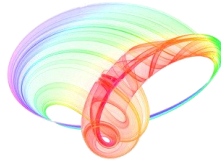


Book of abstracts



PHOTONICA2019

The Seventh International School and Conference on
Photonics, 26 August – 30 August 2019, Belgrade, Serbia

& Machine Learning with Photonics Symposium
(ML-Photonica 2019)



& ESUO Regional Workshop



& COST action CA16221



Editors: Milica Matijević, Marko Krstić and Petra Beličev

Belgrade, 2019

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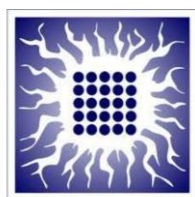
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Inducing LIPSS on multilayer thin metal films by femtosecond laser beam of different orientations

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The occurrence of laser-induced periodic surface structures (LIPSS) has been known for a while [1]. Multilayer thin films, like Al/Ti, are suitable for LIPSS formation and attractive for applications – due to their wearing behavior and corrosion resistance; LIPSS generation may improve their properties as well [2, 3]. LIPSS properties depend not only on the material but also on the beam characteristics, like wavelength, polarization and scanning directions, etc. [4].

After exposing with NIR femtosecond pulses from Coherent Mira 900 laser system in several beam exposures, we have analyzed the samples of thin metal film systems with Tescan Mira3 SEM and NTegra AFM. The formation of LIPSS is most probably due to the generation of surface plasmon polariton, through the periodic distribution of energy in the interaction zone which lead to thermal processes in layers and interfaces. Two types of LIPSS were generated, which differ in shape, orientation and in ablation pronounced or not. For consecutive interactions in the same direction, LIPSS maintained its orientation, while for orthogonal passes LIPSS with mutually orthogonal orientation were generated. LIPSS period fluctuated between 320 and 380 nm and structures with pronounced ablation have significantly smaller width. Probable mechanism is that for greater accumulated energy pronounced ablation takes place giving LIPSS in the form of “trenches”, while for less accumulated energy the buildup of the material – probably due to pronounced oxidation – lead to LIPSS in the form of “hills”.

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