α-$RuCl_3$/Pt における磁気抵抗効果

平田雄翔[A]，田中秀数[B]，栗田伸之[B]，森山貴広[A]，小野輝男[A,C]
(京大化研[A]，東工大理[B]，阪大 CSRN[C])

Magnetoresistance in an α-$RuCl_3$/Pt

Yuushou Hirata[A], Hidekazu Tanaka[B], Nobuyuki Kurita[B], Takahiro Moriyama[A], and Teruo Ono[A,C]
([A]ICR, Kyoto University, [B]Department of Physics, Tokyo Institute of Technology, [C]CSRN, Osaka University)

Introduction

Recently an α-$RuCl_3$ has emerged as a primal candidate for hosting a Kitaev Quantum Spin Liquid [1] and has been attracting great attentions. In this study, we investigated the magnetoresistance [2] in Pt/α-$RuCl_3$ bilayers at low temperatures where the Kitaev QSL state and zigzag antiferromagnetic state [3] are expected to emerge.

Experimental method

We transferred an α-$RuCl_3$ flake on a SiO_2 substrate by exfoliating with the Scotch tape and then deposited 3 nm-thick Pt on top of it. The bilayer was patterned into a 50 μm wide Hall bar using e-beam lithography technique. The rotation angles (α,β,γ) and the measurement configurations are defined in Fig. 1(a).

Experimental results

Fig. 1(b) shows the temperature dependence of magnetoresistance normalized to the base corresponding resistance ($\Delta R_{xx}/R_{xx} = \Delta\rho_{xx}/\rho_{xx}$) obtained for the three field rotations. Below 50 K, $\Delta\rho_{xx}/\rho_{xx}$ increase with decreasing temperature for both -β and -γ rotations. In the presentation, we will discuss the temperature dependence of $\Delta\rho_{xx}/\rho_{xx}$ with respect to the temperature dependence of magnetic state of an α-$RuCl_3$.

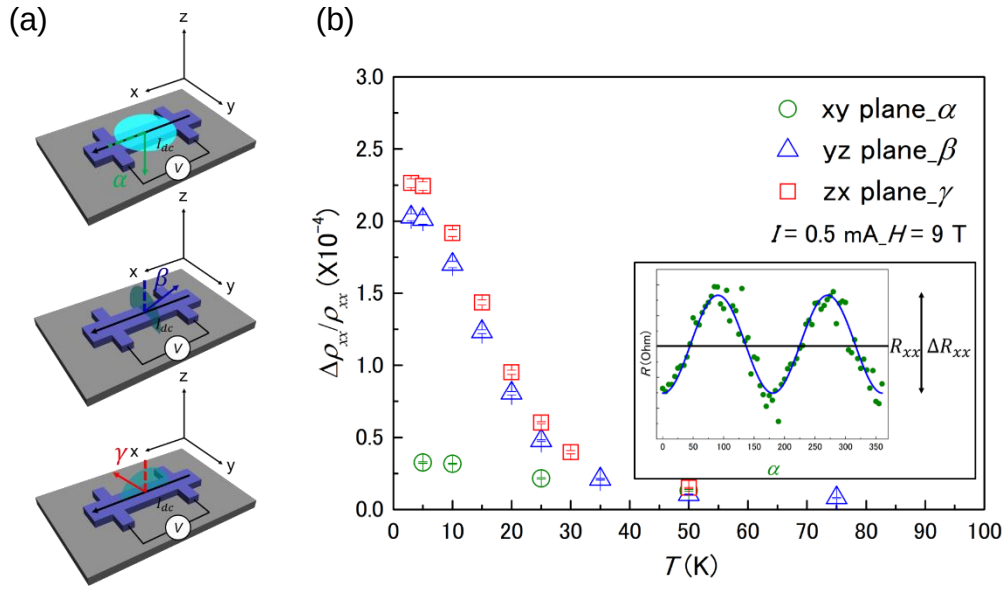

Fig. 1 (a) The measurement configurations. (b) Temperature dependence of $\Delta\rho_{xx}/\rho_{xx}$ obtained at 9 T. Inset: the angular dependence of the longitudinal resistance *Rxx*(α) at 5 K.

[1] A. Kitaev, Ann. Phys. **321**, 2 (2006).
[2] H. Nakayama *et al.*, Phys. Rev. Lett. **110** 206601 (2013).
[3] R. D. Johnson *et al.*, Phys. Rev. B **92** 235119 (2015).