

Electron tunneling measurements in atomic scale gap filled with liquid ^4He below 4.2K

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Recently, it has become possible to investigate the electrical property of the atomic-sized metallic contacts by atomic-sized tip, e.g. STM and mechanical controllable break junction (MCBJ). By using MCBJ technique, one can prepare two symmetrical atomic-sized metallic electrodes and control the gap of the two electrodes precisely by piezo-electronic force.

In this presentation, we report the tunneling spectroscopy investigation in atomic scale gap filled with liquid ^4He . In order to assure the filling of liquid ^4He between the gap, the following experimental procedure was carried out. We construct a cryostat with a inner vacuum chamber inside the vacuum jacket for the thermal isolation. MCBJ apparatus is installed in the inner chamber with a flexible bellow. After filling liquid ^4He below 4.2 K, Au electrical electrodes was stretched by the mechanical force generated by piezo device. We observed the increase of the tunnel conductance through liquid ^4He compared to that in the vacuum environment.