

## Expanded use of a fast photography technique to characterize laser-induced plasma plumes (Article)

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### Abstract

Expanded use of fast photography is proposed to characterize laser ablation plasma plumes by the analysis of a set of photographs by means of appropriate mathematical algorithms. The laser ablation plasma plumes studied were generated by ablation of both a multicomponent target of the nominal composition  $\text{Ni}_{50}\text{Mn}_{37}\text{Sn}_{13}$  and a highly pure Cu target (Cu) using a Q-switched Nd-YAG laser system. The experiments were conducted under different background argon pressures. Several photograph parameters such as intensity per unit time of exposure for a pixel, mean intensity per pixel per unit time of exposure, integrated intensity and cross correlation were studied. The intensity per unit time of exposure allowed for identification of the fast component of the triple structure of the expanding plasma into the background gas (that travels at a speed close to the one measured in vacuum). This parameter together with the use of cross correlation enabled the identification of regions of the expanded plasma plume with higher and lower similarities in their optical emission behavior. The mean intensity per pixel per unit time of exposure can be used as a measurement of the amount of light emitted by the plume as a function of time.

### Author keywords

Digital image processing; Fast photography; Laser ablation; Plasma diagnostics; Plasma plume splitting