Photo-conductance of thin microstructured WO_3 films in the vicinity of the edge of fundamental absorption band

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Induced photoconductivity is investigated for thin layers of micro particles WO_3 (average diameter of <25 micron, Sigma Aldrich product 232785) near the edge of the fundamental absorption band using pulse-periodic laser pumping in the wavelength range from 440 to 500 nm. The particles were deposited on the interdigital Cr electrodes from aqueous suspensions. The layer thicknesses were estimated as ranging from 20 to 100 μm using the OCT system.

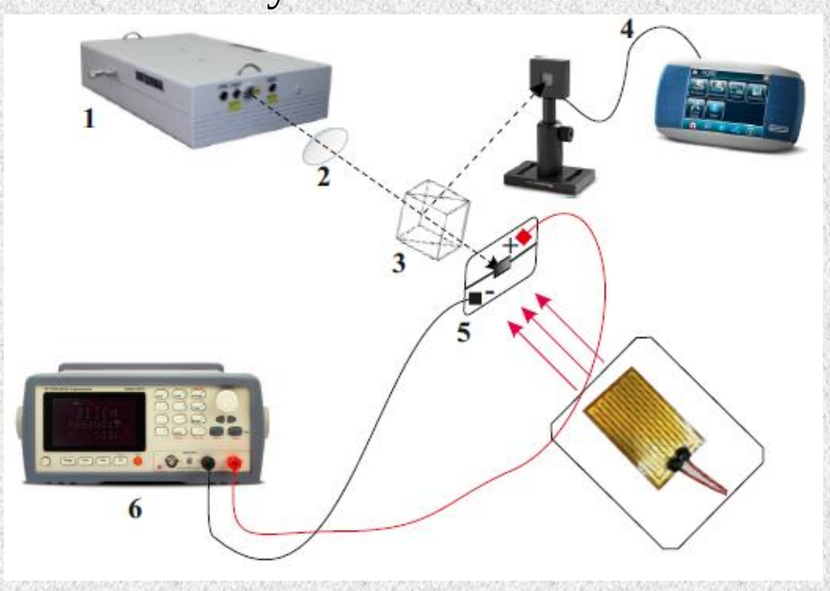

Figure 1 - Scheme of the experimental setup.

1 – laser LOTIS TII 2145-OPO; 2 - quartz lens; 3 - beam splitting cube; 4 - measuring instrument Gentec Maestro Q12MF1; 5 - sample; 6 – teraohmmeter Tetron M13A; Heating was carried out by a resistive heater.

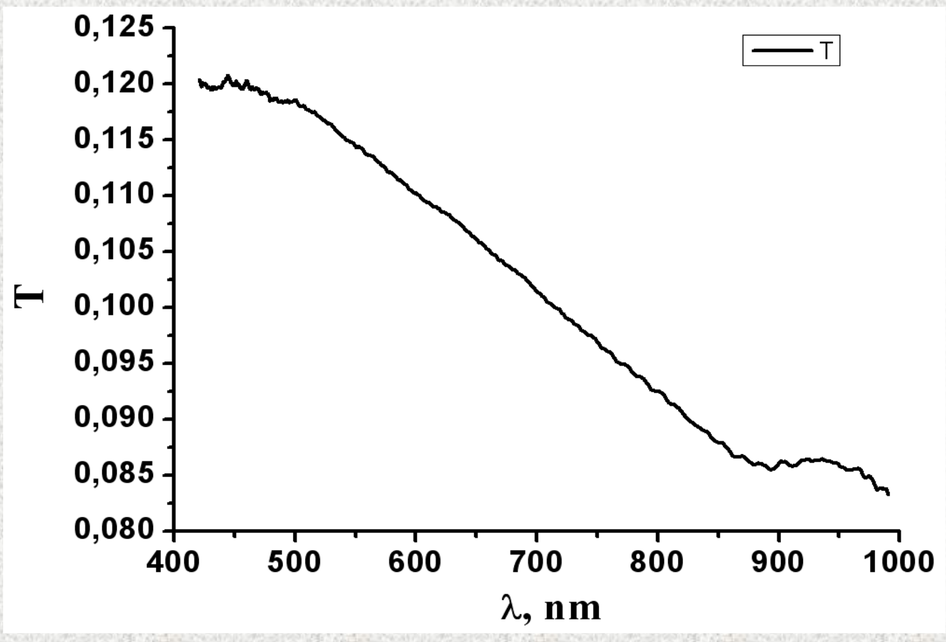

Figure 2 Collimated transmission spectrum of WO3 aqueous suspensions.

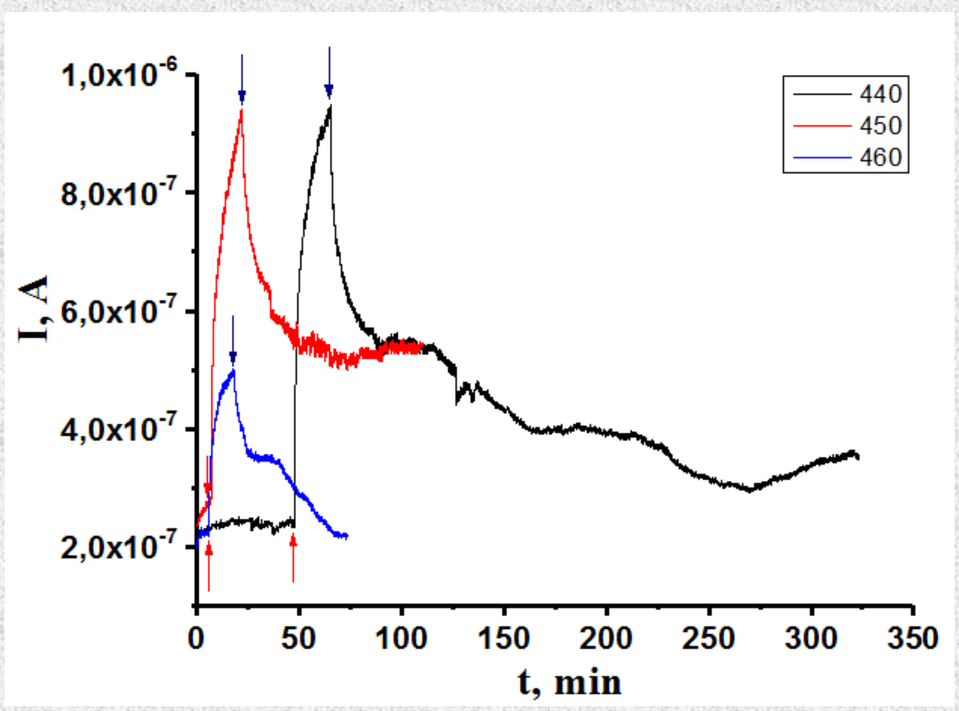

Figure 3 - Experimental data on the photoconductivity at the various wavelengths: the red arrows show the beginning of pulsed pumping, the blue arrow shows the switching off of laser radiation.

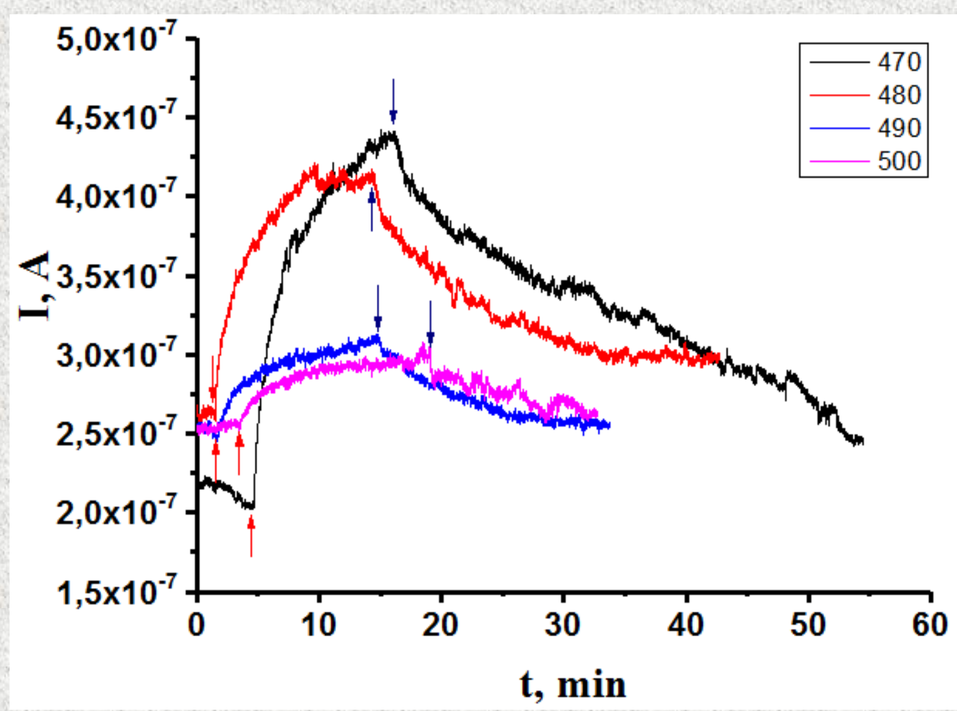

Figure 4 - Experimental data of the photoconductivity at the various wavelengths: the red arrows show the beginning of pulsed pumping, the blue arrows show the switching off of laser radiation.

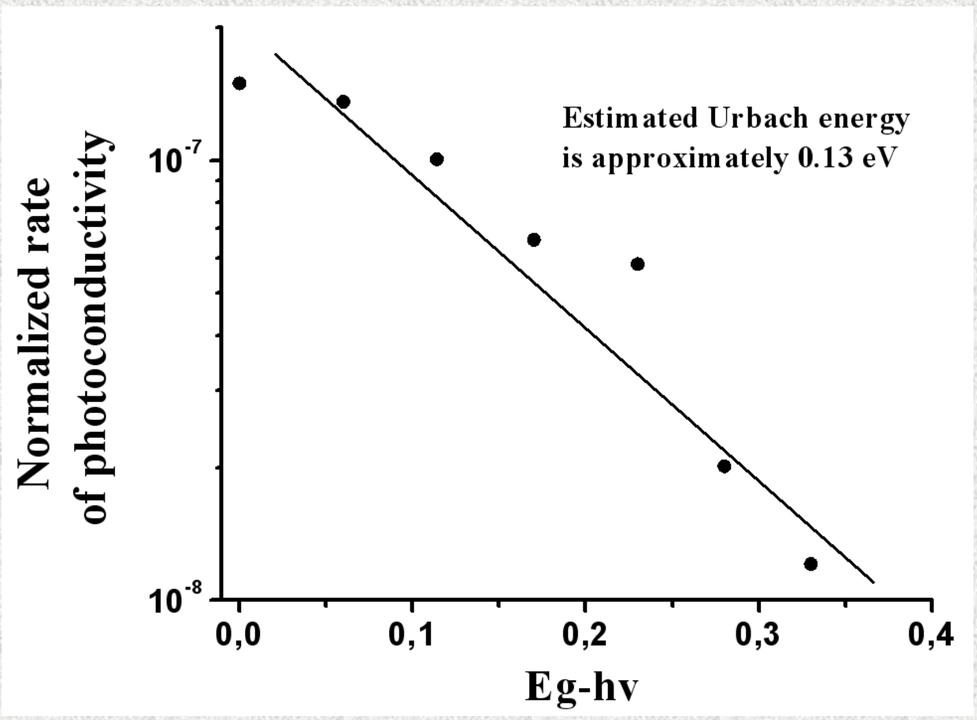

Figure 5 - Normalized photoconductivity values depending on the difference between the band gap and the photon energy.

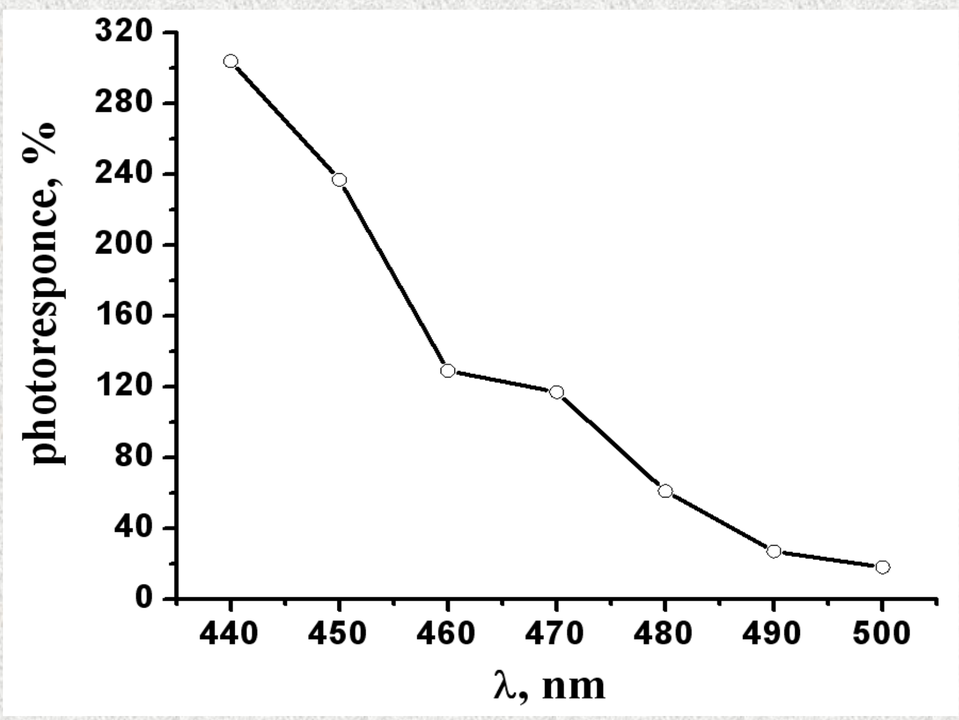

Figure 6 - the system response distribution depending on the laser wavelength of the pumping.

ACKNOWLEDGMENT

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Conclusions

The system is characterized by a high broadband optical response to laser radiation, especially strong in the fundamental absorption band. The value of the Urbach energy, estimated as approximately 0.13 eV, is directly related to the bulk and surface defects of the particles under study.