Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Investigation of short and ballistic coupling in vertical $NbSe_2$ - graphene - $NbSe_2$ Josephson junctions MINSOO KIM, GEON-HYOUNG PARK, JONGYOON YI, JAE HYEONG LEE, JINHO PARK, HU-JONG LEE, Pohang University of Science and Technology — 2H-$NbSe_2$ is a layered two-dimensional superconducting material, which can be constructed into a van der Waals heterostructure with versatile functionality. Here we fabricated a vertically stacked $NbSe_2$ - graphene - $NbSe_2$ heterostructure by the dry transfer technique, where defect-free contact via van der Waals force provides the high interfacial transparency. Insertion of an atomically thin graphene layer between two $NbSe_2$ flakes ensures the formation of highly coherent proximity Josephson coupling. Observed temperature dependence of the junction critical current (I_c) and large value of I_cR_n product (as large as $2.3\Delta_{NbSe2}$) reveal the short and ballistic Josephson coupling characteristics. Large junction critical current density of ˜10^4 A/cm^2, multiple Andreev reflection in the subgap structure of the differential conductance, and magnetic field modulation of I_c also suggest the strong Josephson coupling via the graphene layer.

Minsoo Kim
Pohang University of Science and Technology

Date submitted: 10 Nov 2016 Electronic form version 1.4