EFFECT OF SCATTERING ON THE TRANSMISSION SPECTRA OF CRYSTALLINE P-TERPHENYL.

Olena KOVALENKO[1], Olga YUNAKOVA[2], Yevhen MAKOVETSKYI[2], Mykola YUNAKOV[3]

[1]Department of Physics, Faculty ACT, Kharkiv National University of Radio Electronics, Kharkiv, Ukraine

[2]Physical optics Department, Faculty of Physics, V. N. Karazin Kharkiv National University, Kharkiv, Ukraine

[3]Department of Materials for Reactor Constructing and Physical Technologies, Education and Research Institute "School of Physics and Technology", V. N. Karazin Kharkiv National University, Kharkiv, Ukraine

ABSTRACT

Interest in studying the transmission spectra of crystalline p-terphenyl is due to the possibility of creating effective scintillators based on it. The samples of large volume or large area are used for this purpose. The transmission spectra of crystalline p-terphenyl samples with a thickness of 2 and 4 mm and a diameter of 18 mm are studied in this work. Sufficiently strong light scattering appears in such samples, which has a significant effect on their transmission spectra.

Two broad electronic absorption bands are observed at 315 nm and 341 nm in the short-wavelength region of the spectrum of p-terphenyl with a thickness of 2 mm,. And in a sample with a thickness of 4 mm these absorption bands are observed at 306 nm and 340 nm, respectively. It is known that light scattering leads to a short-wavelength shift of absorption bands and their weakening, which is observed in p-terphenyl samples of different thicknesses.

The transmittance T(λ) increases from 10% to 35% in a sample 2 mm thick and from 9% to 30% in a sample 4 mm thick in the transparency region of crystalline p-terphenyl (370 nm – 1100 nm). Such a significant increase of T(λ) in the transparency region is associated with the presence of a grid of small microcracks with a thickness $t \ll \lambda$ in the near-surface layer of crystals, which arise during mechanical polishing of their surface. The presence of small microcracks leads to the tunneling effect, which determines the increase of T(λ).

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