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.

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

Inducing LIPSS by multi-pass and cross-directional scanning of femtosecond beam over surface of thin metal films

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During interaction of femtosecond laser beam with metal surfaces, laser induced periodic nanostructures, LIPSS can be formed, which may improve properties of materials. Having excellent mechanical properties, multilayer thin films, like 5x(Al/Ti)@Si, are convenient for forming of high quality LIPSS [1] due to their multilayer structure. We have exposed the multilayer thin film metal systems 5x(Al/Ti)@Si with femtosecond beam from the laser system Coherent Mira 900 in NIR with various scanning configurations [2]. The irradiated samples have been analyzed by Tescan Mira3 SEM. The beam scanned over the surface of the samples with multi-pass and cross-directional scanning configurations with the change of polarization direction. The formation of LIPSS is most probably due to the occurence of surface plasmon polariton, which leads to the periodic distribution of energy on the sample surface. The orientation of the LIPSS is related to the direction of the beam polarization. During multi-pass scanning, LIPSS maintained its configuration. The preservation of structures occured to some extent. Depending on the accumulated energy, two forms of LIPSS were generated: "hills", for less accumulation, and "trenches" for greater accumulation. "Hills" are non-ablative, probably are due to the build-up of the material and are parallel to the polarization direction. "Trenches" are formed by ablation and are perpendicular to the polarization direction. During cross-directional scanning, LIPSS of orthogonal directions have been generated. The value of the "hills" period was around 360 nm and the width was ∼285 nm. The values of "trenches" period fluctuated between 320 and 380 nm, while width was between 85 and 45 nm. Proposed mechanism is that, for less accumulated energy, "hills" formed, while more accumulated energy leads to the ablation and formation of "trenches".

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