substance: NbO_2
property: transport properties and stoichiometry

Considerable disagreement over the stoichiometric range has been reported:

$NbO_{1.9975}$–$NbO_{2.0030}$ at 1373 K		66J
$NbO_{2.000}$– $NbO_{2.024}$ at 1575 K		69S2
$NbO_{1.9}$– $NbO_{2.1}$	arc melted single crystals	75S
$NbO_{1.990}$–$NbO_{2.0336}$		77G
$NbO_{2.000}$–NbO_{2+x}	x = 0.0032 at 1273 K, = 0.0046 at 1323 K, = 0.0060 at 1373 K	76M

Isotherms are shown in Fig. 1. Calculated curves were obtained for a model which involves niobium vacancies.

For the processes $2O_O + V_{Nb} \rightarrow 2O_\infty$ (E_v) and $2O_O + V_{Nb}' + N_{Nb} \rightarrow 2O_\infty + Nb_{Nb}$ ($E_{v\cdot}$): E_v = 254 kcal mol^{-1}, $E_{v\cdot}$ = 285 kcal mol^{-1} [76M], where O_∞ is an oxygen atom at infinity and the temperature range studied was 900...1100°C.

Crystals can be grown by vapour transport and by Czochralski techniques [72S, 75K, 74B]. Vapour transport crystals show conductivity and susceptibility data (Fig. 2) similar to results obtained earlier [69S1]. More detailed studies have shown that at both low and high temperatures, the conductivity and associated parameters are very anisotropic [74B]. For resistivity in the *a* and *c* directions, see Fig. 3. In the range 300...450 K, the Hall mobility (Fig. 4) and drift mobility (Fig. 5) are activated (save for μ_H along the *c* axis).

References:

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75K Kodama, H., Goto, M.: J. Cryst. Growth 29 (1975) 222.
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76M Marucco, J. F., Tetot, R., Gerdanian, P., Picard, C.: J. Solid State Chem. 18 (1976) 97.
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Fig. 1.

NbO_2. Composition parameter x vs. oxygen pressure at three temperatures [76M].

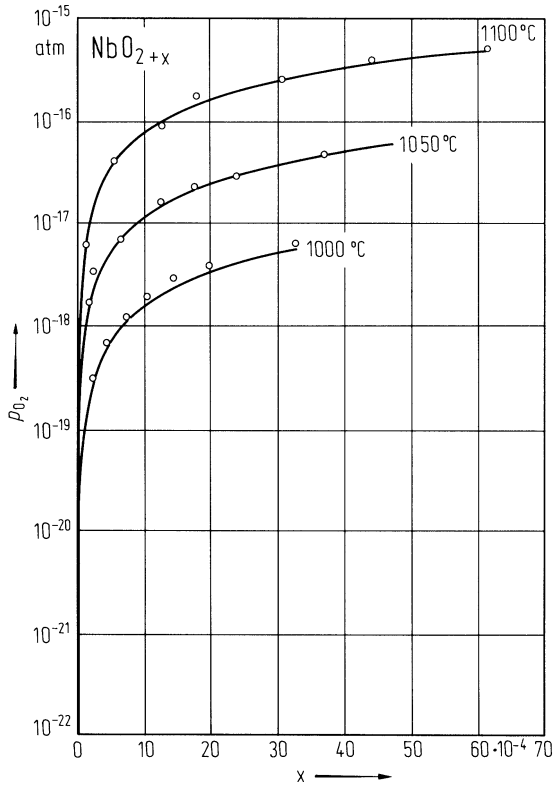

Fig. 2.

NbO_2. Conductivity and magnetic susceptibility vs. (reciprocal) temperature [72S]. χ_m in CGS-emu.

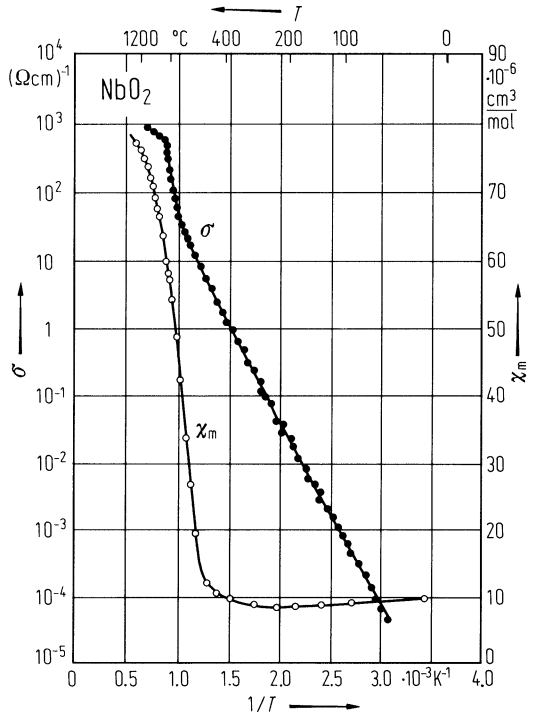

Fig. 3.

NbO_2. Resistivity vs. reciprocal temperature in *a* and *c* direction [74B].

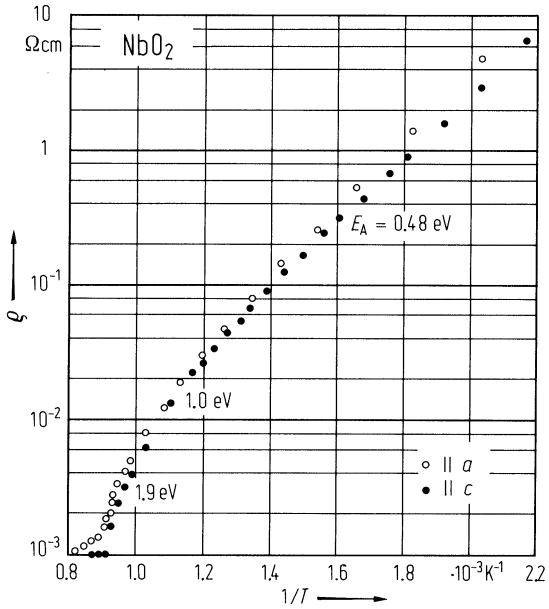

Fig. 4.

NbO_2. Electron Hall mobility vs. reciprocal temperature along different directions [74B].

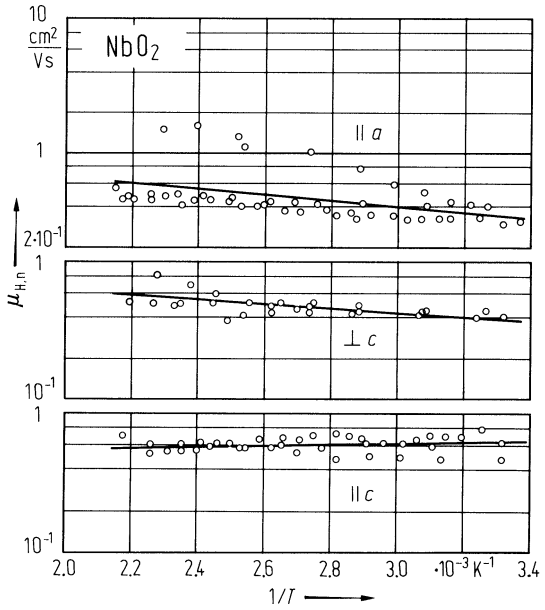

Fig. 5.

NbO_2. Electron drift mobility vs. reciprocal ternperature along different directions [74B].