substance: VO_2
property: optical properties, dielectric constants

Photoelectron spectrum: Fig. 1, real and imaginary parts of the refractive index for $T < T_{tr}$: Fig. 2, UV data reported in [72G, 68V, 74V, 76M2]).

absorption coefficient

For $T < T_{tr}$: Fig. 3, comparison of absorption coefficients: Fig. 4. Structure at $E < 1.8$ eV assigned to d–d transitions with threshold at 0.6 eV [72G]. At 1.82 eV, threshold for O 2p – V3d transitions with peaks at 2.64 eV and 3.56 eV. Optical absorption inVO_2:Cr shows no distinct edge, but for $h\nu < 0.6$ eV the absorption tail can be fitted to $K \propto A \exp(E/E_0)$ where $E_0 = 0.088$ eV. Hence $E_g \approx 0.60(5)$ eV and absorption below 0.6 eV is excitonic in origin. Thermoreflectance spectra are not observed either above or below T_{tr} save in a region very close to T_{tr} and the electroreflectance signal also behaved in an anomalous fashion near T_{tr} [80M].

dielectric constants

$\varepsilon(0)$	40.6	$E \perp a_m$, $T < T_{tr}$	from infrared lattice modes	66B
	25.9	$E \parallel a_m$		
	24	$E \parallel a_m$, $T < T_{tr}$		72K
	43	$T = 77$ K	$f = 10$ Hz; true static ε estimated as 70...100	76R
	ca.100	$T = 300$ K		78M
	18.3	$E \parallel a_m$, RT		75Z
	39	$E \perp a_m$		
$\varepsilon(\infty)$	10.0	$E \perp a_m$, $T < T_{tr}$	from infrared lattice modes	66B
	9.7	$E \parallel a_m$		
	9	$E \parallel c_R$, $T > T_{tr}$ (353 K)		66B

carrier contribution to dielectric constant

$\varepsilon_{carrier} = -\omega_p^2/(\omega^2 + i\omega\omega_c)$ with $\omega_p = 8000$ cm^{-1} and $\omega_c = 10000$ cm^{-1} for high-temperature phase [66B].

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Fig. 1.

VO_2, V_2O_3. XPE spectrum (intensity vs. binding energy). — metallic phase, ⋯ semiconducting phase [79S].

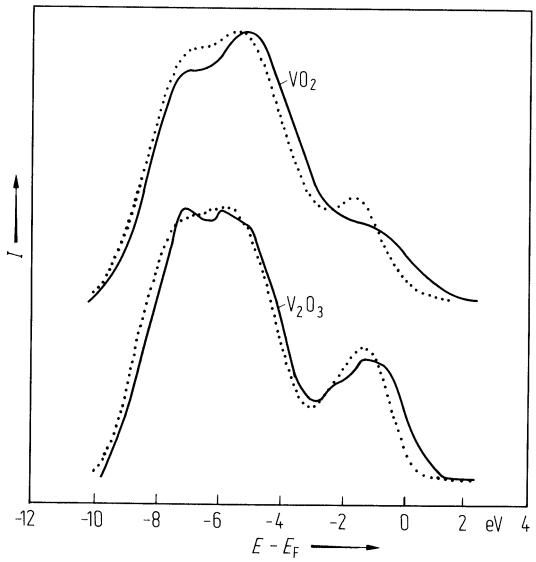

Fig. 2.

VO_2. Real (*n*) and imaginary (*k*) parts of the refractive index vs photon energy at RT for polycrystalline films [72G].

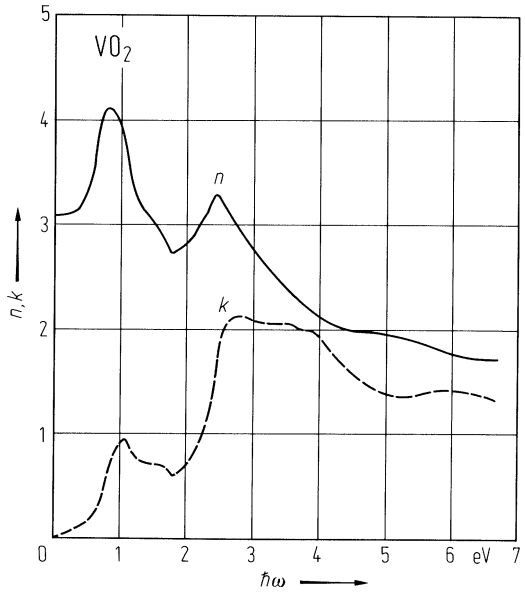

Fig. 3.

VO_2. Absorption coefficient vs. photon energy in the semiconducting phase [72G].

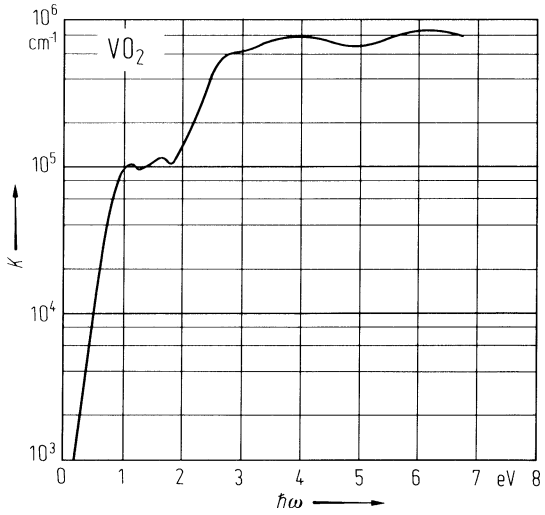

Fig. 4.

VO_2. Absorption coefficient vs. photon energy of crystalline films for (a) $E \perp a_R$, (b) $E \parallel a_R$. Curves *1*: $T < T_{tr}$, curves *2*: $T > T_{tr}$ [76M1].