Control of the electronic state of Ca_2RuO_4 by uniaxial pressure

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Ca_2RuO_4 under hydrostatic pressure exhibits a variety of electronic states[1] : the antiferromagnetic insulating phase, the ferromagnetic metallic phase, and even the superconducting phase[2] . Importantly, the phase transitions are accompanied by crystal distortions; in particular, the RuO_6 octahedra in the crystal are elongated along the c axis in the metallic state while they are flattened in the insulating state[3]. Hence, the crystal structure is a crucial parameter to determine the electronic state in this system. Anticipating that uniaxial pressure along the ab plane elongates the RuO_6 octahedra of Ca_2RuO_4 more effectively than hydrostatic pressure, we measured the resistance of Ca_2RuO_4 under in-plane uniaxial pressures by a quasi-four-terminal method and indeed succeeded in inducing a metallic phase. We report on the low-temperature properties of this induced metallic phase.

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