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Elastic properties of $\text{CeOs}_4\text{Sb}_{12}$ at low temperatures

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Ultrasonic measurement was performed on Kondo semiconductor $\text{CeOs}_4\text{Sb}_{12}$ to investigate the elastic property. This compound crystallizes in the cubic skutterudite $\text{LaFe}_4\text{P}_{12}$ structure. $\text{CeOs}_4\text{Sb}_{12}$ exhibits semiconductor behavior in which an energy gap is likely to be formed by hybridization between the localized states and conduction electric states. This hybridization energy gap is estimated to be $\Delta E/k_B \sim 10\text{K}$ by the resistivity measurement. Furthermore an enhanced electronic specific heat coefficient of $\gamma \sim 92 \text{ mJ/molK}^2$ and Pauli susceptibility were reported. As a result $\text{CeOs}_4\text{Sb}_{12}$ is regarded as Kondo semiconductor.

To elucidate the ground state of Ce ion split by crystalline electric field (CEF) effect elastic constants were measured. A distinct elastic softening toward low temperatures was observed in C_{11} , whereas no softening was observed in C_{44} . The obtained results were analyzed based on the CEF level scheme proposed by the magnetic susceptibility measurements. However, it hardly explains the present results, indicating that the softening is ascribed to another reason. Since $\text{CeOs}_4\text{Sb}_{12}$ is likely to have the enhanced band the coupling between sound strain and the band may play a crucial role. We discuss the origin of the distinct softening in C_{11} from the view of this coupling.

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