJJs), where a monolayer graphene sheet is sandwiched between two superconducting electrodes along the c -axis of graphene. To enhance the transparency between electrodes and graphene layer we thermally deposited aluminum superconducting electrodes on both surfaces of the graphene sheet by using a “flip-transfer” scheme instead of transferring graphene onto the bottom electrode. With the highly transparent contacts and atomically short channel length, vGJJ shows a very large value of $I_c R_N$ product ($2.2\Delta_{Al}$). This value is in sharp contrast to much suppressed value of $I_c R_N < \Delta_{Al}$, observed in planar graphene Josephson junctions. Surprisingly, I_c decreases superlinearly with increasing temperature (T) from 50 mK up to the junction critical temperature, which is a typical character of a short ballistic Josephson junction. To our best knowledge, this feature has long been predicted but never been reported in proximity-coupled Josephson junctions. I_c - T curve fits well to the short ballistic Josephson junction model (KO-2)¹ with the transparency of 0.94.

¹K. K. Likharev, Rev. Mod. Phys. **51**, 101 (1979)

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