

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

**property: transport properties, high 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].

**high-temperature range**

A plot of the form  $\sigma = A T^{-3/2} \exp(-0.16 \text{ eV}/kT)$  seems to fit the data along the  $c$ -axis (Fig. 2) [70I] ( $T$  in Kelvin).

Drift mobility  $\mu = \mu_0 \exp(-0.06 \text{ eV}/kT)$ ,  $T$  in K, along all three axes;  $\mu_0$  is axis dependent [69V]; resistance vs. pressure: Fig. 3.

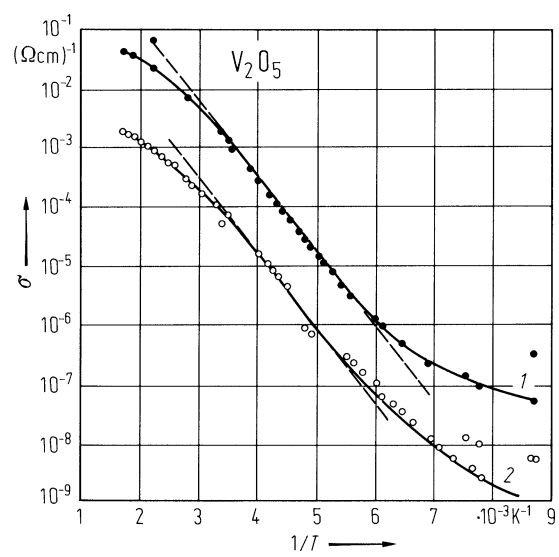
**ac conductivity:** Oxygen deficient V<sub>2</sub>O<sub>5</sub> samples are inhomogenous containing, in layers parallel to (010) plane, planar inclusions (probably of lower oxides) whose conductivity was much higher than the native V<sub>2</sub>O<sub>5</sub> matrix [81I]. The ac conductivity and permittivity are shown in Fig. 4 in the temperature range 70...250 K. An analysis shows  $\sigma \propto \omega^s$ ,  $s \approx 0.4...0.5$ , activation energy for the V<sub>2</sub>O<sub>5</sub> matrix is 0.2 eV and for inclusions 0.08 eV. The break at 140 K in Fig. 4 corresponds to a transition from a dominated by the inclusions at low temperature to a dominated by the matrix above 140 K [81I].

## References:

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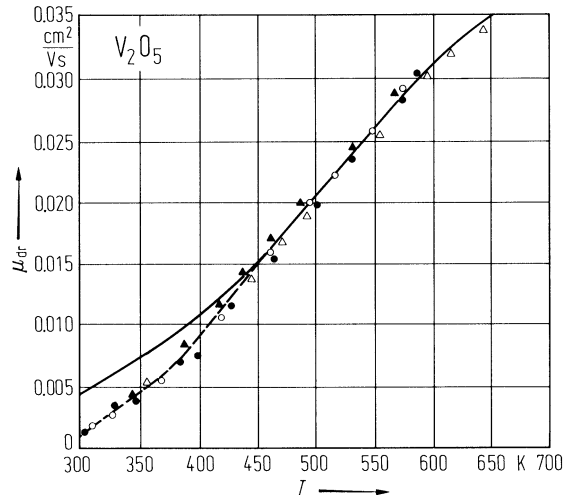
**Fig. 1.**

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



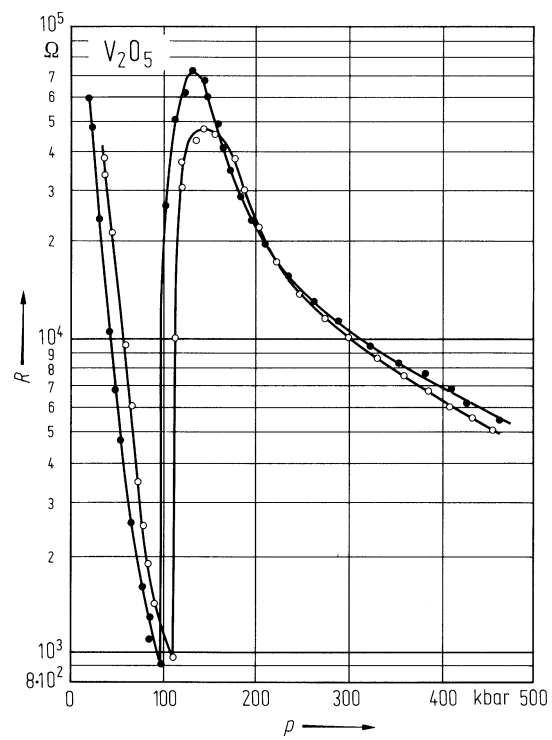
**Fig. 2.**

$V_2O_5$ . Drift mobility vs. temperature. Points: calculated values for five single crystals with different number of epr centres ( $3 \cdot 10^{18} \dots 2 \cdot 10^{19} \text{ cm}^{-3}$ ); full line: function  $T^{-3/2} \exp(-0.16 \text{ eV}/kT)$  [70I]. Orientation not specified.



**Fig. 3.**

$V_2O_5$ . Resistance vs. pressure for two separate samples [63M].



**Fig. 4.**

$V_2O_5$ . (a) Dielectric constant and (b) conductivity vs. reciprocal temperature for single crystal along  $[001]$  axis at different frequencies: 1:  $10^3$  Hz, 2:  $3 \cdot 10^3$  Hz, 3:  $10^4$  Hz, 4:  $3 \cdot 10^4$  Hz, 5: dc value [81I].

