

Transport properties of 1T-TaS₂ single crystal

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1T-TaS₂ is a quasi-two-dimensional transition-metal dichalcogenide in which charge density wave (CDW) behavior coexists with strong electron-electron correlations. Below 180 K, 1T-TaS₂ is a Mott insulator in which commensurate CDW orders the tantalum atoms in star-shaped clusters with a long-range superlattice structure. Above the CDW transition temperature, 1T-TaS₂ becomes nearly commensurate and a pattern of approximately hexagonal insulating commensurate CDW domains and triangular pieces of metallic phase is formed.

We have undertaken a systematic study of the 1T-TaS₂ transport properties (particularly the thermal conductivity and the Hall coefficient) from 2 to 360 K, to our knowledge for the first time in both cooling and heating regime in such a wide temperature range.[3,4] The effect of the hysteresis on the transport properties of the compound has also been addressed. We discuss our findings with the main emphasis on the changes in the phonon scattering and charge carriers in the relevant CDW states.

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