Transport properties in spin-orbit Mott insulator Ba_2IrO_4 under high pressure

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The recent findings of the novel Mott insulating state in Sr_2IrO_4[1] have developed a new research field on solid-state physics. The cooperation of the large spin-orbit (SO) interaction and the moderate on-site Coulomb interaction between $5d$ electrons yields $J_{\rm eff} = 1/2$ Mott ground state, similar to Mott states in parent materials of high-$T_{\rm c}$ cuprates such as La_2CuO_4. Recently, we successfully synthesized a novel layered iridate Ba_2IrO_4, which is isostructural to Sr_2IrO_4, but has flat IrO_2 square planar lattice with straight Ir-O-Ir bonds.

In this presentation, we report on results of the electric resistivity (ρ) under pressure of up to 15 GPa. Ba_2IrO_4 is an insulator at ambient pressure, however undergoes a phase transition to a metallic state above 13.8 GPa. The temperature dependence of ρ is well-described by the Mott variable-range-hopping regime in the insulating side. However, in the metallic side, the non-Fermi-liquid behavior was observed below $\sim$20 K. These results indicate that the both the disorder and the electronic correlation contribute to the transport property of Ba_2IrO_4. Our sample is probably located on the verge of the phase boundary between the Anderson and the Mott insulator.

[1]B. J. Kim *et al.*, Phys. Rev. Lett. **101**, 076402 (2008).