

**substance: V<sub>2</sub>O<sub>5</sub>**

**property: transport properties, low temperature range**

V<sub>2</sub>O<sub>5</sub> shows three quite distinct conductivity regions (Fig. 1): a low-temperature region ( $T \leq 140$  K) of very low activation energy, an intermediate region ( $140 \text{ K} \leq T \leq 350 \text{ K}$ ) where good linearity in the  $\ln \rho$  vs.  $T^{-1}$  curve is obtained, and a final high-temperature region ( $350 \text{ K} \leq T \leq 600 \text{ K}$ ) where substantial non-linearity is found [70I, 73H, 71P].

**low-temperature range**

Disagreements exist about the conductivity mechanism: [71P] report an activated mobility with  $E_A = 0.0781$  eV at  $T < 170$  K, [73H] find evidence for a random range hopping between defects with a  $T^{-1/4}$ -law (Fig. 2). [73H] reports activated conductivity in the  $b$  direction to much lower temperatures than the  $a$  and  $c$  directions (Fig. 3).

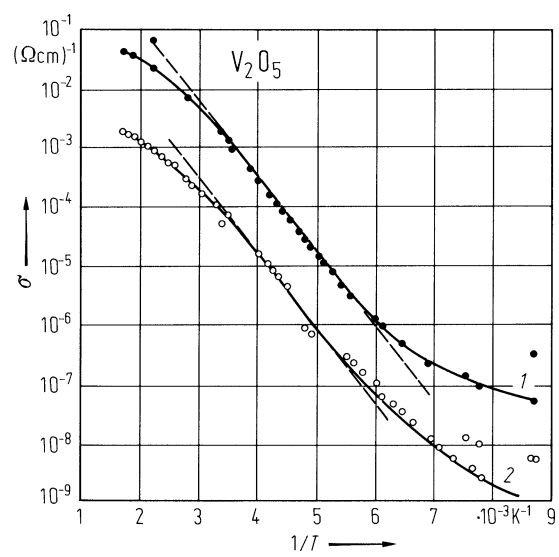
No Seebeck data have been reported in this temperature region. ac data supports the hopping model (Fig. 4). EPR data on Na<sub>0.01</sub>V<sub>2</sub>O<sub>5</sub> [74S] suggest that direct hopping between defects occurs at low temperature with  $E_A \approx 0.07(2)$  eV.

## References:

- 70I Ioffe, V. A., Patrina, I. B.: Phys. Status Solidi 40 (1970) 389.
- 71P Perlstein, J. H.: J. Solid State Chem. 3 (1971) 217.
- 73H Haemers, J., Baetens, E., Vennik, J.: Phys. Status Solidi (a) 20 (1973) 381.
- 74S Sperlich, G., Zimmermann, P.: Solid State Commun. 14 (1974) 897.

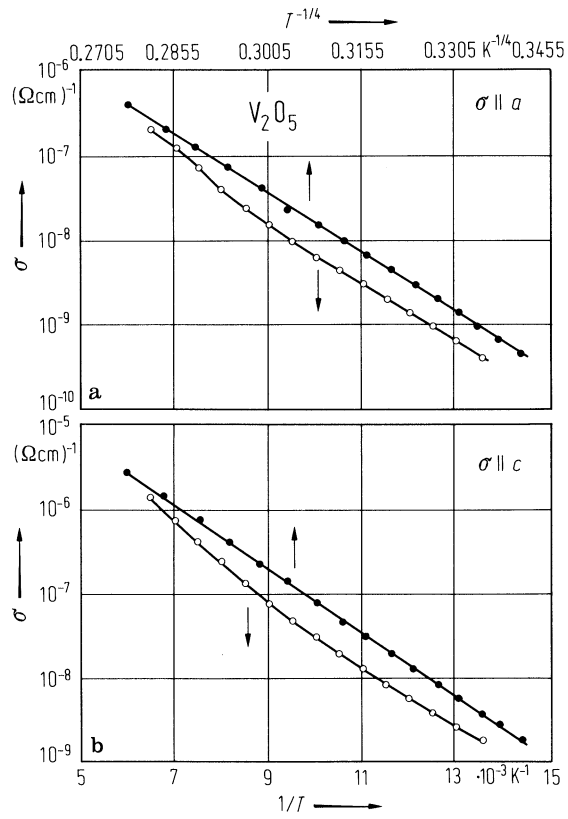
**Fig. 1.**

$V_2O_5$ . Conductivity vs. reciprocal temperature for (1) along  $c$ -axis (2) along  $b$ -axis [70I].



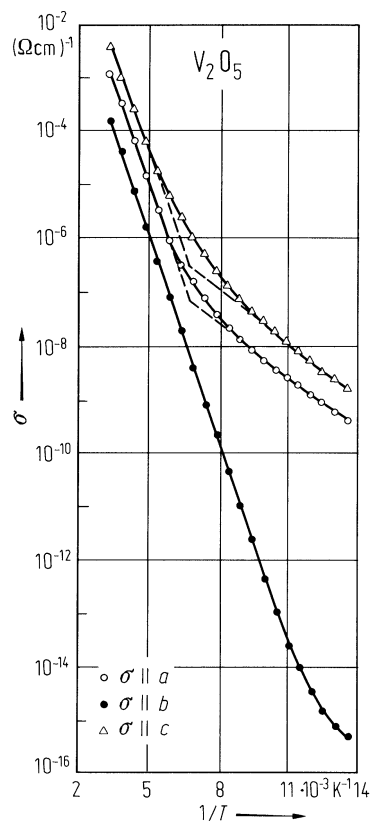
**Fig. 2.**

$V_2O_5$ . Conductivity vs. reciprocal temperature (open symbols) and  $T^{-1/4}$  (full symbols) for (a) parallel  $a$  and (b) parallel  $c$  [73H].



**Fig. 3.**

$V_2O_5$ . Conductivity vs. reciprocal temperature for low temperatures along the three crystallographic directions [73H].



**Fig. 4.**

$V_2O_5$ . ac and dc conductivity vs. reciprocal temperature along the  $b$ -axis [73H].

