substance: WO_3
property: optical properties, dielectric constants

optical spectra: absorption in the visible: Fig. 1, in the near IR: Fig. 2, optical density of thin films: Fig. 3, derived absorption coefficient for amorphous films: Fig. 4.

photoemission spectra [76H, 77A, 78B] show a valence band about 4 eV wide for RT (γ) phase (Fig. 5). On reduction the W(5d) conduction band becomes clearly visible (Fig. 6). EELS shows a peak at 1.3 eV which becomes strongly enhanced on reduction [77R].

higher energy peaks

E	6.5 eV	O(2p)–W(5d) (probably γ-phase)	77R
	14.0 eV	O(2p)–W(6s)	
	21.0 eV	O(2s)–CB	
	34.7 eV, 35.2 eV	W(4f)–CB	
	35.7 eV	W(5p)–CB	
	36.9 eV, 37.4 eV	W(4f)–CB	
	43.1 eV, 46.1 eV	W(5p)–CB	
	52.9 eV, 56.6 eV	W(5s)–CB (?)	

dielectric constant

seems to depend quite critically on the nature of the sample (Fig. 7 for single crystals, Fig. 8 for sintered samples). Above room temperature ε has been reported as going through a maximum value of $2...3\cdot10^5$ [69B]. Much lower values have been reported:

$\varepsilon(0)$	20	RT	evaporated films	73D
$\varepsilon(\infty)$	5	RT		
$\varepsilon(0)$	90	RT	amorphous films	78M
$\varepsilon(0)$	12.1...14.0	RT	sintered samples (γ-phase)	76S

refractive index

n_a	2.703(35)	tungsten lamp,	temperature dependence: Fig. 9;	59S
n_b	2.376(35)	$T = 23°C$	the material is double-refracting	
n_c	2.283(35)		(probably γ-phase)	

References:

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Fig. 1.

WO_3. Transmission vs. wavelength in [0 0 1]-direction at RT [72S].

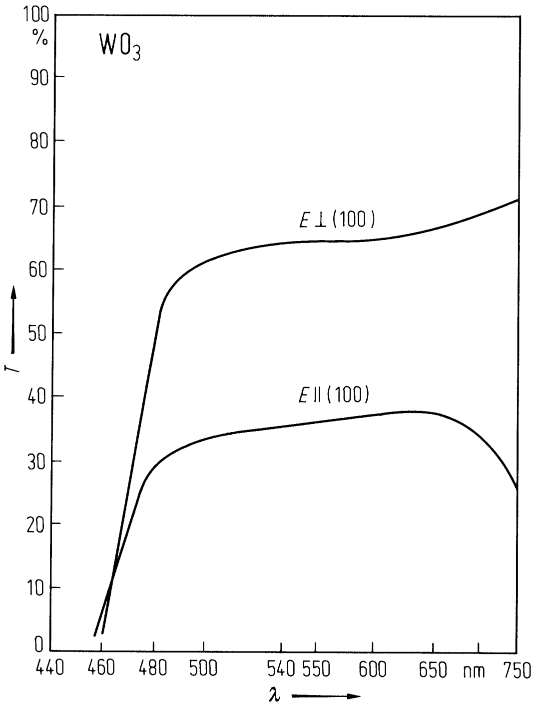

Fig. 2.

WO_x. Absorption coefficient ($E \perp c$-axis) vs. wavelength (photon energy) for three crystals at RT [70B].

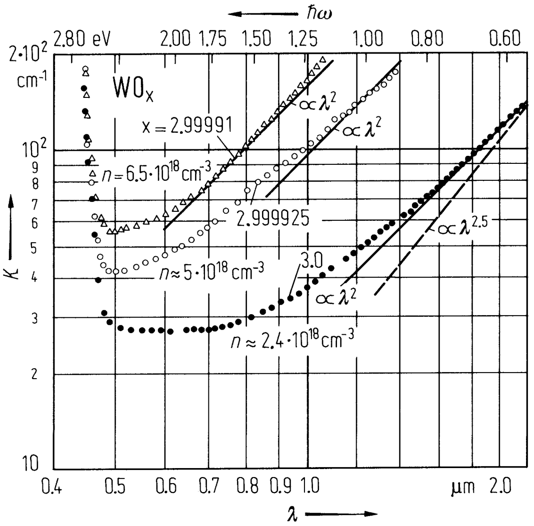

Fig. 3.

WO_3. Optical density at RT vs. wavelength of amorphous and crystalline films of thickness 0.05 μm (a) and 1.0 μm (b) [73D].

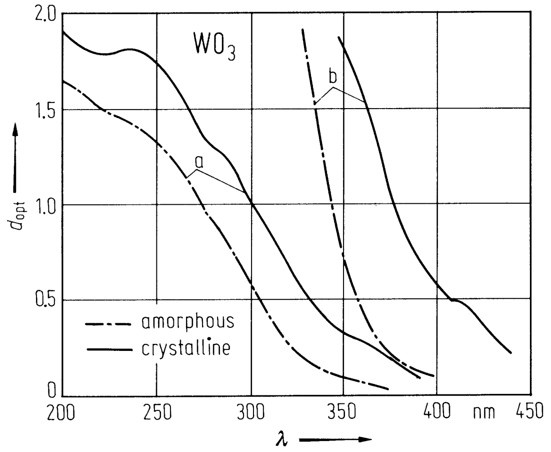

Fig. 4.

WO_3. Absorption coefficient at RT vs. wavelength (photon energy) for amorphous films of different thickness [73D].

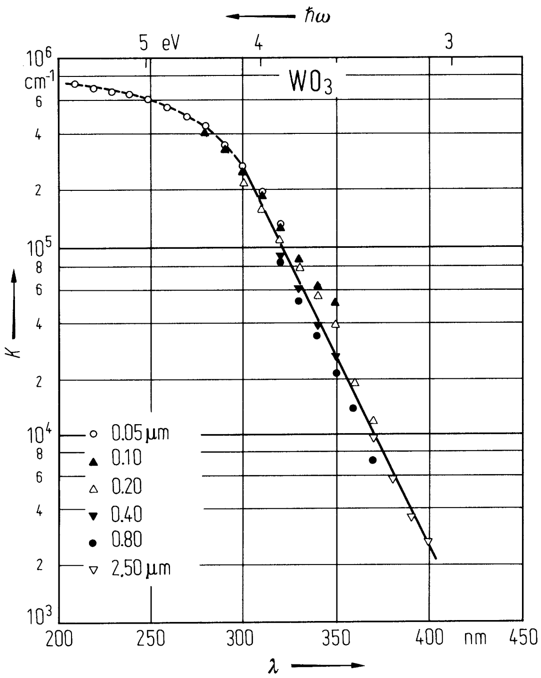

Fig. 5.

γ-WO_3. UV-photoemission spectra at RT (intensity vs. electron kinetic energy), (a) He I, (b) He II [78B]. He I: light source – 21.2 eV He line, He II: light source – 40.8 eV He line.

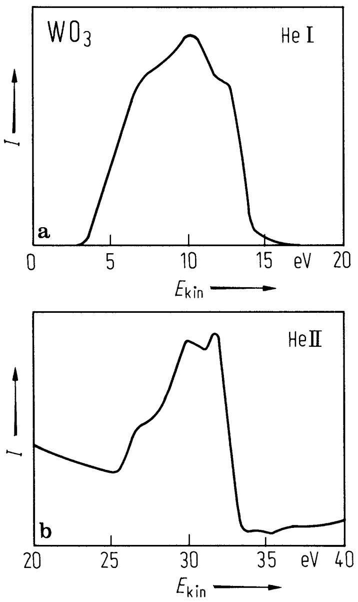

Fig. 6.

WO_{3-x}. XPE spectra (intensity vs. binding energy) for samples with x = 0.04 (*a*), 0.10 (*b*), 0.28 (*c*), 1.00 (*d*), 0 (*e*) [77A].

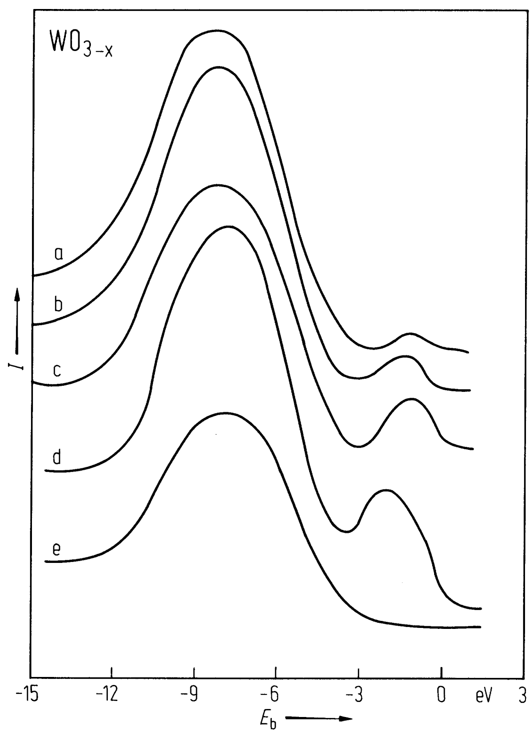

Fig. 7.

WO_3. Dielectric constant and dissipation factor vs. temperature measured between nominal RT (001) surfaces of a stoichiometric single crystal at 1 kHz [75L].

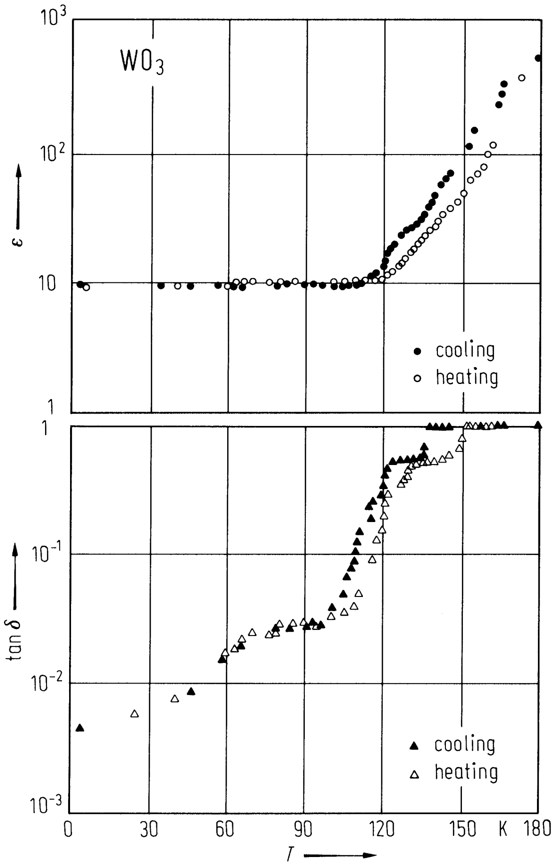

Fig. 8.

WO_3. Dielectric constant and dissipation factor vs. temperature derived from capacitive measurements on sintered wafers of stoichiometric material at 1 kHz [75L].

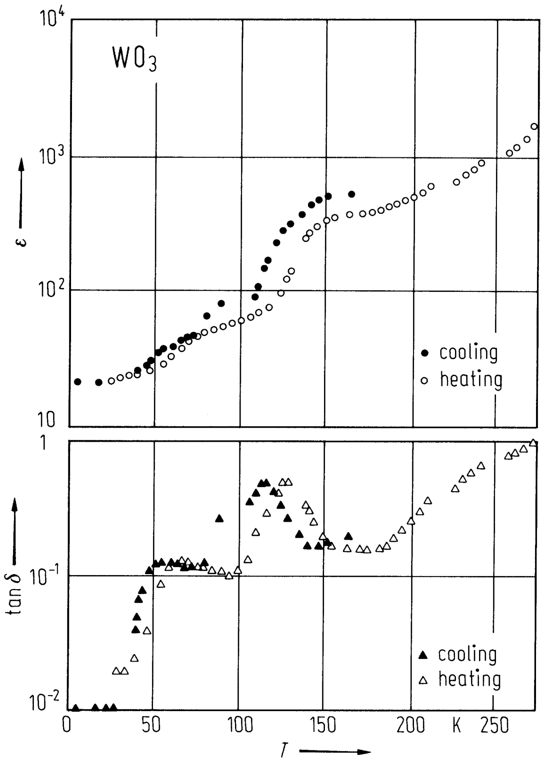

Fig. 9.

WO_3. Indices of refraction vs. temperature [59S]. $n^{-} = (1/3)(n_a + n_b + n_c)$.