substance: WO_3
property: transport properties, triclinic phase

(223 K < T < RT);

Hall carrier concentration: Fig. 1, Hall mobility: Fig. 2, activation energy for carrier generation 0.031 eV. The Hall mobility has been analyzed in terms of a large polaron model [67L]. The best fit to the data give: Fröhlich coupling constant $\alpha = 4.2$, effective polaron mass $m^{**} = 1.4\ m_0$, phonon effective temperature $h\nu_{LO}/k = 225(50)$ K. These results are somewhat out of line with the data for the high T monoclinic phase (γ-WO_3) and some additional scattering mechanism may be operative [70B].

Seebeck coefficient: Fig. 3. Also shown are calculated values. The origin of the poor fit may lie in phonon drag effects, but a straight-forward application of present-day phonon drag theories [54H, 66P] is not possible.

References:

54H Herring, C.: Phys. Rev. 96 (1954) 1163.
66P Plavitu, C. N.: Phys. Status Solidi 16 (1966) 69.
67L Langreth, D. C.: Phys. Rev. 159 (1967) 717.
70B Berak, J. M., Sienko, M. J.: J. Solid State Chem. 2 (1970) 109.

Fig. 1.

WO_3. Electron concentration vs. reciprocal temperature for T < 300 K; open circles: untwinned crystal; full circles: crystal twinned (100) along its entire length [70B].

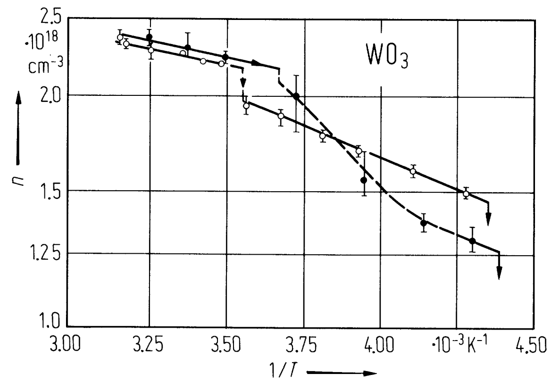

Fig. 2.

WO_3. Electron Hall mobility vs. reciprocal temperature below 300 K showing the monoclinic-triclinic transition. Upper curve, twinned (100) crystal; lower curves, two untwinned crystals [70B]. $\mu \parallel a$.

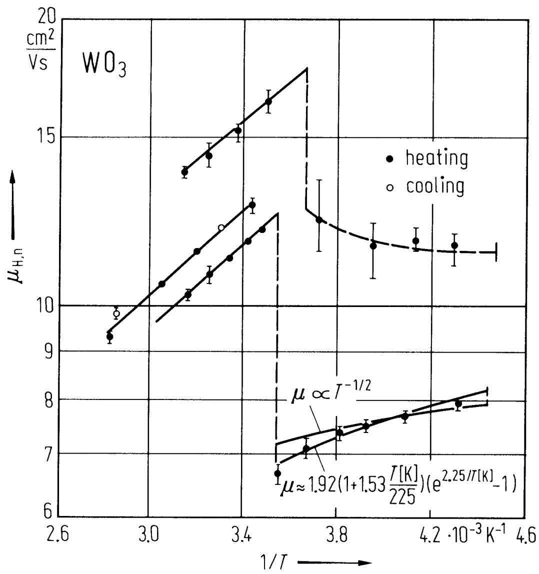

Fig. 3.

WO_3. Seebeck coefficient vs. temperature below 320 K. Upper curve is calculated without assuming a phonon-drag contribution [70B]. Specimen contains some (100) twin planes. *S* || *a*