



XXV RNE - IX CIE ESPECTROSCOPIA

**XXV NATIONAL SPECTROSCOPY
MEETING (XXV RNE)**

**IX IBERIAN SPECTROSCOPY
CONFERENCE (IX CIE)**

Alicante, 20th-22nd July 2016

Book of abstracts

Scientific Program

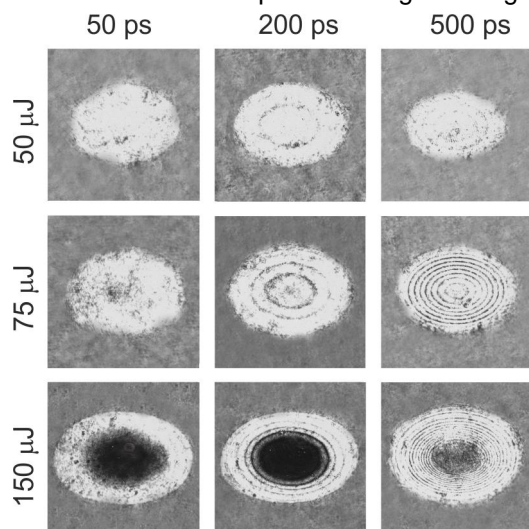
- 16:30-16:45 **O-06:** P. Purohit, F. J. Fortes, J. J. Laserna
OC-OT-LIBS: A novel approach to the chemical characterization of single particles
- 16:45-17:00 **O-07:** J. M. Vadillo, I. M. Carrasco-García, M. López-Claros, J. J. Laserna
Femtosecond time-resolved phase-change microscopy and ablation threshold calculations to understand ultrafast laser ablation
- 17:00-17:15 **O-08:** S. Medina, J. M. Vadillo, J. J. Laserna
Femtosecond laser ionization time-of-flight mass spectrometry of size-sorted aerosolized matter
- 17:15-17:45 Coffee break
- Oral communications (III): Environmental analysis, sensors and imaging techniques
Chairs: Concepción Pérez Conde and Carlos Bendicho Hernández
- 17:45-18:00 **O-09:** J. Anzano, D. Paules, R. Mur, R. J. Lasheras, M. Escudero, J. del Valle, O. Tapia, S. Hamida, E. Gaspar, J. Cajal, C. Bello, J. Casas, S. Sangüesa, F Bayo, P. González-Blasco, A. Calvo, J. Cáceres, S. Moncayo, J. Anwar, A. Dar
Analytical Potential of Laser Induced Breakdown Spectroscopy in Environmental Studies
- 18:00-18:15 **O-10:** M. M. Erenas, A. Martínez-Olmos, N. López-Ruiz, I. de Orbe-Payá, A. J. Palma, L. F. Capitán-Vallvey
HF RFID label for simultaneous oxygen, ammonia, carbon dioxide and humidity determination
- 18:15-18:30 **O-11:** E. Benito-Peña, F. Salis, A. B. Descalzo, M. C. Moreno-Bondi, G. Orellana
Immunoassay for immunosuppressant drugs using conjugated strongly near-infrared fluorescent magnetic nanoparticles
- 18:30-18:45 **O-12:** A. López-Molinero, P. Berlin
The lighting Influence in Digital Image Based methods
- 18:45-19:30 Meeting the Experts
- 20:00 Alicante city guided tour

Femtosecond time-resolved phase-change microscopy and ablation threshold calculations to understand ultrafast laser ablation

I. M. Carrasco-García, M. López-Claros, **J. M. Vadillo**, J. J. Laserna.
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Ultrashort laser pulses have proven to be a powerful tool for the solids spectroscopy. The particular coupling of energy and high peak power enabled by ultrashort laser pulses facilitates energy coupling inside materials by multi-photon or tunneling ionization mechanisms. From the analytical point of view, ultrashort laser ablation opens new possibilities due to the significantly different properties when compared with their nanosecond counterpart, where the concurrence of photochemical and photothermal processes taking place during the photon absorption govern the process. During nanosecond ablation the incoming laser beam and the expanding plasma interact, impairing the visualization of the different phenomena occurring until mass transfer occurs. Such hidden events are on the basis of the physics governing the ablation process and are in close contact with analytical techniques as LIBS, LIMS, MALDI or LA-ICP.

The present communication details the design, construction and evaluation of a microscope with time-resolved imaging capabilities. With such instrument, femtosecond-resolved micrographies of the surface of samples exposed to ultrashort laser pulses are obtained, allowing the dynamic observation of the phase-change during subthreshold laser-matter interaction. The results



presented demonstrates the appearance of dynamic Newton rings at the surface of the sample that corresponds to the formation of a thin laser-induced surface layer resulting in constructive and destructive interference of the light reflected from the surface with the light reflected from the layer interface (see figure inserted). Additionally, accurate calculation of the ablation thresholds required in different materials and pure elements will allow to demonstrate the existence or not of matrix effects that condition the selective appearance of specific elements in the expanding plume.

Acknowledgements

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List of authors

T

| | |
|--------------------|---------|
| Tanarro, I. | 60, 180 |
| Tapia, O. | 37 |
| Taravillo, M. | 50 |
| Tena, M. T. | 115 |
| Timón, V. | 60, 139 |
| Tobar, M. J. | 155 |
| Tolosa, J. | 74 |
| Tornero, J. | 123 |
| Torres, A. | 77 |
| Tuñón, J. | 57 |

U

| | |
|-----------------|-----|
| Ubeda, C. | 82 |
| Ugena, L. | 123 |
| Urraca, J. | 111 |

V

| | |
|----------------------------|------------------|
| Vadillo, J. M. | 35, 36, 126, 187 |
| Valencia-Reyes, Z. L. | 88 |
| Van-Dam, A. D. | 42 |
| Vandenabeele, P. | 57 |
| Vasimalai, N. | 24 |

| | |
|-------------------------|---------------|
| Vaz, P. D. | 25, 184 |
| Vázquez-Guilló, R. | 179 |
| Vidal, L. | 117, 149, 152 |
| Vilas, V. | 24 |
| Villar-Navarro, M. | 82 |
| Viñas, P. | 77 |
| Vizoso, F. J. | 49 |

W

| | |
|-------------------|-----|
| Wang, P. | 41 |
| Wehbe, K. | 185 |
| Wilbur, S. | 52 |
| Wünscher, S. | 51 |

Y

| | |
|-------------------|-----|
| Yamanaka, M. | 52 |
| Yañez, A. | 155 |

Z

| | |
|---------------------|-----|
| Zagorovsky, K. | 24 |
| Zalaffi, M. S. | 143 |
| Zougagh, M. | 55 |