

# Transport Measurements on Two Dimensional Ta Films Decorated by Spatially Inhomogeneous Disorders

S. Park and E. Kim

*Center for Supersolid & Quantum matter Research and Department of Physics, KAIST, Daejeon 305-701, Korea*

Superconductor-insulator transition has been investigated in numerous experiments by tuning disorders or magnetic fields. Recent electrical transport measurements of Ta thin films revealed an interesting intermediate metallic phase which intervenes superconducting and insulating phases in the zero temperature limit. The resistance of the Ta films in this regime exhibits sharp drops at the transition temperatures but finite saturated values at low temperatures. In addition, IV characteristic curves show non-linear response, indicating the appearance of a new metallic phase. The intriguing quantum metallic phase is partially attributed to the presence of homogeneous disorders in Ta thin films. Accordingly, the metallic phase is possibly suppressed by introducing inhomogeneous disorders which are manipulated by heat treatment of the amorphous Ta films. Here we present preliminary studies on superconductor-metal-insulator transition in two dimensional Ta films decorated by spatially inhomogeneous disorders.

Keywords: Quantum phase transition, SIT, Superconducting thin film, Intermediate phase, Disorder.