

10<sup>th</sup> International Conference and Exhibition on

# LASERS, OPTICS & PHOTONICS

November 26-28, 2018 | Los Angeles, USA

## **Burst features influence on incubation effect during irradiation of stainless steel with a burst of picosecond delayed fs laser pulses**

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In this work, we report on an experimental study of the incubation effect during the irradiation of stainless steel with bursts of 650fs laser pulses at 1030nm. A series of birefringent crystals was used to split the pristine 650fs pulses into bursts of up to 32 sub-pulses with time separations of 1.5ps and 3ps. The number of selected bursts was varied between 50 and 1600. In order to highlight the influence of the burst features on laser BM processing, the threshold fluence was measured for each combination of the number of sub-pulses and time delays within the burst. The threshold fluence in NPM was measured as well, to provide a comparison between the two processing modes. In BM, we found as many values of threshold fluence as the combinations of the number of bursts and of sub-pulses constituting the bursts set to give the same total number of impinging sub-pulses, while in NPM the threshold fluence has a unique value, once the number of impinging pulses is fixed. Therefore, a dependence of the incubation coefficient with the burst features was hypothesized and experimentally investigated by assuming the incubation factor as a burst feature dependent coefficient. It was found that incubation effect is higher in BM than NPM and that it decreases with the number of sub-pulses  $n$  and for shorter time delays within the burst. The Two Temperature Model (TTM) has been adapted to the irradiation with single bursts of up to 4 sub-pulses to interpret the experimental results.

### **Biography**

Caterina Gaudio received her Master Degree (cum Laude) and PhD in Physics from University of Bari (Italy) in 2011 and 2016, respectively. During her PhD, she spent a period of research as visiting PhD student at the Institut für Angewandte Physik of the Friedrich-Schiller-Universität Jena (Germany), under the supervision of Prof. S Nolte. She is currently a Postdoctoral Researcher at the Physics Department, University of Bari and her main research interest is laser ablation with ultrafast lasers. Her research is especially focused on the generation of bursts of picosecond-delayed sub-pulses, the study of the influence on the ablation process of the sub-pulse period within the burst and number of sub-pulses in the burst, the onset of damage process and the incubation effect. Recently, she has become interested in the use of bursts of sub-pulses for nano- and micro-structuring of materials, for varying the wettability and tribological properties of surfaces. The products of her research are 3 publications in peer-reviewed journals, 4 conference proceedings and 7 contributed conference presentations.

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