# Determination Of Plasma Formation Thresholds Using Femtosecond Laser Pulses

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Our current research line focuses on studying and understanding processes of laser-material interaction in condensed phase using femtosecond lasers in an attempt to improve the analytical performance of laser-based optical emission spectroscopy.

An aspect that attracts great interest is the establishment of the energetic demand for both ion and photons formation process after the beam femtosecond laser arrives. The thermoionic emission requires warming the material until its melting point, whereas that the formation of visible plasma need that energy density put into play forms a liquid heated above its critical temperature, that comes out to the surface explosively. Each element in pure form has a particular threshold, which is modified by the matrix effect and the experimental conditions. We are carrying out a systematic study of wide range of metallic samples as well as binary samples, alloys, complex matrices and others, in order to provide a complete view of the process of interesting analytical samples.

The core of the experiment is a 80 Mhz, 100 nJ, 400 fs Ti-Saphire oscillator that is additionally subjected to chirped pulse amplification to produce an output of 3,5 mJ at 35 fs and a maximum repletion rate of 1 KHz. Different wavelengths (800, 400 and 266 nm) are achievable. An intensified CCD and a dual-state reflectron equipped with a cassegrain reflective optics are used for the analysis of the photons and ion generated after laser irradiation.