

High-speed imaging system with a laser monitor for studying high-temperature combustion processes

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Self-propagating high-temperature synthesis and plasma synthesis are promising methods for obtaining new materials with specified properties. The properties of the products are determined not only by the composition of the components, but also by the dynamics of the processes. No less popular direction in the study of extreme states of matter is high-temperature combustion. An urgent task is a comprehensive study of the thermal effects of the high-energy substances on infrastructure objects to ensure technospheric safety. Imaging systems based on high-speed cameras and laser radiation allow monitoring through bright illumination accompanying the flow of high-temperature processes [1], [2]. The report discusses the laboratory complex for high-speed visualization based on two high-speed cameras Evercam F 1000-16-C (Russia) and an original copper bromide brightness amplifier. The complex was used to visualize contact and laser initiation and high-temperature combustion of thermite mixtures, and electric arc synthesis of refractory materials at atmospheric pressure. Using proposed experimental technique, it is possible to understand the features of the processes during combustion of the thermite mixture or processes in the crucible during plasma synthesis. This will make it possible to use the obtained results in solving current problems in the field of combustion physics and other extreme states of matter.

- [1] Batenin V M K I I and A S L 1988 *Doklady Akademii Nauk* **303**(4) 857–860
- [2] Gubarev F A M A V and L L 2023 *Opt. Laser Technol.* **159** 108981