

第 520 回 物性セミナー・

第 20 回創発的物性物理研究拠点セミナー

Kondo Insulator to Semimetal Transformation Tuned by Spin-Orbit Coupling

*This lecture will be given in English.

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日 時: 2018 年 5 月 17 日 (木) 16:30-

場 所: 先端物質科学研究科 405N

Recent theoretical studies of topologically nontrivial electronic states have pointed to the importance of spin-orbit coupling (SOC) for stabilizing these states. The assertion is held even in Kondo insulators, however, its systematic experimental study remains elusive [1, 2].

Here we present the successful growth of the substitution series $\text{Ce}_3\text{Bi}_4(\text{Pt}_{1-x}\text{Pd}_x)_3$ ($0 \leq x \leq 1$) of the archetypal noncentrosymmetric Kondo insulator $\text{Ce}_3\text{Bi}_4\text{Pt}_3$. The Pt-Pd substitution is isostructural, isoelectronic, and isosize. It therefore is likely to leave the Kondo coupling and the chemical potential essentially unchanged. By contrast, the large mass difference between the 5d element Pt and the 4d element Pd leads to a large difference in the SOC, which thus is the dominating tuning parameter in the series. With increasing x we observe a Kondo insulator to semimetal transition, demonstrating an unprecedented drastic influence of the SOC. The fully substituted end compound $\text{Ce}_3\text{Bi}_4\text{Pd}_3$ show thermodynamic signatures of a recently predicted Weyl-Kondo semimetal.

[1] Hsin-Hua Lai et al., PNAS 115, 93-97 (2018).

[2] S. Dzaber et al., Phys. Rev. Lett. 118, 246601 (2017).

5 研究科共同セミナーの認定科目です

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