LIMITATION OF LASER POWER IN THE UV REGION BY CONJUGATES OF SINGLE-WALL CARBON NANOTUBES WITH PHTHALOCYANINES

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UV radiation is invisible to the eyes, and therefore the eyes will not take protective actions such as blinking or closing when hit by a high-intensity beam. However, if the eye absorbs too much light, the cornea or lens can be permanently damaged. The effect of exposure can be cumulative, i.e. capable of accumulating over a lifetime. In most cases, to protect against UV laser radiation with a pulse duration of less than 1 μs light filters are usually used, which equally attenuate radiation of different powers.

Recently, the problem of attenuating the power of widely used nanosecond laser pulses at a wavelength of 355 nm (the third Nd:YAG harmonic) has become topical. To solve this problem, nonlinear optical materials should be used. In this work, a conjugate of single-walled carbon nanotubes with metal-free tetra(hydroxy)phthalocyanine $(OH)_4$PcHH was obtained. Using this material, a dispersion in dimethylformamide was prepared, which showed a strong attenuation of the laser radiation, accompanied by a change in the duration of the transmitted laser pulse. The resulting conjugate exhibits the properties of saturable absorption (SA) and reverse saturable absorption (RSA). For the studied dispersions, the values of the nonlinear absorption coefficients changes from 10 cm/GW (phthalocyanines) and 108 cm/GW (initial nanotubes) to 236 cm/GW in the case of conjugates. The saturation intensity for phthalocyanine samples was 0.06 GW/cm^2.