Book of Abstracts

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ОЭС
СПЕЦПОСТАВКА

hv photonics

International Conference on Ultrafast Optical Science (UltrafastLight-2018), is the broad-scope, annual international symposium dedicated to the most important aspects of ultrafast phenomena in different fields of natural sciences and engineering.

The Conference topics:

1. Radiation and nuclear photonics at high fields
2. Ultrafast phenomena in condensed matter and ionized gases
3. Ultrafast laser nanofabrication and nanophotonics
4. Femtosecond non-linear optics. Filamentation.
High field THz generation.
5. Femtosecond laser photobiology and photochemistry.
6. Physics and technology of ultrashort laser pulses and innovative femtosecond laser technology.
7. Femtosecond radiation in spectroscopy and optical frequency metrology.

Website: ultrafastlight.lebedev.ru

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Section 3: Ultrafast laser nanofabrication and nanophotonics

Section Chair: Sergey Kudryashov (ITMO university; LPI), email: sikudr@lebedev.ru

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Scope
Ultrafast nanostructured light + nanostructured matter
Ultrafast nanophotonics
Femtosecond-laser nanofabrication

Modification of Ti/Zr multilayer by femtosecond laser pulses

B. Gaković[1], S. Petrović[1], D. Peruško[1], A. Mimidis[2], E. Kavatzikidou[2] and E. Stratakis[2]

[1]Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia;
[2]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology (FORTH), Heraklion, Crete, Greece
e-mail: biljance@yandex.com

Femtosecond laser texturing holds promise for the surface modification of materials, due to a wide application to all materials; the possibility of getting a wide variety of structures with micro- and nano-scaled features; and a fast, repeatable and contactless process. Laser processing is unique method, which allows production of active surface with formation of the desired oxide, creation of nano/micro textures and change wettability of the surface.

Due to excellent mechanical properties and moderate biocompatibility, Ti/Zr multilayer thin films, as novel nanolayered composites were deposited by ion sputtering on Si substrate. Subsequently, the Ti/Zr thin films were irradiated by femtosecond laser pulses in air to induce the following modifications: (i) mixing of components within the thin film structures, (ii) formation of ultrathin oxide layer at the irradiated surfaces, and (iii) structuring of the surface arrays in form of ripple structure. The main focus of this experimental study was examined different surface motives with nano- and micrometre features. For this purpose, the modifications of Ti/Zr multilayers were included formation of spots, lines and surfaces with different pulse energy, scanning speed i.e. number of pulses, z-distance. Laser-induced spots are composed of concentric circles, where the number of circles in individual spots is increased with increasing pulse energy. Maximum depth in the centre of spots and total roughness are gradually rising with pulse energy, but heights between ablated layers in these spots does not match with the thickness of layers, but these deviations are not significant. Lines and surfaces were scanned with different scanning rate, the conditions for formation of well-defined LSFL (low spatial frequency LIPSS) are determined. The periodic structures at high scanning rate (3 mm/s) are mainly formed on the multilayer thin film. However, the degree of ablation becomes higher at the lowest rate (0.5 mm/s) where the ripples mostly are formed on the Si substrate.

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