

**substance: WO<sub>3</sub>**

**property: transport properties, monoclinic phase**

( $\gamma$ -WO<sub>3</sub>)

Hall carrier concentration: Fig. 1, Hall mobility: Fig. 2. Best fit to the large polaron model:  $\alpha = 3.00$ ,  $m_n = 1.75 m_0$ ,  $m^{**} = 3.26 m_0$ ,  $h\nu_{LO}/k = 565$  K.

Seebeck effect (Fig. 3) shows a trend opposite to that expected from elementary theory and phonon-drag effects again seem implicated. Activation energies for carrier generation 0.01...0.016 eV. Energies of the donor states responsible are  $E_d = 0.009$  eV, assuming  $n_d = 3.9 \cdot 10^{18} \text{ cm}^{-3}$  and  $E_d = 0.04$  eV, assuming  $n_d = 1.9 \cdot 10^{18} \text{ cm}^{-3}$  (temperature range 230...290 K) [70B].

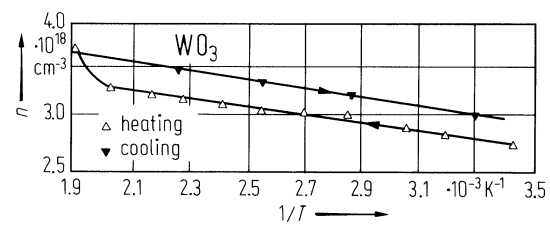
At higher temperatures results are scanty, see Fig. 4 for results showing a slight anomaly at 330°C. ac measurements are shown in Fig. 5. Discontinuities are apparent at 750°C, 910°C and 1235°C. dc resistivity showing anomalies at high temperature: Fig. 6.

**References:**

- 56S     Sawada, S.: J. Phys. Soc. Jpn. 11 (1956) 1237.
- 63C     Crowder, B. L., Sienko, M. J.: J. Chem. Phys. 38 (1963) 1576.
- 67L     Langreth, D. C.: Phys. Rev. 159 (1967) 717.
- 70B     Berak, J. M., Sienko, M. J.: J. Solid State Chem. 2 (1970) 109.

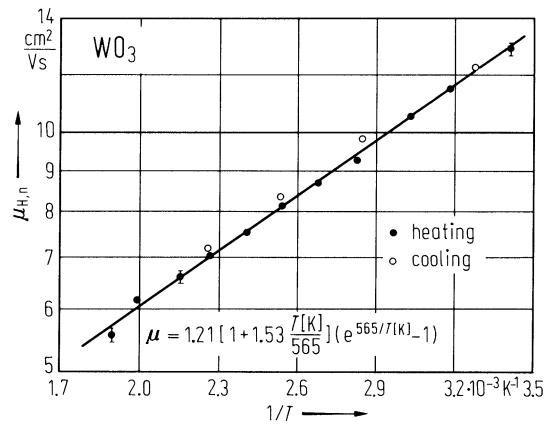
**Fig. 1.**

WO<sub>3</sub>. Electron concentration vs. reciprocal temperature above 300 K [70B].



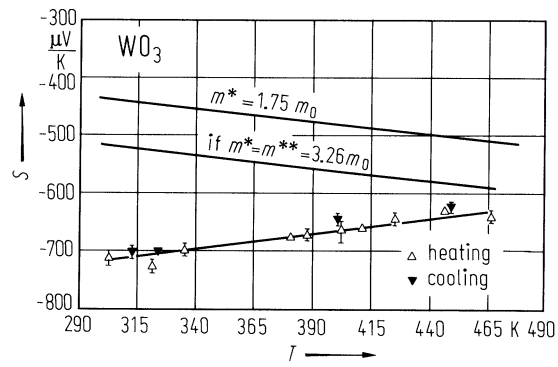
**Fig. 2.**

WO<sub>3</sub>. Hall mobility vs. reciprocal temperature above 300 K. Solid line is the best fit to a large-polaron theory [67L, 70B].  $\mu \parallel a$ .



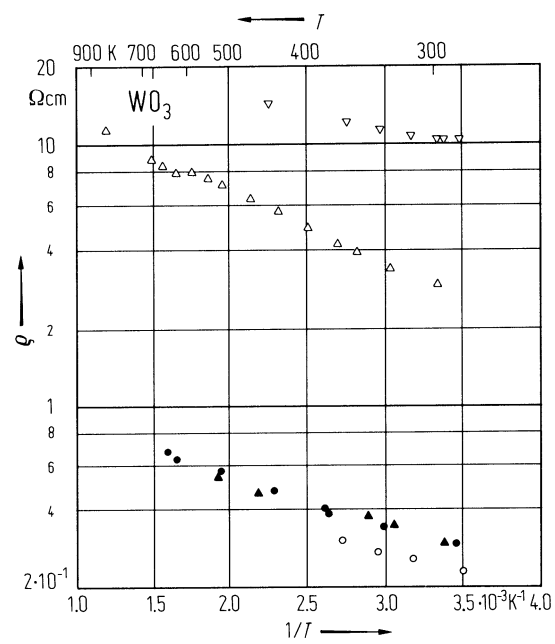
**Fig. 3.**

WO<sub>3</sub>. Seebeck coefficient vs. temperature above a 300 K. The two curves are calculated using a rigid band mass and polaron mass, respectively [70B].  $S \parallel a$ .



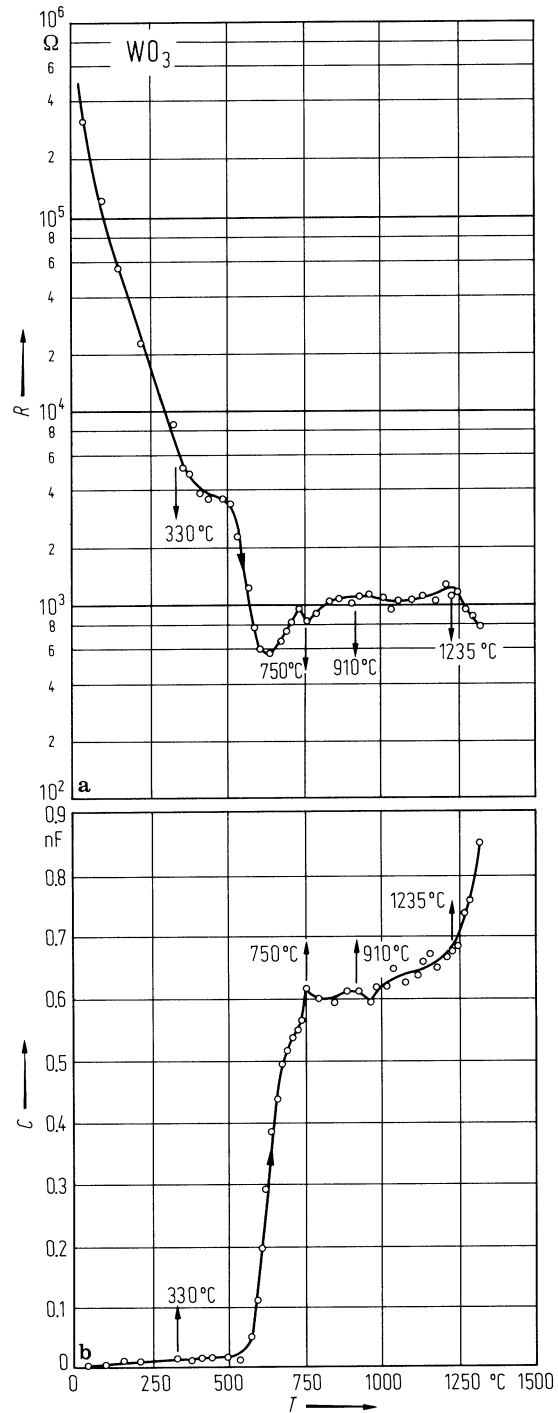
**Fig. 4.**

$\gamma$ -WO<sub>3</sub>. Resistivity vs. (reciprocal) temperature for various samples [63C]. Orientation not stated.



**Fig. 5.**

WO<sub>3</sub>. (a) Resistance and (b) capacitance vs. temperature for a sintered bar analyzed from a series equivalent circuit at 1.043 MHz [56S].



**Fig. 6.**

WO<sub>3</sub>. Resistivity vs. temperature of sintered samples (a) below, (b) above 920°C [56S].

