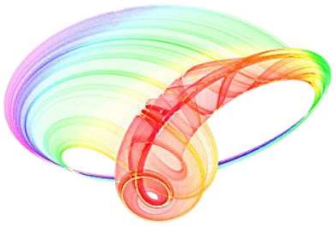
Book of abstracts



IX International School and Conference on Photonics

PHOTONICA2023

with joint events:

Understanding interaction light - biological surfaces: possibility for new electronic materials and devices

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Biological and bioinspired structures for multispectral surveillance

&

Quantum sensing integration within microfluidic Lab-on-a Chips for biomedical applications

&

Advanced Biophysical Methods for Soil Targeted Fungi-Based Biocontrol Agents

August 28 - September 01, 2023, Belgrade, Serbia

Editors

Jelena Potočnik, Maja Popović, Dušan Božanić

Vinča Institute of Nuclear Sciences – National Institute of the Republic of Serbia, University of Belgrade

Belgrade, 2023

ABSTRACTS OF TUTORIAL, KEYNOTE, INVITED LECTURES, PROGRESS REPORTS AND CONTRIBUTED PAPERS

of

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Dear Colleagues, friends of photonics,

We are honored by your participation at our PHOTONICA 2023 and your contribution to the tradition of this event. It is our pleasure to host you in Belgrade and in Serbia. Welcome to the world of photonics.

The International School and Conference on Photonics, PHOTONICA, is a biennial event held in Belgrade since 2007. The first meeting in the series was called ISCOM (International School and Conference on Optics and Optical Materials), but it was later renamed to PHOTONICA to reflect more clearly the aims of the event as a forum for education of young scientists, exchanging new knowledge and ideas, and fostering collaboration between scientists working within emerging areas of photonic science and technology. A particular educational feature of the program is to enable students and young researchers to benefit from the event, by providing introductory lectures preceding most recent results in many topics covered by the regular talks. In other words, tutorial and keynote speakers will give lectures specifically designed for students and scientists starting in this field. Apart from the oral presentations PHOTONICA hosts vibrant poster sessions. A significant number of best posters will be selected and the authors will have opportunity to present their work through short oral presentations – contributed talks.

The wish of the organizers is to provide a platform for discussing new developments and concepts within various disciplines of photonics, by bringing together researchers from academia, government and industrial laboratories for scientific interaction, the showcasing of new results in the relevant fields and debate on future trends.

PHOTONICA 2023 will host three joint events: PhoBioS COST Action “Understanding interaction light - biological surfaces: possibility for new electronic materials and devices”, NATO Science for Peace and Security Program (grant G5618) workshop “Biological and bioinspired structures for multispectral surveillance”, workshop on “Quantum sensing integration within microfluidic Lab-on-a Chips for biomedical applications” and BioPhysFUN workshop “Advanced Biophysical Methods for Soil Targeted Fungi-Based Biocontrol Agents”. Following the official program, the participants will also have plenty of opportunities to mix and network outside of the lecture theatre with planned free time and social events.

This book contains 130 abstracts of all presentations at the IX International School and Conference on Photonics, PHOTONICA2023. Authors from all around the world, from all the continents, will present their work at this event. There will be 4 tutorial and 7 keynote lectures to the benefits of students and early stage researches. The most recent results in various research fields of photonics will be presented through 16 invited lectures and 8 progress reports of early-stage researchers. Within the poster sessions and a number of contributed talks, authors will present 95 presentations on their new results in a cozy atmosphere of the building of Serbian Academy of Science and Arts.

Belgrade, August 2023

Editors

Conference Topics

1. Quantum optics and ultracold systems
2. Nonlinear optics
3. Optical materials
4. Biophotonics
5. Devices and components
6. Optical communications
7. Laser spectroscopy and metrology
8. Ultrafast optical phenomena
9. Laser - material interaction
10. Optical metamaterials and plasmonics
11. Machine learning in photonics
12. Other topics in photonics

Joint Events

PhoBioS COST Action - Understanding interaction light - biological surfaces: possibility for new electronic materials and devices

NATO Science for Peace and Security Program - Biological and bioinspired structures for multispectral surveillance

Workshop - Quantum sensing integration within microfluidic Lab-on-a Chips for biomedical applications

BioPhysFUN workshop - Advanced Biophysical Methods for Soil Targeted Fungi-Based Biocontrol Agents

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1. Quantum optics and ultracold systems

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12. Other topics in photonics

Selective ablation and laser induced periodical surface structures (LIPSS) produced on (Ni/Ti) nano layer thin film with ultrafast laser pulses

S. Petrović[1], B. Gaković[1], C. Siogka[2], D. Milovanović[3] and G. Tsibidis[2]
[1]*Vinča Institute of Nuclear Sciences - National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia*
[2]*Institute of Electronic Structure and Laser (FORTH), Heraklion, Greece*
[3]*Institute of General and Physical Chemistry, Belgrade, Serbia*
e-mail: spetro@vin.bg.ac.rs

Nano layer thin films (NLTF), composed of alternating layers of various materials, are widely used in modern nanotechnology. Ultrafast lasers for processing is a precise non-contact method. Single pulses can be used to remove NLTF from the substrate or to accurately and selectively ablate one or more layers of the film's surface. Selective ablation can only be achieved at specified values of the laser beam's properties for a given material [1-3]. On practically any material, a laser beam can be used to produce the universal phenomena known as "laser-induced periodic surface structures" (LIPSSs). These structures are created by exposing the sample's surface to multi-pulse irradiation and have a variety of applications [4,5].

The interaction of ultrafast laser pulses with nickel/titanium (Ni/Ti) thin film was investigated. The NLTF, composed of ten alternating Ni and Ti layers, was deposited on silicon (Si) substrate by ion-sputtering. A single and multi-pulse irradiation was done in air with focused and linearly polarized laser pulses (wavelength 1026 nm and pulse duration 170 fs). For achieving selective ablation, the single pulse energy was gradually increased from near the ablation threshold to a level that completely removed the NLTF. The pulse energy for LIPSS creation was close to the ablation threshold of the NLTF. The laser induced morphology and the elemental composition changes were examined with microscopy, optical profilometry and energy dispersive X-ray spectroscopy. To interpret the experimental observations, theoretical simulation has been performed to explore the thermal response of the NLTF after irradiation with single laser pulses.

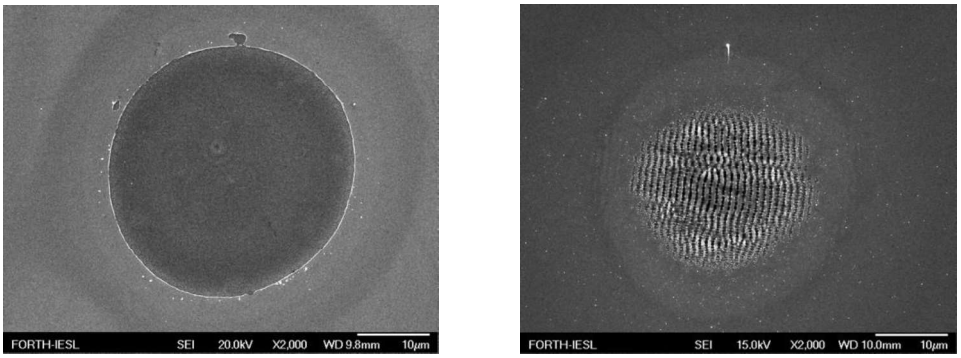

Figure 1. SEM micrographs of (Ni/Ti) surface after single pulse ablation of the first Ni layer at fluence of 0.2 J/cm^2 (left), and LIPSS formation after 10 pulses at 0.08 J/cm^2 (right).

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