

## RELATION BETWEEN OPTICAL CHARACTERISTICS OF AP/AL MIXTURE AND SENSITIVITY TO LASER RADIATION

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Ammonium perchlorate (AP) and aluminum are the main components of modern solid propellants, but their mixture is capable of burning and exploding on its own [1]. In addition, the AP/Al mixture is a convenient model object for studying the behavior of metallized double-base energetic materials (EM).

Previously, we studied the behavior of a AP/nanosized Al mixture (60:40 mass fraction) under the action of millisecond Nd-laser radiation [2–4]. It was found that the ignition threshold of confined mixture samples into PMMA capsule was much higher in comparison with open samples [5]. Such behavior is not characteristic of gasified EMs. This paper presents the results of studying the optical characteristics of both individual components and the mixture itself. It is shown that with an increase in the Al mass concentration, the optical properties of the mixture change radically. For concentrations less than ~5% of the Al content, the scattering properties of AP predominate, and at high concentrations, the optical properties are completely determined by the properties of Al. This conclusion is confirmed by the performed optical measurements and the results of numerical simulation by the Monte Carlo method.

Based on the obtained absorption and scattering coefficients, the problem of heating a mixture sample under the action of a laser pulse is solved by the method of finite differences. It is shown that at the absorption index of the mixture  $\mu \approx 10^4 \text{ cm}^{-1}$ , heating occurs in a thin near-surface layer, which contributes to significant heat loss through the surface into the covering material.

### REFERENCE

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