Contributions of sub target and confinement effects in extension of laser induced shock wave plasma spectroscopy to non-metallic targets

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Abstrak

ABSTRACT
An comprehensiove study has been carried out for the study and extension of lases induce shock wave plasma spectroscopy (LISPS) application to non metalic soft and hard samples. For this purpose, a series of experiments were conducted to investigate the dynamical process taking place in the laser plasma generated by a high power and short pulse laser irradiations on a non metal soft and hard samples it was found that in the case of non metal soft sample, the ablated atoms failed to induce a visible plasma at the surface of the target however, it became possible, after a few laser shots depending on the target layer thickness, to generate the sock wave plasma emitting the characteristic spectral line of the target material.
Another related phenomenon studied in this experiment is the pre-irradiation effect pbserved on a non metal hard sample such as quartz sample, which was characterized by absence of secondary plasma at athe initial shots. The disappearance of this effect at a later stage was found to be connected with the appearance of a crater of appropriate depth on the sample surface created by iniatial repeated irradiations on the sample surface. The plasma produced thereafter exhibited typical features of a secondary plasma. Further experiment employing aaratificial ring crater on the sample surface has eliminated the pre-irraduation effect completely, and has thus demonstrated that it is the confinenement effect of the crater which was solely responsible for the generation of secondary plasma from the non metal hard tearget. This conclusion is ini confrormation with the shock wave proposed earlier.
These experimental studies have thus considerably substantiated our understanding of the process of secondary plasma generatuion. In turn, this result helps to improve the quality and extend the scope of LISPS applications in the future