Book of Abstracts

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O_12 Laser-Induced Plasma Spectroscopy Of Organic Compounds: Understanding Fragmentation Processes Using Ion-Photon Coincidence Measurements

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Coincident detection is of interest to get as much information as possible about transient events occurring in laser induced plasmas. The present work is focused on coincident ion-photon detection of laser plasmas of high-energy organic compounds (TNT and DNT) in condensed phase irradiated with UV laser pulses using an advanced instrument for simultaneous monitoring of both type of chemical species generated. These compounds presented a similar fragmentation pattern in time-of-flight mass spectra in the low-mass region and analogous features in emission LIBS spectra. The optical emission spectrum is acquired from atoms, atomic ions and diatomic molecules, whereas the mass spectrum derives from fragment ions of the molecule. These fragments result from direct ionization or may be formed through indirect pathways. Fluence-resolved experiments showed the evolution of the main optical-mass signals in the acquired spectra for a limited energetic range, showing the different stages of lifetime of plasma: the rising thresholds and extinction of the different atomic and molecular studied species, besides the breakage of the aromatic ring and the later excitation of ionic species at higher fluence level. A good agreement between the trends of the emission and mass atomic species (H, C, N and O) was found out, indicating a high correlation between both processes in the time and energetic scales. As for molecular species, the observed trends were different for diatomic ion signals ($^{24}C_2^+$ and $^{26}CN^+/C_2H_2^+$) and emission of molecular bands C_2 and CN mainly due to differences in the energetic regime of excitation and ionization processes.