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REAL TIME DETERMINATION OF THE LASER ABLATED MASS BY MEANS OF ELECTRIC FIELD-PERTURBATION MEASUREMENT

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Abstract

A Nd:YAG ns-pulsed laser was used to ablate Al, Cd and Zn targets, which were placed between the plates of a planar charged capacitor. The plasma generates a transient redistribution of the electrical charges on the plates that can be measured as a voltage drop across a resistor connected to the ground plate. This signal is proportional to the capacitor applied voltage, the distance between the plates and the total number of ions produced in the ablation process which in turn is related to the laser energy and the ablated mass. After a series of pulses, the targets were weighed on a thermogravimetric balance to measure the ablated mass. Our results show that the electrical signal measured on the resistor is univocally related to the ablated mass from the target. Therefore, after a proper calibration depending on the material and the experimental geometry, the electrical signal can be used for real time quantitative measurement of the ablated mass in pulsed laser generated plasma experiments. The experiments were repeated on an aluminum target, with and without the presence of the external electric field in order to determine the possible influence of the applied electric field on the ablated mass.

Keywords: Laser ablation, Plasma diagnostic techniques, ablated mass