MECHANISM OF HOT SPOTS FORMATION IN PENTAERYTHRITOL TETRANITRATE UPON EXCITATION BY THE FIRST HARMONIC OF A NEODYMIUM LASER

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Currently, several alternative models of laser initiation of «pure» (without specially introduced impurities) samples of pentaerythritol tetranitrate (PETN) have been proposed. The most widespread model is thermal hot-spot initiation model.

The purpose of this work is to explore the mechanism of the formation of «hot spots», which are formed in the samples of «pure» PETN under pulsed action of the first harmonic of Nd-laser.

The work presents first results of experimental studies of spatial, temporal and amplitude characteristics of luminescence, which appears under irradiation of a «pure» and carbon black doped pressed samples of PETN and neutral samples (MgO, Cu) by the first harmonic of the Nd-laser (λ = 1064 nm, τ = 16 ns). It was found that on the surface of all studied solids at the instant of irradiation the micro plasma spot was formed («hot spot»), which characteristics are determined by absorbing irregularities on the surface of the irradiated targets and the parameters of the laser radiation.

The effect of «burning out» of absorbing irregularities with multi-pulse irradiation of the studied target was detected. Analysis of the results suggests that the cause of the formation of «hot spots» in the studied materials is the low-threshold optical (electric) breakdown, developing in local (defective) regions of solids in the electric field of the electromagnetic wave.

The possible types of the «defects» responsible for a near-surface laser plasma formation are discussed.

Keywords: *Pentaerythhritol tetranitrate, laser radiation, hot spots.*