DETERMINATION OF THE EXPLOSION DELAY TIME DURING LASER INITIATION OF ENERGY-INTENSIVE COMPOUNDS

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Abstract: A method for recording light flashes during the initiation of an explosion in energy-intensive materials by a laser monopulse is proposed. Two methods of measuring the explosion delay are implemented. In the first, the photocell is installed on the back side of the test sample and luminocity is recorded in the infrared range ($>$ 700 nm). On the register diagram, two separate peaks are clearly observed corresponding to the moment of generation (1064 nm) and the expansion of the explosion products. In the second, two photocells are used: the first one is located similarly and the second one is located on the side, in front of the sample. Luminocity is recorded in the range of 400–440 nm. The direct and scattered (explosion products) light fluxes emitted by the discharge of a pulsed pump lamp are measured. The delay is determined by the time shift of the signals of both photocells. The delay times for the selected chemical compound were 10 and 20 μs for monopulses with an energy of $\sim$50 and $\sim$ 60 mJ, respectively. The time of expansion of the explosion products is estimated in the interval from the beginning to the peak of the photocurrent. The specified value was $\sim$ 35 μs and did not depend on the initiation energy.

Keywords: initiation; detonation; laser pulse; solar cell; energy-intensive substances

DOI: 10.30826/CE21140109

Figure Captions

Figure 1 Experimental technique: *1* — optical bench; *2* — solid-state laser; *3* — experimental sample in the cage; *4* — light filter; *5* — photocell in the housing; *6* — alignment laser (the side photocell is not shown)

Figure 2 Example of an experimental register program in the experiment where initiation took place

Figure 3 Example of a diagram in the experiment with registration in the range of short wavelengths

Acknowledgments

The research was performed due to the subsidy given to N. N. Semenov Federal Research Center for Chemical Physics of the Russian Academy of Sciences to implement the state assignment of the topic 0082-2019-0006 “Fundamental studies of conversion processes of energetic materials and development of scientific grounds of controlling these processes” (Registration No. AAAA-A21-121011990037-8).

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Received January 20, 2021

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