

substance: $\text{Ti}_n\text{O}_{2n-1}$ ($n \geq 3$)

property: physical properties of V-doped Ti_4O_7

This system has been extensively explored [79H, 79S, 77M, 76L, 78A, 79S].

Phase diagram: Fig. 1. The lower transition temperature decreases rapidly with increasing x in $(\text{Ti}_{1-x}\text{V}_x)_4\text{O}_7$ and vanishes for $x \geq 0.0035$. For $x \approx 0.0025$ two crystallographic transitions are seen (Fig. 2). The entropy changes at the two transition temperatures (Fig. 3). Magnetic susceptibility shows Curie behaviour below the upper transition temperature, $x > 0$ (Fig. 4) with $p_{\text{eff}} \approx 2.0 \mu_{\text{B}}$ per V-atom. Electrical resistivity: Fig. 5. The activation energy in the intermediate phase drops sharply with x . In the low-temperature phase, the resistivity varies with T as $\rho \propto A \exp(-(T_0/T)^{1/4})$ (Fig. 6) characteristic of variable-range hopping, with $T_0 \approx 10^8\text{K}$ [79S].

References:

- 76L Lakkis, S., Schlenker, C., Chakraverty, B. K., Buder, R., Marezio, M.: Phys. Rev. B14 (1976) 1429.
- 77M Miller, V. I., Perelyaev, V. A., Shveikin, G. P., Alyanovskii, S. I.: Izv. Akad. Nauk SSSR, Neorg. Mater. 13 (1977) 566.
- 78A Ahmed, S., Schlenker, C., Buder, R.: J. Mag. Magn. Mater. 7 (1978) 338.
- 79H Hodeau, J. L., Marezio, M.: J. Solid State Chem. 29 (1979) 47.
- 79S Schlenker, C., Ahmed, S., Buder, R., Gourmala, M.: J. Phys. C12 (1979) 3503.

Fig. 1.

$(\text{Ti}_{1-x}\text{V}_x)_4\text{O}_7$. Phase diagram showing regions of order/disorder of Ti–Ti pairs [79S].

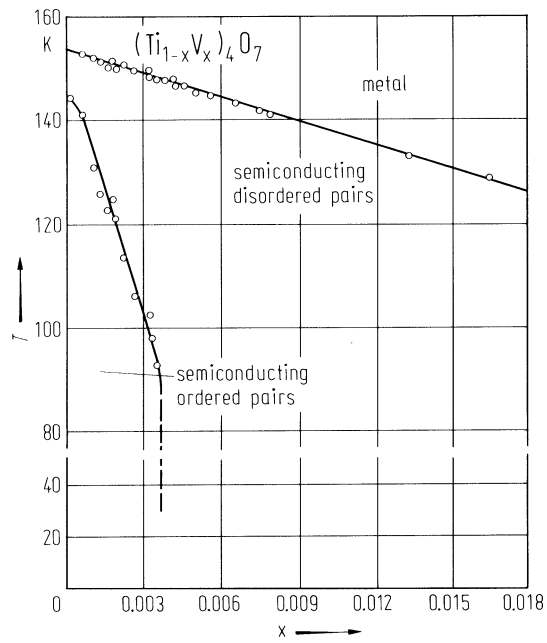


Fig. 2.

$(\text{Ti}_{0.9975}\text{V}_{0.0025})_4\text{O}_7$. Lattice parameters vs. temperature. Full circles: cooling, open circles: warming. --- pure Ti_4O_7 [79H].

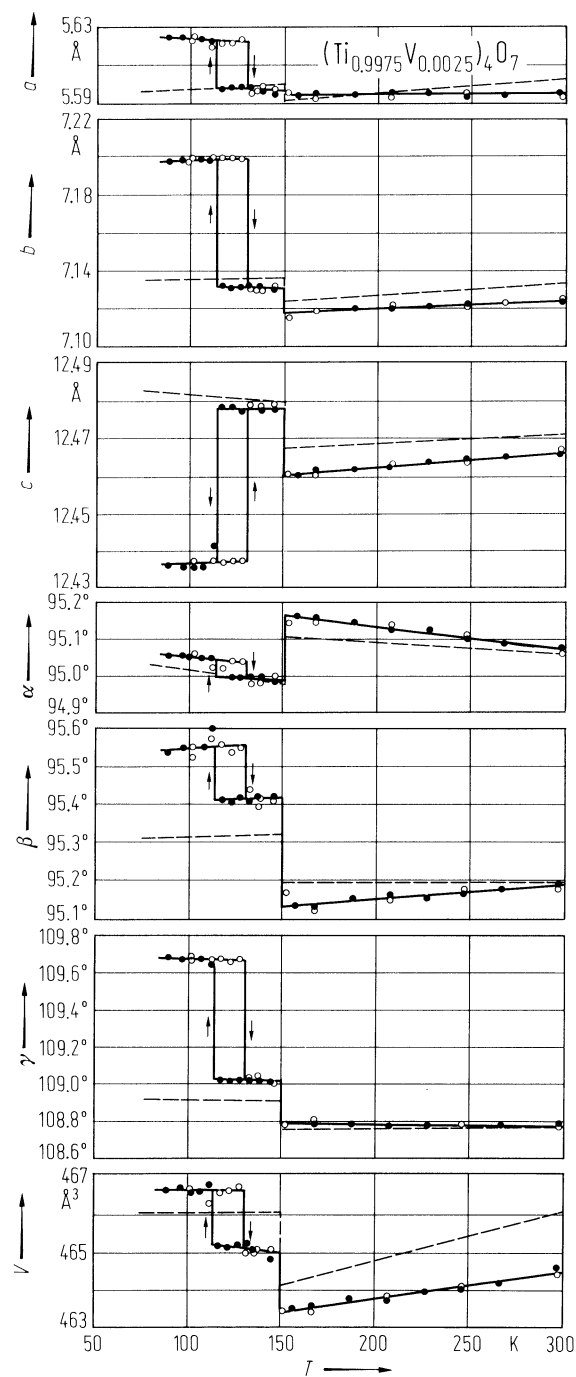


Fig. 3.

$(\text{Ti}_{1-x}\text{V}_x)_4\text{O}_7$. Entropy changes at the high- (full circles) and low- (open circles) temperature transition vs. x [79S].

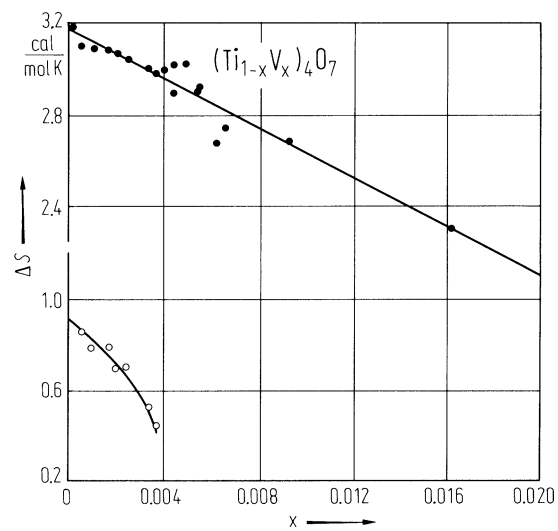


Fig. 4.

$(\text{Ti}_{1-x}\text{V}_x)_4\text{O}_7$. Molar magnetic susceptibility vs. temperature for various x . χ_m in CGS-emu [79S].

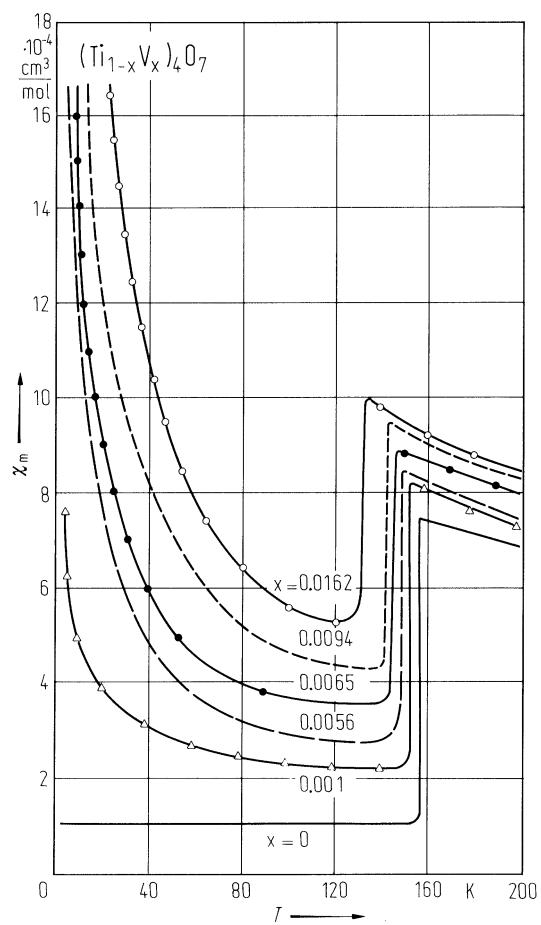


Fig. 5.

$(\text{Ti}_{1-x}\text{V}_x)_4\text{O}_7$. Resistivity vs. (reciprocal) temperature for samples of different composition [79S]. Orientation not specified.

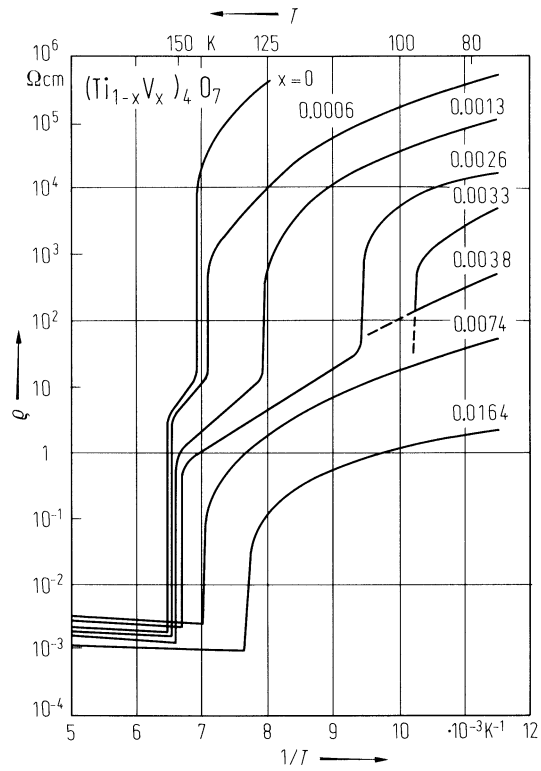


Fig. 6.

$(\text{Ti}_{1-x}\text{V}_x)_4\text{O}_7$. Resistivity vs. $T^{-1/4}$ for various x [79S]. Orientation not specified.

