Abstract Submitted to the
IICAM Workshop on Correlated Thermoelectricity
25 - 30 September, 2005
Hvar, Croatia

Thermoelectric power in ThAsSe *

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Interaction between the conduction electrons and structural two-level systems (TLS) leads to an orbital Kondo effect in a diamagnetic ThAsSe at liquid-helium temperatures. Low-lying electron excitations in ThAsSe may be related to a cause of high-temperature anomalies in the thermoelectric power $S(T)$ and the electrical resistivity $\rho(T)$. Especially that ThAsSe exhibits a strong anisotropy of the transport properties: while $\rho(T)$ along the c axis displays a well-defined metallic behavior, its qualitatively different dependence, i.e, an increase upon cooling, was observed in the basal plane. Furthermore, $S(T)$ along the c axis shows a linear-in-T dependence in the whole temperature range, whereas a broad minimum at around 80 K was found in the ab plane. These observation are accompanied with small, negative values of $S(T)$ in both crystallographic directions. The Fermi energy $E_{\rm F}$ that accounts for a few eV has been estimated from a diffusive thermopower at high temperatures. Such a large value of $E_{\rm F}$, typical for ordinary metal, is rather unusual for a system, whose the c-axis resistivity is as large as a few mΩcm and $\rho_{ab}(T)$ shows a negative temperature coefficient at $T > 65$ K. Among different scenarios discussed, a multi-band model appears to be most applicable to a description of the transport properties of ThAsSe in the temperature range 20-300 K.

*Supported by the Polish Committee for Scientific Research, Grant No. 1 P03B 073 27.

Keywords : structural two-level systems, electronic transport