On the measurements of scattering coefficient of nanostructured glass-ceramics by a serial spectrophotometer

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Abstract

In determination of the extinction coefficient for light-scattering materials from transmission experiments, a problem arises, which is connected with unwanted contribution from the scattered light to readings of the detector of a spectrophotometer. In this paper, the problem is discussed for the case of nanostructured nonabsorbing glass-ceramics. For the detector of the spectrophotometer Shimadzu UV 3600, the acceptance angle was determined to be about 6°. The methods are proposed for determination of the critical value of optical density, exceeding of which leads to an appreciable measurement error associated with falling the scattered light into a detector. The methods are based on study of the spectral behavior of the optical density or extinction coefficient. If the acceptance angle of the detector is about 6° and the refractive index of the nanostructured material exceeds 1.6, the critical value of optical density was experimentally found to be approximately 2.

Keywords: Spectrophotometer; Optical density; Light scattering; Acceptance angle; Nanostructured materials; Glass-ceramics.