

Abstract Submitted
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Observation of a third, previously unknown charge-density-wave order in $R\text{Te}_3$ by optical spectroscopy N.L. WANG, International Center for Quantum Materials, School of Physics, Peking University, China, B.F. HU, Institute of Nuclear Physics and Chemistry, China Academy of Engineering Physics, R.Y. CHEN, International Center for Quantum Materials, School of Physics, Peking University, Y. HUANG, Institute of Physics, Chinese Academy of Sciences, T. DONG, International Center for Quantum Materials, School of Physics, Peking University — The occurrences of collective quantum states, such as superconductivity and charge- or spin-density-waves (CDWs or SDWs), are among the most fascinating phenomena in solids. Rare-earth tri-telluride $R\text{Te}_3$ (R being an element of the lanthanide family) represents an interesting and well-known CDW family in which the CDW phase transition temperature could be tuned by changing the size of the rare earth element. Previously it was known that the light rare-earth element R based compounds have only one CDW order or phase transition, while for the four heavy rare-earth $R\text{Te}_3$ (R=Tm, Er, Ho, Dy) compounds, a second CDW order with the wave vector $\mathbf{q}_2 \sim 1/3 \mathbf{a}^*$ perpendicular to the first one developed at lower temperature. Here we report the observation of a third CDW order in the series by optical spectroscopy probe. This third CDW order also evolves systematically with the size of R element. With increased chemical pressure, the first and third CDW orders are both substantially suppressed and compete with the second one by depleting the low energy spectral weight. A complete phase diagram for the multiple CDW orders in this series is established. We acknowledge B. Cheng and R. H. Yuan for their help in the experiments.

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