

## **Evolution of plasma double layers in laser-ablation plumes**

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The double layers (DLs) are one of the most complex problems of the plasma physics. These layers are apparently important not only in laboratory plasmas [1] and laser-ablation plasma plumes [2-3] but also in natural phenomena, e.g. the aurora and fire balls [4-5]. This work studies the dynamics of the double layers in a laser ablation plume from different targets irradiated by a Nd: YAG 10 ns pulsed laser. The plasma formation was studied by means of both Langmuir probe and mass spectrometry methods using an experimental set-up developed for the study of environmental [6-7] or technological interest [8] samples. The ionic current distribution in plasma plume formation was recorded in different experimental conditions. We have found that it depends on the laser energy, the pressure of the buffer gas and the probe position. The periodical oscillations recorded in different experimental conditions prove that these plasma formations (DLs) are local physical systems able to accumulate and release energy. Acting as storing and releasing energy elements, the DLs can sustain periodical or non-periodical variations of the current or of the other global parameters of the plasma.

- [1] M. Sanduloviciu and E. Lozneau, *Plasma Phys. and Contr. Fus.* 28 (1985) 585.
- [2] S. Eliezer and H. Hora, *Phys. Rep.* 172 (1989) 339.
- [3] N.M. Bulgakova, A.V. Bulgakov, and O.F. Bobrenok, *Phys. Rev. E* 62 (2000) 5624.
- [4] M. A. Raadu, *Phys. Rep.* 178 (1989) 25.
- [5] M. Sanduloviciu and E. Lozneau, *J. Geophys. Res. Atm.*, 105 (2000) 4719
- [6] C. Focsa, B. Chazallon and J.L. Destombes, *Surf. Sci.* 528 (2003) 189.
- [7] C. Mihesan, N. Lebrun, M. Ziskind, B. Chazallon, C. Focsa, J.L. Destombes, *Surf. Sci.* 566 568 (2004) 650.
- [8] C. Mihesan, S. Gurlui, M. Ziskind, B. Chazallon, G. Martinelli, H. Zeghlache, M. Guignard, V. Nazabal, F. Smectala, and C. Focsa, *Appl. Surf. Sci.*, in press (2005).