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Novel Kondo semiconductors CeM_2Al_{10} (M = Fe, Ru, Os): Anisotropic Kondo effect and CDW-driven magnetic ordering

Recently, intricately crystallized compounds have attracted attention because of the novel physical properties that these structures can generate. One of these compounds is CeM_2Al_{10} (M = Fe, Ru, Os) that has an orthorhombic $YbFe_2Al_{10}$-type crystal structure (*Cmcm*, Z = 4) [1]. $CeRu_2Al_{10}$ and $CeOs_2Al_{10}$ have anomalous second-order antiferromagnetic phase transitions, with insulator-metal and insulator-insulator transitions, respectively, at 28 K (T_0) [2]. Because of the long distance between Ce-ions (> 5 Å), the phase transition is considered to be driven by other mechanism than the Ruderman-Kittel-Kasuya-Yoshida (RKKY) interaction, which gives rise to magnetic transitions in conventional rare-earth compounds [3].
To clarify the origin of the anomalous magnetic transition at T_0 and the anisotropic physical properties, we measured temperature-dependent polarized δ (ω) spectra along all principal axes. As the result, we observed the anisotropic Kondo effect in spite of the isotropic hybridization intensity between the conduction band and 4*f* state [4], and the antiferromagnetic magnetic ordering is induced by the charge instability as well as the charge-density states along the *b*-axis [5].
This work was performed by the collaboration with Prof. Takabatake group of Hiroshima University.

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