DIREC T L A S E R I N I T I AT I O N O F O P E N S E C O N D A R Y E X P L O S I V E S

Assovskiy I.G., * Melik-Gaikazov G.V., Kuznetsov G.P.

ICP RAS, Moscow, Russia

*assov@chph.ras.ru

The use of laser pulse instead of electric heating for initiation of explosives is considered as a promising alternative, which is insensitive to external electromagnetic influences. In addition, short laser pulses can significantly reduce and optimize the ignition-period of the explosion. Therefore, the laser radiation impact on energetic materials is in recent years the subject of comprehensive studies in many scientific centers (see, for example, reviews in publications: I.G. Assovskiy, Physics of combustion and interior ballistics. Moscow: Nauka, 2005; V. I. Tarjanov ”Pre-explosion phenomena in rapid initiation of high explosives (review)”, Combustion, Explosion and Shock Waves, 2003, V. 39, No.6.). The goal of this paper is a theoretical and experimental study of the mechanism of initiation of explosion in secondary explosives (SE) by short laser pulse. Laser initiation of SE is much more difficult in comparison with initiation of primary explosives. Typically using of some special methods is requested to realize laser initiation of SE: putting of explosive in closed volume and using of porous SE. In this paper we consider interaction of laser pulse with open surface of non-porous SE. Only pure chemical methods as well as metallic additives were used to control the light sensitivity of SE. Implementation of the method of laser initiation is reduced to the optimization of composition and molecular structure of the explosives, thermo-mechanical properties of metallic additives, along with the optimization of the laser pulse (its duration, energy density and wavelength), taking into account the great variety of secondary explosives and conditions for their functioning, as well as the laser beam diameter, the beam divergence and dynamics of the pulse power variation in time.