

of Maxwell's equations that provide always physical fields with correct modal spectrum of guided and, especially, radiated energy and, thus, could be applied to studying both linear and nonlinear photonic problems.

**Analysis of the influence of nanoparticles  
in Photodynamic Therapy applied to biological tissues**

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Photodynamic Therapy (PDT) is a photo-optical treatment technique intended for malignant biological tissue destruction. An inoculated photosensitizer is optically irradiated and tumoral tissue is destroyed with great specificity, practically absent secondary effects and good aesthetic result.

PDT is inefficient in thick tumoral tissues due mainly to the optical radiation and photosensitizer spatial distributions, and also to lesion-independent clinical protocols. In this work we analyse the use of different nanoparticles in PDT. Optical propagation, photosensitizer non-homogeneous spatial distribution and photochemical reactions are taken into account. A complex predictive model is used to estimate the treatment outcome and the influence of nanoparticles.

**The optimized adaptive dynamic holographic interferometer on  
crystal  $\text{Bi}_{12}\text{TiO}_{20}$**

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The model of a holographic interferometer, where a cubic optically active photorefractive crystal  $\text{Bi}_{12}\text{TiO}_{20}$  (BTO) is used as a working environment, is suggested. In theoretical calculation of diffraction efficiency of the holograms which are written down in the crystal both electrooptical, and piezoelectric holographic recording mechanisms are used. The crystal is established according to results of theoretical predictions for achievement of the maximum diffraction efficiency of the transmission hologram. Feature of an interferometer is the diffusion mechanism of record of holograms without application of external electric field. The interferometer can be used for control of drawing of coverings on optical elements, and the increase in a thickness of a covering is in vitro modeled by means of a mobile piezoelectric mirror.