International Conference 3rd edition
MODERN LASER APPLICATIONS

Bran, Romania **INDLAS** 20-24 May 2013

Satellite

International Student Conference on Photonics

ISCP

Key topics

- High-Power Lasers
- Lasers in Materials Science and Processing
- Nonlinear Photonics
- Optoelectronics and Optical Components
- Laser Metrology and Testing
- Lasers in Environment and Life Sciences
- Physics of Plasma Sources and Applications

INFLPR

APEL LASER
Lighting the Future

SPIE Student Chapter
Institute for Atomic Physics

Coordinators

Dr. Rares V. Medianu
NILPRP
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Apel Laser S.R.L.

http://indlas.inflpr.ro

OSA The Optical Society

ARFO Asociatia Romana de Fotonica

TEHNOEL

HISTERESIS

PROTOFLEX

aralis

ADREM INVEST Experience Progress

COHERENT.

WELLCOME TO INDLAS 2013

The conference ”INDLAS 2013” is the third one in a series of international conferences dedicated to modern laser applications which is to be replay in BRAN after four year of standby. From 2010 it was given “the relay race” to the young students and researchers who already lead and develop the SPIE Romanian chapter and OSA Romanian chapter within the National Institute of Lasers, Plasma and Radiation Physics. The topic of this new started conference was targeted toward some specific priorities like: high power lasers, laser in material science and processing, nonlinear photonics, optoelectronics and optical components, laser metrology and testing, laser environment and life science, physics of plasma sources and applications.

The aim of this international conference is to provide a good opportunity for experts working in the laser applications field and lasers to share experience, to discuss the latest results, to stimulate interdisciplinary exchanges and to consider the prospects of new applications. The position of our country, Romania, in the Central-East Europe could be play an important role in the promotion of the scientific contacts in this area, which is now completely integrated into European Union, NATO and become more and more active in the frame of European Strategy for Research and Development. From 2008 till now in a select international and national competition Romania, more precisely, National Institute of Lasers, Plasma and Radiation Physics through - by Laser Department had wined a number of very important projects like LASERLAB, ELI-Preparatory Phase, ELI – NP and also “Center for Advanced Laser Technology” / CETAL which include the first PW laser that will be functional inside the European Area.

The organization of “INDLAS 2013” was possible only by the action and support of several national and international institutions. We must to mention National Institute of Lasers, Plasma and Radiation Physics / Laser Department, APEL LASER S.A., “Institute for Atomic Physics” – SPIE student chapter, “OSA-National Institute of Lasers, Plasma and Radiation Physics” Student Chapter, and at last Romanian Ministry of Education and Research. Thanks are due to the co-sponsoring entities to the success of the conference: Romanian Association of Photonics, TEHNOOPTOELECTRONICA S.A., Aralis Consulting S.A., Coherent and last but not list Protoflex Corporation U.S.

By the efforts of the Scientific and Program Committees, about 85 scientific papers by authors from 10 countries have been selected for presentation at “INDLAS 2013” in 24 invited lectures, 1 training course on “Quantitative Phase Imagining, Principles and Applications”, 26 oral presentations, 1 mini-workshop on “Center for Advanced Laser Technology”, 1 mini-workshop on “Laser Induced Damage and Laser Beam Characterization” and 35 posters.

We express our gratitude to the referees, to the invited professors and to all participants for their high level work. Some of these papers, reviewed by an international referee board, will be published in a SPIE Proceedings volume, which hopefully will have a wide distribution and interest in the scientific world; on the other hand we will also try to publish a dedicated edition of “Rapid Communication-Journal of Optoelectronics and Advanced Materials”

We would like to express our thanks, to the members of Scientific Committees and Organizing Committees of “INDLAS 2013”, for their work. A special address and thank is to Dr. Adrian Petris who was a key person of the Organizing Committees. We thank to Dr. Ion Morjan, Dr. Traian Dascalu and Dr. Viorica Stancalie as managers of the National Institute of Lasers, Plasma and Radiation Physics and Laser Department and last but not list to the: Angela Staicu, Laura Mihai, Silviu T. Popescu, Gabriela Salamu, Tatiana Alexandru, Andra Dinache, Mariana Buzatu, Gabi Stan and to all who were at list sentimental involved.

Finally, we hope that the participants in “INDLAS 2013” will enjoy the scientific sessions, will meet here friends and will have the opportunity to start new scientific collaborations.

Thank you again,
Dr. Eng. Rares Medianu and Dr. Eng. Mircea Udrea

CONFERENCE PROGRAM

Date	*Time*	*Hall I*	*Hall II*
May 20, Monday	14.00 – 18.00	**Registration**	
May 21, Tuesday	09.00 – 09.15	**Opening session (Hall 1)**	
		Session 1 (Hall 1)	
		Chair: Pawan Bhat	
	09.15 – 09.45	**I1. Eugene Arthurs** Problems found; The Renaissance of Laser Applications	
	09.45 – 10.15	**I2. Ion N. Mihailescu** Advanced pulsed laser technologies for new applications in biology and medicine	
	10.15 – 10.45	**I3. Ralf Gross** Material Processing with Short Pulse (ps) Lasers	
	10.45 – 11.00	***Coffee Break***	
		Session 2 (Hall 1)	**Session 3 (Hall 2)**
		Chair: Victor Rares Medianu	*Chair: Mircea Udrea*
	11.00 – 11.30	**I4. Eugenio Fazio** Photonic circuits by solitonic waveguides	**I6. Dan Sporea /Constantin Grigoriu** CETAL project - The Photonics Investigations laboratory
	11.30 – 12.00	**I5. Adrian Petris** Reflection scan for characterization of fs excited optical nonlinearities	**I7. Marian Zamfirescu** Laser facility for micro- and nanoprocessing
	12.00 – 12.15	**O1. Gabriela Salamu** Diode-pumped laser emission in femtosecond-laser inscribed Nd:YAG waveguides	**O2. Laura Ionel** Numerical analysis of spatial distortions in a chirped pulse amplification system
	12.15- 12.30		**O3. Liviu Neagu** CETAL – 1 PW ultra-high intense laser facility

Date	*Time*	*Hall I*	*Hall II*
	12.30 – 14.30	***Lunch***	
		Session 4 (Hall 1)	**Short Course (Hall 2)**
		Chair: Viorica Stancalie/ Victor Rareş Medianu	*Chair: Angela Staicu*
	14.30 – 15.00	**I8. Davide Boschetto** Ultrafast Processes and Phonons Dynamics in Crystals	**I11. Gabriel Popescu** Quantitative Phase Imaging: Principles and Applications to Biomedicine
	15.00 – 15.30	**I9. Dan Sporea** Optical fibers in radiation sensing	
	15.30 – 16.00	**I10. Catalin Vitelaru** Laser spectroscopy with tunable diode lasers in magnetron sputtering plasmas	
	16.00 – 16.15	***Coffee Break***	
		Session 5 (Hall 1)	**Short Course (Hall 2)**
		Chair: Ion. N. Mihailescu	*Chair: Angela Staicu*
	16.15 – 16.30	**O4. Carmen Ristoscu** Synthesis of nanometric oxide films by reactive pulsed laser deposition for sensing applications	
	16.30 – 16.45	**O5. Cristian Viespe** Surface Acoustic Wave Sensors Coated with Nanoporous ZnO Film for Hydrogen Detection	
	16.45 – 17.00	**O6. Felix Sima** Biomimetic multilayered structures by matrix-assisted pulsed laser evaporation	**I11. Gabriel Popescu** Quantitative Phase Imaging: Principles and Applications to

Date	*Time*	*Hall I*	*Hall II*
	17.00 – 17.15	**O7. Angela Vlad** Uptake heavy metals ions from aqueous solutions on layered double hydroxides thin films deposited by laser technique	Biomedicine
	17.15 – 17.30	**O8. Nicu D. Scarisoreanu** Pulsed laser deposition growth of lead-free (Ba1−xCax)(ZryTi1−y)O3 thin films and their structural, optical and electrical properties	
	17.30 – 17.45	**O9. Stefan Banita** The monitorization of lipid oxidation in strawberries, using photoacoustic spectroscopy assay	**I11. Gabriel Popescu** Quantitative Phase Imaging: Principles and Applications to Biomedicine
	17.45 – 19.15	**Poster Session**	
	19.45	***Get Together Party***	
May 22, Wednesday		**Session 6 (Hall 1)**	**Special Session: LID-LBC (Hall 2)**
		Chair: Eugenio Fazio	*Chair: George Nemes*
	09.00 – 09.30	**I12. Mircea Guina** High-power ultrafast semiconductor lasers and saturable absorbers mirrors based on novel compound semiconductors"	**For detailed program please download LID-LBC.pdf**
	09.30 – 9.45	**O10. Catalina Alice Brandus** Laser emission at 1061 nm in a diode-pumped Nd:GdLuCOB laser	
	9.45 – 10.00	**O11. Flavius Voicu** Sm3+ doped YAG and sesquioxides translucent ceramics	
	10.00 – 10.15	***Coffee Break***	
		Session 7 (Hall 1)	**Special Session: LID-LBC (Hall 2)**
		Chair: Gabriel Popescu	*Chair: George Nemes*

Date	*Time*	*Hall I*	*Hall II*
	10.15 – 10.30	**O12. Andra Dinache** Spectroscopic studies and applications of laser exposed drugs	**For detailed program please download LID-LBC.pdf**
	10.30 – 10.45	**O13. Tatiana Alexandru** FTIR studies of Phenotiazines exposed to laser beam	
	10.45 – 11.00	**O14. Alexandru Stoicu** Spectrochemical study about the photoreaction products obtained by Chlorpromazine exposure to UV laser beam	
	11.00 – 11.15	**O15. Smarandache Adriana** Study of the optical properties of 2-thiohydantoin derivatives	
		Session 8 (Hall 1)	**For detailed program please download LID-LBC.pdf**
		Chair:Mircea Guina	
	11.15- 11.30	**O16. O.G.Kuzmina** Multiwave vanadate laser for treatment of purulent inflammatory disease of soft tissues	
	11.30- 11.45	**O17. Cristiana Grigorescu** Cold laser therapy of herniated disc and fractured vertebrae in dogs: two-case study	
	11.45 – 12.00	**O18. Valentin Ion** Optical properties of tungsten oxide thin films obtained by pulsed laser deposition	
	12.00 – 12.15	**O19. Marius Dumitru** X-Ray diffraction studies on tungsten oxide thin films obtained by pulsed laser deposition	
	12.15 – 14.15	***Lunch***	
		Session 8 (Hall 1)	**Special Session: LID-LBC (Hall 2)**
		Chair: Adrian Petris	*Chair: Andrius Melninkaitis*

Date	*Time*	*Hall I*	*Hall II*
	14.15 – 14.45	**I13. Anca Nemuc** Laser remote sensing techniques for atmospheric investigations	**For detailed program please download LID-LBC.pdf**
	14.45 – 15.00	**O20. Laura Mihai** Evaluation of Local Cloud Surface Radiative Forcing, using MODTRAN Model	
	15.00 – 15.15	**O21. Catalina Albu** Periodical structures induced by femtosecond laser on nickel in air	
	15.15 – 15.30	**O22. Iulia Anghel** The influence of ambient medium on femtosecond laser micro/nanoprocessing of silicon substrates	
	15.30 – 15.45	**O23. Florin Jipa** Photoresist masks for near-field processing	
	15.45 – 16.00	**O24. C.R. Iordanescu** On some structural and optical properties of porous Al2O3 PLD films	
	16.00 – 16.15	***Coffee Break***	
	16.15 –16.45	***Best student scientific presentations - Award ceremony (Hall 1)***	
May 23, Thursday	09.00-18.00	***Trip to Sighisoara***	
	19.30	***Collegial Dinner***	
May 24, Friday		**Session 9 (Hall 1)**	
		Chair: TBA	
	09.00 – 9.30	**I14. George Stanciu** Investigations on photonic quantum ring lasers investigated by using laser scanning microscopy	
	09.30 – 9.45	**O25. V.Tiron** The Tunable Diode Laser Techniques used in Plasma Diagnostics; Strong Points and Weaknesses	

Date	*Time*	*Hall I*	*Hall II*
	09.45 – 10.00	**O26. A. Parlog** Treatment of scars by CO2 laser beam	
	10.00 – 10.30	**Closing session (Hall 1)**	

May 20, Monday

May 20, Monday	14.00 – 18.00	**Registration**

May 21, Tuesday

Time	*Hall I*	*Hall II*
09.00 – 09.15	**Opening session (Hall 1)**	
	Session 1 (Hall 1) *Chair: Pawan Bhat*	
09.15 – 09.45	**I1. Problems found; The Renaissance of Laser Applications** Eugene G. Arthurs *SPIE, 1000 20th St. Bellingham WA, USA 98225* For perhaps two decades after Ted Maiman's operation of the first optical maser, the laser was seen as something of a scientific curiosity, mocked as a "solution looking for a problem". Today, living would be a much different experience were it not for the laser. There is the exciting promise of so much more to come with ongoing advances in laser technology and in computational speed affording near real time feedback. Size, cost and reliability barriers to adoption of laser technology are being replaced by new limits to the diffusion rate; a shortage of skills in the manufacturing base, the low interest of universities in real world problems, and the low appeal of manufacturing as a career.	

Time	*Hall I*	*Hall II*
09.45 – 10.15	**I2. Advanced pulsed laser technologies for new applications in biology and medicine** Ion N. Mihailescu *National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania*	
10.15 – 10.45	**I3. Material Processing with Short Pulse (ps) Lasers** Ralf Gross	
10.45 – 11.00	***Coffee Break***	
	Session 2 (Hall 1)	**Session 3 (Hall 2)**
	Chair:Victor Rareş Medianu	*Chair: Mircea Udrea*
11.00 – 11.30	**I4. Photonic circuits by solitonic waveguides** Eugenio Fazio	**I6. CETAL project - The Photonics Investigations laboratory** Dan Sporea / Constantin Grigoriu *National Institute for Laser, Plasma and Radiation Physics, Laser Metrology and Standardization Laboratory; 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania*
11.30 – 12.00	**I5. Reflection scan for characterization of femtosecond excited optical nonlinearities** A. Petris, V. I. Vlad *National Institute for Laser, Plasma and Radiation Physics, Dept. of Lasers, 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania; e-mail: adrian.petris@inflpr.ro* We present our analytical model of reflection scan when third- and higher-order nonlinear optical response is excited. A simulation of high-order nonlinear response of As_2S_3 is performed using this model. The nonlinear response of nano-patterned SOI excited with high-repetition-rate femtosecond pulses is well explained by our model in which both third- and fifth-order nonlinearities are considered.	**I7. Laser facility for micro- and nanoprocessing** Marian Zamfirescu, Nicu Doinel Scarisoreanu, Dana Miu, Catalin Luculescu, Constantin Grigoriu *INFLPR, Atomistilor 409, 077125 Magurele, Romania* The ultrashort pulsed lasers, in the range of femtoseconds to few picoseconds pulse duration, are more and more utilized in micro and nanotechnologies for 2D and even 3D structuring. Due to the fast interaction of the laser beam with the material at time-scale shorter than the thermal diffusion time, typically few ps, the heat affected zone remains confined below the diameter of the laser irradiated spot. This allows for physical and chemical localized modification of materials, even under optical diffraction limit. Several effects can be involved in laser structuring of materials such as: two photon absorption in photopolymers; laser ablation on metals, ceramics or transparent materials; laser densification in bulk glasses; laser induced surface structuring by self-organization. On the other hand, the laser-based material processing techniques such as Pulsed Laser Deposition (PLD), Laser Induced Forward Transfer (LIFT) or Matrix Assisted Pulsed Laser Evaporation (MAPLE) can use lasers with different

Time	*Hall I*	*Hall II*
		characteristics in the meaning of pulse duration, energy regime or wavelength for achieving enhanced material's properties and functionalities. The material studies involving these laser-based techniques have gain the attention of all major research and industrial facilities which are interested on new classes of functional materials in order to enable the next generation of devices. This is one of the reasons for the huge number of published scientific papers which these laser-based techniques generate each year. In the first semester of 2013, a laser infrastructure for laser micro and nanostructure was commissioned under the project CETAL. In the frame of "Advanced Technologies for Photonic Processing Laboratory" the new facility includes: - Laser system (Photonic Profesional - Nanoscribe GmbH, Germany) for 2D and 3D laser lithography in photopolymers for fabrication of micro-optics, photonic crystals and metamaterials, scaffolds for tissue engineering, micro-fluidics, wire bonding, 2D masks for classical photolithography. Picoseconds laser (Hyper Rapid 50 - LUMERA LASER GmbH, Germany) with laser scanning heads for fast processing of large areas with application in micromachining of hard materials. - Pulsed laser deposition system for layer-by-layer, multilayer or combinatorial thin film depositions and fully RHEED compatible. The system has UHV capabilities with a dual load-lock system for both targets and substrates. The reaction chamber can accommodate up to 4 targets and 6 substrates, having multiple possibilities for achieving thin films deposition with complex stoichiometries. - Continuum wave and pulsed CO_2 laser for photochemistry and nanomaterials synthesis; A Clean Room of 100 m^2 equipped with anti-vibration optical tables, sample preparation benches, fume extractors, etc. assure the suitable operation of the equipments and the best control and reproducibility of the processed samples.
12.00 – 12.15	**O1. Diode-pumped laser emission in femtosecond-laser inscribed Nd:YAG waveguides** G. Salamu*, F. Voicu, N. Pavel, T. Dascalu, F. Jipa, M. Zamfirescu **National Institute for Laser, Plasma and Radiation Physics, Laboratory of Solid-State Quantum Electronics Bucharest, R-077125, Romania; email: gabriela.salamu@inflpr.ro* In this work we report on realization of double-wall waveguides and depressed cladding waveguides in an Nd:YAG single-crystal using direct writing with an femtosecond laser, and we investigate performances of laser	**O2. Numerical analysis of spatial distortions in a chirped pulse amplification system** Laura Ionel *Department of Lasers, National Institute for Laser, Plasma and Radiation Physics, Laser Department, Atomistilor Str. 409, P. O. Box MG-36, 077125, Magurele-Bucharest, Romania; email: laura.ionel@inflpr.ro* A numerical study of the distorted laser beam after propagation through an optical chirp pulse amplification (CPA) system was developed. This study is based on numerical simulation using the ray-tracing model from Rayica module of

Time	*Hall I*	*Hall II*
	emission at 1.06 and 1.3 μm under the pump with a fiber-coupled diode laser at 807 nm. A double wall waveguide of 40-μm width yielded laser pulses with 0.92-mJ energy at 1.06 μm and with 0.40-mJ energy at 1.3 μm; overall optical-to-optical efficiency was 0.20 and 0.09, respectively. A depressed circular cladding waveguide with diameter of 110 μm improved the 1.06-μm wavelength laser pulse energy at 1.43 mJ. Laser emission performance in continuous-wave operation is discussed. This is the first demonstration of emission at 1.3 μm from direct fs-laser written waveguides in Nd:YAG, and one of the first reports on laser emission in such waveguides under the pump with fiber-coupled diode laser.	MATHEMATICA and it relates the behavior of the distorted beam in terms of spatial distortions (eg. spatial chirp and pulse front tilt) in case of user-induced misalignments in grating stretcher-compressor system. The results are relevant for different applications which use CPA systems with needs of high quality laser beam profile.
12.15- 12.30		**O3. CETAL- 1 PW ultra high intense laser facility** L. Neagu*, F. Jipa, I. Dancus, R. Dabu, G. Matras, F. Caradec, C. Radier, C. Simon-Boisson, L. Boudjemaa **Department of Lasers, National Institute for Laser, Plasma, and Radiation Physics, 409 Atomiştilor Str., 071125 Măgurele, Romania* Center of the Excellence for Advanced Laser Technology (CETAL) is the biggest running Romanian investment project in the research field. One of the major CETAL laboratories is dedicated to a high intense and ultrafast laser system and its applications. This femtosecond laser system was developed by the French company Thales Optronics. Based on the Ti:Sapphire technology, the laser system shall deliver 1-PW peak power. The petawatt laser system with a modular configuration consists in a high contrast front-end amplifier and a final bow-tie multipass amplifier pumped with 3 Atlas lasers. It is able to deliver a peak power of 1 PW at 0.1 Hz repetition rate, centered at 805 nm wavelength and a pulse width shorter than 25 fs. More than 10^22 W/cm^2 laser intensity in the focused beam is expected. The laser system can also operate at higher repetition rates for dedicated experiments. Indeed, the laser system can be configured in order to deliver 45 TW pulses up to a repetition rate of 10 Hz and an additional output placed before the XPW filter can be used to get a beam delivering sub-mJ pulses at 1 kHz repetition rate. The laser system commissioned in factory during April 2013 will be installed during next summer at Magurele. The PW laser facility will come into operation in the second half of the year 2013.
12.30 – 14.30	***Lunch***	

Time	*Hall I*	*Hall II*
	Session 4 (Hall 1)	**Short Course (Hall 2)**
	Chair: Viorica Stancalie/ Victor Rares Medianu	*Chair: Angela Staicu*
14.30 – 15.00	**I8. Ultrafast Processes and Phonons Dynamics in Crystals** Davide Boschetto *Laboratoire d'Optique Appliquée, ENSTA/Ecole Polytechnique, Palaiseau, France* The modern laser technology allows reaching femtosecond time resolution, which is the characteristic time-scale of the lattice and electrons dynamics within a crystal. The ability to follow in-time such dynamics disclose the unique opportunity of studying the electron-phonon interaction as well as the energy relaxation mechanism in solids. The development of pump-probe experiments using femtosecond laser system has allowed the study of a single coherent phonon mode. This means that we can selectively study a given lattice vibration and its coupling to the electrons subsystem. In this way, it was even possible to investigate the role of a given phonon in phase transitions. At Laboratoire d'Optique Appliquée, we used time-resolved spectroscopy to study the coherent phonon modes and their coupling to the electrons in several interesting materials, ranging from standard semimetal to superconductor. We have shown how the phonon parameters can be used to characterize the energy relaxation process, as for example the frequency or damping time. We have also study such phonon dynamics across some phase transitions, which highlights their role in the transition process. In this talk, we will show the major achievements we have reached in the last years, together with new experiments highlighting the role of phonons in topological insulators. We will also show the major perspective opened by this experiments.	**I11 Quantitative Phase Imaging: Principles and Applications to Biomedicine**. Gabriel Popescu

Time	*Hall I*	*Hall II*
15.00 – 15.30	**I9. Optical fibers in radiation sensing** Dan Sporea *National Institute for Laser, Plasma and Radiation Physics, Laser Metrology and Standardization Laboratory; 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania*	**I11 Quantitative Phase Imaging: Principles and Applications to Biomedicine**. Gabriel Popescu
15.30 – 16.00	**I10. Laser spectroscopy with tunable diode lasers in magnetron sputtering plasmas** C. Vitelaru*, V.Tiron, G. Popa **Faculty of Physics, Al I Cuza University, Bd. Carol No 11, Iasi, 700506, Romania; acatalin.vitelaru@inoe.ro* Magnetron sputtering plasmas are known as sources of metal vapor, being used in the field of thin film deposition for a broad range of applications. Even if the technological applications are widely spread and used intensively by the industry, the characterization of the magnetron plasma remains important for both fundamental and applications point of view. The link between the two approaches, fundamental and applicative, can be made by the comprehension of sputtering and transport mechanisms, needed to optimize and control the deposition process. Moreover, the demand of better and more complex deposited thin films are pushing towards new developments of sputtering configurations. One example is the use of high power pulsed power supplies, first proposed in the late 90's], which has gained a lot of interest in the scientific and industrial communities. This new version of magnetrons raises additional questions on both the fundamental aspects of discharge physics and on the best possible applications of its capabilities for thin film deposition. The presence of crossed electric and magnetic fields in front of the sputtering target makes it difficult to perform diagnostics in the high density plasma region. It is therefore desirable to use non-intrusive diagnostic techniques, that will offer an inside view on the elementary processes and also will not interfere with the sputtering process and the thin film deposition process. Laser spectroscopy in general is used in plasma diagnostics for measuring particle density and temperature, trough the absorption profile, or velocity distribution functions, through the Doppler shifted laser induced fluorescence profile respectively. The developments of solid diode lasers, in terms of available wavelengths, tunability and maximum output power, permitted to perform experimental investigations	

Time	*Hall I*	*Hall II*
	on a large variety of atoms and molecules, present in different types of plasmas. Among other types of lasers that have been used for spectroscopic measurements, the solid diode laser have the advantage very broad line width, typically around 10 MHz if placed in an external optical cavity, which offers a very high spectral resolution. This contribution will deal with the use of solid diode lasers for the characterization of both metal and buffer gas atoms by means of Tunable Diode-Laser Absorption Spectroscopy (TD-LAS) and Tunable Diode-Laser Induced Fluorescence (TD-LIF). The basic principles of these two techniques will be presented, emphasizing the specific issues encountered when dealing with sputtering plasmas at low and intermediate pressure, in the range 0.4 to 4 Pa. For each type of technique typical results will be presented, illustrating both the experimental procedure and the physical aspects specific to the magnetron discharge. Two types of magnetron plasmas will be characterized by the above mentioned techniques, namely the classical DC-magnetron discharge, and the so called High Power Pulsed Magnetron Sputtering (HIPIMS) plasma. For the DC case we will focus on the characterization of sputtered atoms by the velocity distribution functions obtained with TD-LIF. The spatially resolved measurements offer a view on both the sputtering fundamentals (the velocity distribution of neutral metal atoms ejected by sputtering) and also on the transport of sputtered species. The collision processes of metal atoms with buffer gas lead to energy losses of the first ones (illustrated by the changes in the velocity distribution function measured by TD-LIF on metal atoms), and to the gas heating (illustrated by the gas temperature increase measured by TD-LAS on Ar atoms). In the case of HiPIMS we will focus on the time evolution of neutral atoms (both metal and argon gas) in the after-glow phase of the plasma, after the high power pulse cut-off. During this transitory phase all the atoms created during the pulse relax towards an equilibrium state, being submitted to different types of processes such as ballistic transport, thermalization, diffusion, collisions, etc. The time and space resolved measurements on both metal atoms and argon gas atoms in metastable state offer a global view on this processes, and on their spatial and temporal distribution in the discharge. A global view on the use of TD-LIF and TD-LAS techniques for the magnetron plasma characterization will be offered. The present results show the capabilities of solid laser based techniques to perform space and time-resolved measurements for the characterization of neutral species in fundamental or metastable states. They are planned to be extensively used to better understand the elementary processes governing HiPIMS and reactive magnetron plasmas.	**I11 Quantitative Phase Imaging: Principles and Applications to Biomedicine**. Gabriel Popescu

Time	*Hall I*	*Hall II*
16.00 – 16.15	*Coffee Break*	
	Session 5 (Hall 1)	**Short Course (Hall 2)**
	Chair: Ion. N. Mihailescu	*Chair: Angela Staicu*
16.15 – 16.30	**O4. Synthesis of nanometric oxide films by reactive pulsed laser deposition for sensing applications** C. Ristoscu*, N. Serban, G. Socol, N. Stefan, I. N. Mihailescu, *National Institute for Laser, Plasma and Radiation Physics, PO Box MG-54, RO-77125, Magurele, Romania* KrF* excimer laser radiation of (248 nm) was used in reactive pulsed laser deposition method for the synthesis of nanometric iron or chromium oxide films with variable thickness, stoichiometry and electrical properties. Film deposition was carried out on <100> Si and SiO_2 substrates. The number of laser pulses was increased from 4,000 to 6,000, while ambient oxygen pressure varied from 0.1 to 1.0 Pa. The film thickness depended on oxygen pressure, number of laser pulses and substrate nature. All films demonstrated semiconducting temperature behaviour with variable band gap (E_g) depending on oxygen pressure, substrate nature and temperature. E_g value was less than 1.0 eV for all deposited films. XRD analysis showed that films deposited on Si substrate had polycrystalline structure, while films deposited on SiO_2 were amorphous. The higher oxygen pressure, the lower crystallinity of the deposited film was observed, resulting in change of thermo electromotive force coefficient (S). The higher substrate temperature, the more crystalline was observed for the deposited films, resulting in increased S coefficient values. The largest value of the S coefficient for iron oxides was about 2.2 - 2.4 mV/K in the range 290-300 K and it decreased to 1.0-1.6 mV/K when heating temperature changed from 240 to 330 K. The figure of merit is ZT = 3-6 in the range 240-330 K with the maximum of 12 at 300-304 K. In case of Chromium oxides, the highest S coefficient value of 2-8 mV/K was found in the range 240-330 K for T_S = 800 K. In this case, the figure of merit was ZT = 1.2-4.0 in the range 303-330 K. When T_S = 293 K, the figure of merit was ZT = 0.24-0.34 in the range 303-330 K. A strong dependence on electrical and structural properties was observed for the hermo-sensing characteristics of the films. The obtained results show that RPLD can be used to produce iron or chromium oxide thin films with	**I11 Quantitative Phase Imaging: Principles and Applications to Biomedicine**. Gabriel Popescu

Time	*Hall I*	*Hall II*
	polycrystalline structure, variable thickness, variable degree of oxidation and different band gap. The *S* coefficient and figure of merit *ZT* for thin films deposited by RPLD have values superior to other bulk or thin-film thermoelectric materials. These values strongly depend on deposition conditions, namely, substrate nature and temperature, oxygen pressure in the chamber, and number of laser pulses. The deposition on heated Si substrate resulted in increasing of the *S* coefficient and the figure of merit at given oxygen pressure and film thickness. An important mention is that no toxic or poison substances were used in reported experiments. We conclude that nanometric iron or chromium oxide films with polycrystalline structure and controlled degree of oxidation synthesized by RPLD method are up-to-date appropriate coatings for effective thermo-sensors and thermo-converters operating at moderate temperature.	**I11 Quantitative Phase Imaging: Principles and Applications to Biomedicine**. Gabriel Popescu
16.30 – 16.45	**O5. Surface Acoustic Wave Sensors Coated with Nanoporous ZnO Film for Hydrogen Detection** C. Viespe, C. Grigoriu *Laser Department, National Institute of Laser, Plasma and Radiation Physics, Magurele-Bucharest, Romania; viespe@ifin.nipne.ro* The performance of surface acoustic wave sensors with nanoporous ZnO sensing material for hydrogen (H_2) detection at room temperature is presented in this paper. The fabricated sensor was "delay line" type (quartz substrate, 69.4 MHz central frequency). The nanoporous sensitive layer was directly deposited on quartz substrate, using the picosecond laser ablation method. X-ray diffraction (XRD) and scanning electron microscopy (SEM) were employed to investigate the influence of different oxygen gas pressure. The sensor performances (sensitivity, limit of detection and response time) at RT, for a hydrogen concentration in synthetic air of 0.015– 2 % were studied.	

Time	*Hall I*	*Hall II*
16.45 – 17.00	**O6. Biomimetic multilayered structures by matrix-assisted pulsed laser evaporation** F. Sima*, E. Axente, L.E. Sima, E. Pauthe, O. Gallet, E. Toksoy Oner, K. Anselme, I.N. Mihailescu **National Institute for Lasers, Plasma and Radiation Physics, Bucharest, Romania; felix.sima@inflpr.ro* The potential of applying laser methods with the view of fabrication biocompatible and biomimetic organic thin coatings with properties that can be tailored by the applied experimental parameters is evaluated. Laser-assisted transfer of extracellular matrix proteins was achieved by a controllable approach in order to obtain a biologically active structure capable to promote cell adhesion and proliferation. A new laser based method was developed recently by us to obtain thin polysaccharide gradient coatings of desired thickness with the potential for applications in drug delivery systems or sensors in biotechnology.	
17.00 – 17.15	**O7. Uptake heavy metals ions from aqueous solutions on layered double hydroxides thin films deposited by laser technique** A. Vlad*, R. Birjega, A. Matei, V. Ion, M. Dinescu **National Institute for Lasers, Plasma and Radiation Physics, 409 Atomistilor Str., 77125 Bucharest- Magurele, Romania; angela.vlad@gmail.com* Layered double hydroxides (LDHs) are a class of layered materials consisting of positively charged brucite-like layers and exchangeable interlayer anions. The capacity of LDHs thin films to retain and therefore to detect heavy metals from aqueous solutions at different concentrations is a novel topic with prospects of attractive applications. We report on the ability of a series of Mg-Al based layered double hydroxides (LDHs) thin films to detect Ni cations in aqueous solutions. The LDHs thin films were deposited using pulsed laser deposition (PLD).	

Time	*Hall I*	*Hall II*
17.15 – 17.30	**O8. Pulsed laser deposition growth of lead-free $(Ba_{1-x}Ca_x)(Zr_yTi_{1-y})O_3$ thin films and their structural, optical and electrical properties.** N. D. Scarisoreanu*, F. Craciun, A. Andrei, V. Ion , R. Birjega, L.Nedelcu, M.G. Banciu and M. Dinescu. **NILPRP, P.O. Box MG-16, RO-77125, Bucharest, Romania* We report on the growth of lead-free perovskite $(Ba_{0.85}Ca_{0.15})(Zr_{0.1}Ti_{0.9})O_3$ thin films made by pulsed laser deposition for MEMS applications. The $(Ba_{1-x}Ca_x)(Zr_yTi_{1-y})O_3$ ceramic systems are known to have high dielectric constant and high dielectric tunability. The BCTZ/Pt/Si thin films were deposited on platinized silicon and the morphological and structural investigations performed showed a smooth surface and randomly oriented, pure perovskite phase. The dielectric tunability have been obtained by dielectric spectroscopy. Using ellipsometry technique, the optical transmission and band gap characteristics were analyzed. The films exhibit moderate dielectric constant (≈ 450) and relatively low dielectric losses (≈ 3.5 %).	
17.30 – 17.45	**O9. The Monitorization of Lipid Oxidation in Strawberries, using Photoacoustic Spectroscopy Assay** S. Banita*, C. Popa, C. Matei, M. Patachia, A. M. Bratu, M. Petrus, and D. C. Dumitras[a] **National Institute for Laser, Plasma and Radiation Physics* *409 Atomistilor St., PO Box MG-36, 077125 Bucharest, Romania;* e-mail: stefan.banita@inflpr.ro These experiments are devoted to study the capabilities of laser photoacoustic spectroscopy method in strawberries quality related question such as the effects of nitrogen. There are many small family farmers who don't use growth hormones or nitrogen on theirs plants. We compare the ethylene concentrations of strawberries under stress conditions with ethylene concentrations from the organic strawberries (fruits without nitrogen or synthetic pesticides or fertilizers, artificial hormones or irradiation, artificial colors or preservatives). We obtained a higher level of ethylene at non-organic strawberries whereas for organic strawberries we obtained a lower level of ethylene.	

Time	*Hall I*	*Hall II*
17.45 – 19.15	**Poster Session**	
19.45	***Get Together Party***	

May 22, Wednesday

	Session 6 (Hall 1)	**Special Session: LID-LBC (Hall 2)**
	Chair: Eugenio Fazio	*Chair: George Nemes*
09.00 – 09.30	**I12. High-power ultrafast semiconductor lasers and saturable absorbers mirrors based on novel compound semiconductors** Mircea Guina *Optoelectronics Research Centre Tampere University of Technology; email: Mircea.Guina@tut.fi*	

09.30 – 9.45	**O10. CW laser emission at 1061 nm in a compact NdGdLuCOB laser pumped by high power laser diode** C.A. Brandus[1,2], F.Voicu [1], L.Gheorghe[1], T Dascalu[1] *National Institute for Laser, Plasma and Radiation Physics, Bucharest R-077125, Romania* *Laboratory of Solid-State Quantum Electronics;* *Doctoral School of Physics, University of Bucharest, Bucharest(Magurele-Ilfov),Romania*; catalina.brandus@inflpr.ro The aim of this work was to study the laser properties of the self-frequency doubling Nd: $GdLuCa_4O(BO_3)_3$ single crystal. An output power of 170 mW at 1061 nm has been obtained from a CW diode-pumped Nd: GdLuCOB laser, for a resonator with a plano-plano cavity and 12 mm length. The crystal was not antireflection treated. The absorbed pump power was 1.3 W, and the lasing threshold was 600 mW of absorbed pump power. The pumping wavelength has been set to 811.88 nm, and the bandwidth was 2.3 nm at FWHM. This output power was obtained with an absorption coefficient of only 60%.	**For detailed program please download LID-LBC.pdf**
9.45 – 10.00	**O11. Sm^{3+} doped YAG and sesquioxides translucent ceramics** Flavius Voicu[*],Lupei Aurelia, Cristina Gheorghe, Luculescu Catalin and Dumitru Marius [*]*National Institute for Laser, Plasma and Radiation Physics* In the present work, Sm^{3+} doped YAG and Ln_2O_3 (Ln= Y, Lu, Sc) sesquioxides translucent ceramics were fabricated by simple solid-state reaction and air sintering. The structure of ceramics was determined by X-ray diffraction. The microstructural properties of translucent ceramics obtained were investigated by scanning electronic microscopy on fracture and surface polished followed by thermal treatment. The absorption and emission spectra were performed. The absorption spectra were recorded with a Jarell Ash monochromator. The emission spectra were obtained by excitation with Xe lamp. A closed cycle He refrigerator was used for low temperature measurements.	
10.00 – 10.15	***Coffee Break***	
	Session 7 (Hall 1)	**Special Session: LID-LBC (Hall 2)**
	Chair: Gabriel Popescu	*Chair: George Nemes*

10.15 – 10.30	**O12. Spectroscopic studies and applications of laser exposed drugs** A. Dinache*, M. Boni, M. Martins, M. P. McCusker, V. Nastasa, S. Fanning, M.L. Pascu **Laser Spectroscopy Group, Laser Department, National Institute for Laser, Plasma and Radiation Physics, P.O. Box MG-36, Magurele, Ilfov, 077125, Romania; andra.dinache@inflpr.ro* Exposing drugs to laser radiation may yield new species. Laser irradiation may modify the shape of the LIF, UV-Vis absorption and FT-IR spectra of the drugs, indicating alteration of the drug molecules. Drugs from two classes were studied: Vancomycin, an antibiotic, and phenothiazines Chlorpromazine, Thioridazine, Promazine and Promethazine. During exposure to laser radiation Vancomycin molecules are modified and foams are generated, most likely due to the tensile component of the laser induced photoacustic wave. Irradiated derivatives of the tested phenothiazines had higher antibacterial activity when compared to their parental compounds. These compounds were more effective against the tested Gram-positive bacteria.	**For detailed program please download LID-LBC.pdf**
10.30 – 10.45	**O13. FTIR studies of Phenotiazines exposed to laser beam** T. Alexandru1*, V. Nastasa, A. Staicu, M. L. Pascu1 *1National Institute for Laser, Plasma and Radiation Physics, Laser Department, 077125, Magurele, Romania; e-mail: tatiana.alexandru@inflpr.ro* Phenothiazines belong to the class of neuroleptic drugs used for the therapy of mental disorders, as a particular case, in the treatment of different psychoses which include schizophrenia and mania. Chlorpromazine is a pharmacologically active derivative used for antipsychotic properties, having also slight antimicrobial activity against the Gram–negative and Gram–positive bacteria. Chlorpromazine Hydrochloride (in ultrapure water) having a concentration of 2 mg/mL, was exposed to 266 nm laser beam from 1 to 240 min. The irradiation products were evaluated by spectrophotometry between 200-1500 nm, Thin Layer Chromatography (TLC), pH analysis, FTIR measurements and Laser induced fluorescence (LIF) spectroscopy.	

10.45 – 11.00	**O14. Spectrochemical Study about the Photoreaction Products Obtained by Chlorpromazine Exposure to UV Laser Beam** A.Stoicu*, E. Radu, V. Nastasa, A. Dinache, T. Alexandru, M. Boni, G. Popescu, A. Staicu, M.-L. Pascu *National Institue for Laser, Plasma and Radiation Physics; 409 Atomistilor Str., 077125, Magurele, Romania; email: alexandru.stoicu@inflpr.ro* Chlorpromazine, a phenothiazine class drug, was exposed to a 266 nm laser beam and changes in the compounds structure were observed. This specific structure was found to absorb light in the UV using UV-Vis spectroscopy and it was determined that after exposure to the laser beam, the specific absorption bands for this compound would decrease in intensity, indicating structural changes. The photon absorption process was explained using the electronegativity values generate with the *ChemAxon* computational chemistry suite and the bonds that are prone to breakage were identified. Thin layer chromatography was used to determine the presence of photoproducts, these species being further identified using GC-MS technique.
11.00 – 11.15	**O15. Study of the Optical Properties of 2-Thiohydantoin Derivatives** **Smarandache Adriana*, Pascu A., Andrei I., Handzlik Jadwiga, Kiec-Kononowicz Katarzyna, Staicu Angela, Pascu M.L.** *National Institute for Lasers, Plasma and Radiation Physics, Laser Department, P.O.Box, MG-36, 077125, Bucharest, Romania; email: adriana.smarandache@inflpr.ro* In this study, the optical properties of 5-(3-chlorobenzylidene)-2-thioxoimidazolidin-4-one ($C_{10}H_7ClN_2OS$, M=238.69 g/mol), generically called SZ-2, are presented. A stability assay using UV/VIS/NIR spectra was performed up to 250 days, as well as FTIR spectroscopic characterization. Liquid samples of SZ-2 in DMSO in bulk were exposed to the third harmonic of a pulsed Nd:YAG laser for different time intervals. The behavior of SZ-2 molecules under laser beam influence was highlighted based on their absorption spectra before and after coherent light irradiation. Also, the ability to generate singlet oxygen of SZ-2 was investigated through photochemical method using 355 nm Nd:YAG laser beam irradiation.

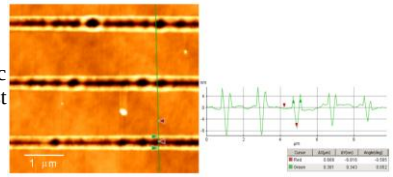
	Session 8 (Hall 1)
	Chair:Mircea Guina
11.15- 11.30	**O16. Multiwave vanadate laser for treatment of purulent inflammatory disease of soft tissues** *G.P.Kuzmin, A.G.Kuzmina*, O.V.Lovachova , A.A.Sirotkin* **First Moscow State Medical University by I.M.Sechenov, Mochovaya, 11, Moscow, 119992, Russia ; E-mail: kuzmin@kapella.gpi.ru* Multiwave laser medical device "Livadia" has been developed either for bactericidal or for therapeutic impact on the affected organism parts. This device is on the diode pumped solid state laser and main wavelength radiation conversion 1064 nm into the second harmonic 532 nm and forth harmonic 266 nm. It has been shown that UV radiation on the wavelength 266 nm on bronchia mucosa with various inflammation types improves regenerative processes in bronchia tissues that comes to treatment deadline decrease.
11.30- 11.45	**O17. Cold laser therapy of herniated disc and fractured vertebrae in dogs: two-case study** Cristiana Grigorescu

For detailed program please download LID-LBC.pdf

11.45 – 12.00	**O18. Optical properties of tungsten oxide thin films obtained by pulsed laser deposition** V. Ion, M. Filipescu and M. Dinescu **National Institute for Laser, Plasma and Radiation Physics, Magurele, Bucharest, Romania* valentin.ion@inflpr,ro Tungsten oxide films are promising for gas sensing applications. Tungsten oxide compounds thin films were obtained by Pulsed Laser Deposition (PLD) and radio-frequency assisted PLD (RF-PLD) techniques on different substrates. Topography of surface of tungsten oxide thin films was studied using atomic force microscopy (AFM). The influence of the gas pressure and substrate temperatures on optical properties of thin films has been investigated using spectroscopic ellipsometry (SE) which is non-destructive and precise technique. Thicknesses of the films, rough layer and values of the optical constants were calculated. The thicknesses of rough layer are in agreement with atomic force microscopy results.	
12.00 – 12.15	**O19. X-Ray diffraction studies on tungsten oxide thin films obtained by pulsed laser deposition** M. Dumitru*, M. Filipescu, R. Birjega and M. Dinescu **National Institute for Laser, Plasma and Radiation Physics, Magurele, Bucharest, Romania* marius.dumitru@inflpr,ro Nanostructured thin films of tungsten oxide are attractive for gas sensing application. Pulsed Laser Deposition (PLD) and radio-frequency assisted PLD (RF-PLD) techniques were used to produce tungsten oxide tin films, on different substrates. The laser wavelength, gas pressure, radio frequency plasma discharge and the substrate temperature influences the surface topography and the crystalline phases of the deposited films. The surface topography of the deposited tungsten oxide thin films was studied using atomic force microscopy (AFM). The influence of deposition parameters on crystalline phases of the resulted thin films was studied by X-Ray diffraction and correlated with the surface topography and the results were used to improve the deposition process.	
12.15 – 14.15	***Lunch***	
	Session 8 (Hall 1)	**Special Session: LID-LBC (Hall 2)**
	Chair: Adrian Petris	*Chair: Andrius Melninkaitis*

14.15 – 14.45	**I13. Laser remote sensing techniques for atmospheric investigations** Anca Nemuc *National R&D Institute for Optoelectronics, Romanian atmospheric 3D research observatory*	For detailed program please download LID-LBC.pdf
14.45 – 15.00	**O20. Evaluation of Local Cloud Surface Radiative Forcing, using MODTRAN Model** Laura Mihai*, Sabina Stefan, Ioana Ungureanu **Laser Metrology and Standardization Laboratory, National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Street, Magurele, Romania* The local cloud radiative forcing at surface (SCRF) was evaluated for a selected period when low and middle clouds (stratus, altostratus and stratocumulus) dominanted at Magurele (44.35 N, 26.03 E), Romania. The cloud radiative forcing was evaluated based on longwave (LW) and shortwave (SW) radiation fluxes computed by MODTRAN radiative transfer model.. The clouds' type and their optical properties (cloud bases, optical thickness and the extinction coefficients), used as input parameters into the model, were determined from CL-31 Ceilometer data. The ceilometer, a mini-lidar, is located at Atmosphere and Earth Department of Faculty of Physics, at Magurele. The useful meteorological parameters within boundary layer for the selected time period have been extracted from radio-sounding data. The modeled values of SCRF obtained for low and mid-level clouds and different environmental conditions were similar with those determined using a parameterized method applied to ceilometer's data. It is important that they provide useful knowledge and understanding on how clouds affect the Earth's energy balance.	

15.00 – 15.15	**O21. Periodical structures induced by femtosecond laser on nickel in air** Catalina Albu[*], C. Luculescu, M. Zamfirescu [*]*National Institute for Laser, Plasma and Radiation Physics, Atomistilor 409, 077125 Magurele, Romania ; E-mail: catalina.radu@inflpr.ro* Ripples or periodical structures are obtained on nickel films by irradiation with femtosecond laser pulses working at both fundamental (775 nm) and frequency doubled (387 nm) wavelengths in air. Depending on the irradiation conditions, such as laser fluence, number of laser pulses or laser wavelength, different morphology and ripples periods has been obtained: Low Spatial Frequency LIPSS (LSFL) with a periodicity of about 240 to 650 nm, and High Spatial Frequency LIPSS (HSFL) with a periodicity from about 100 to 190 nm. Our experimental observations are complemented by calculated ripples period predicted by the classical interference theory and surface plasmon theory.
15.15 – 15.30	**O22. The influence of ambient medium on femtosecond laser micro/nanoprocessing of silicon substrates** I. Anghel[1,2], M. Filipescu[1], M. Zamfirescu[1], M. Enculescu[3] and M. Ulmeanu[1] [1]*Laser Department, National Institute for Laser, Plasma and Radiation Physics, Atomistilor Str. 409, P. O. Box MG-36, 077125 Magurele-Bucharest, Romania;* [2]*University of Bucharest, Faculty of Physics, Atomistilor Str. 405, P. O. Box MG-11, 077125 Magurele-Bucharest, Romania;* e-mail: magda.ulmeanu@inflpr.ro Far field and near-field techniques to pattern the silicon substrate is reported. In the micro/nanofabrication process, a self-assembled mono layer with silica spheres on Si wafer were irradiated with single pulse from a 200 fs laser at 775 and 387 nm wavelength. The substrates to be processed were immersed in a glass container filled with liquid precursors. The influence of the liquid medium, on the near-field and far field interactions with silicon substrate, were investigated. The surfaces topography is influenced by liquid refractive index and the chemical composition of the radicals induced by laser fluency.

15.30 – 15.45	**O23. Photoresist masks for near-field processing** Florin Jipa*, Marian Zamfirescu, Mihaela Filipescu, Adrian Dinescu,Razvan Dabu **National Institute for Laser Plasma and Radiation Physics, Magurele, Bucharest, Romania;* florin.jipa@inflpr.ro The near field processing represent an alternative method for production of nano-patterns on materials surface. This method is based on electromagnetic field enhancement produced when a laser pulse interact with micro-objects. When colloidal particles are used as focusing optics, structures with dimensions under diffraction limit are created on large area. However, the pattern imprinted in this case is limited to nano-holes, arranged in a hexagonal geometry.To overcome this limitations, in this work is presented an alternative near-field processing method where transparent photopolymer masks are used as focusing elements. The optimum mask parameters as well as the theoretic field distribution and intensification factor was computed by Finite-Difference Time Domain (FDTD) method. To demonstrate the feasibility of this method, a silicon wafer was processed using a mask realized in PMMA positive photoresist through electron beam lithography. Atomic Force Microscopy (AFM) was used to investigate the imprinted pattern (Fig. 1). Figure 1. AFM image and profile of the periodic grooves imprinted in silicon wafer using photoresist masks. 
15.45 – 16.00	**O24. On some structural and optical properties of porous Al2O3 PLD films** C.R. Iordanescu*, D. Savastru, D. Tenciu, M.I. Rusu, A. Kiss, R. Notonier, A.Tonetto, C. Chassigneux, L. Tortet, O. Monnereau, M. Stchakowsky, M. Bercu, S. Antohe, C.E.A. Grigorescu On some structural and optical properties of porous Al_2O_3 PLD films * *National Institute R&D Optoelectronics INOE 2000, 409 Atomistilor, Magurele, PO Box MG-5, 77125 Romania*
16.00 – 16.15	***Coffee Break***
16.15 –17.15	***Best student scientific presentations - Award ceremony (Hall 1)***

May 23, Thursday

09.00-18.00	***Trip to Sighisoara***
19.30	***Collegial Dinner***

May 24, Friday

	Session 9 (Hall 1)
	Chair: TBA
09.00 – 9.30	**I14. Investigations on photonic quantum ring lasers investigated by using laser scanning microscopy** George Stanciu
09.30 – 9.45	**O25. The Tunable Diode Laser Techniques used in Plasma Diagnostics; Strong Points and Weaknesses** V. Tiron*, C. Vitelaru, I. Mihaila and D. N. Becherescu **Faculty of Physics, "Alexandru Ioan Cuza University" of Iasi, 700506 Iasi, Romania* Nowadays, *T*unable *D*iode *L*aser is successfully used in absorption spectroscopy (TD-LAS) and induced fluorescence techniques (TD-LIF) for measuring some plasma parameters or local magnetic field strength and some specific particularities of hyperfine structure of atomic levels. The strong points of tunable diode laser consist in the both narrowness (order of 10 MHz) of spectral radiation line and control of a continuous change in a spectral range of about three orders of magnitude larger than spectral line bandwidth. These properties make possible accurate measuring of the absorption spectral line with rather large bandwidth corresponding to high plasma temperature (Doppler broadening) or wave propagation process, Zeeman splitting and non-thermal particles with beam like characteristics. Moreover, LIF technique allows very good spatial resolution in measuring spatial distribution of plasma properties as atom or ion velocity distribution and fluxes or even density of some excited species. Weakness of these techniques consists in two fold elements: i) they use discreet and rather limited range of spectral domain and ii) they might be used for steady state and rather slow variable plasma parameters. In some experiments the TD-LAS technique provide information on mean plasma parameters over spatial non-uniform system and the both TD-LAS and TD-LIF techniques may provide mean value of plasma parameters over large period of time comparing with characteristic time of a non-stationary plasma. In present contribution the experimental results are presented on finding plasma parameters in a typical magnetron discharge operated in both DC steady state and high power pulse regime. Comparison is made between similar parameters as: velocity distribution of sputtered atoms and mean density of metastable argon atoms obtained in magnetron discharge with various target materials as: iron, aluminum, titanium, tungsten or composite.
09.45 – 10.00	**O26 . Treatment of scars by CO2 laser beam** A. Parlog
10.00 – 10.30	**Closing session (Hall 1)**

POSTER SECTION

P1. An image processing method for the study of the unicomponent plasma formed in a linear electrodynamic trap

O. S. Stoican
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An optical method based on the image digital processing, aimed to estimate characteristics of the trapped microparticles placed within the electrodes of a linear electrodynamic trap is reported. The image of the trapped microparticles cloud illuminated by a laser beam is recorded by means of a webcam. The video image is then divided into individual frames. By using an appropriate software each frame is digitally processed in order to calculate the area filled by trapped particles footprint. Knowing frame rate of the video recording, the volume variation of trapped particles assembly, as a function of time is determined. By using Fourier transform, harmonic components of the trapped particles motion are resolved and, subsequently, the its specific charge can be calculated.

P2. Synthesis by solid state reaction and luminescence properties of langanite doped with Tm^{3+} and Yb^{3+}

Cristina Matei**,** Serban Georgescu, Ana-Maria Voiculescu, Angela Stefan, Ruxandra Birjega
National Institute for Lasers, Plasma and Radiation Physics, Atomistilor Street 409, Magurele, P.O. Box MG-36, Bucharest R-077125, ROMANIA; cristina.matei@inflpr.ro

Langanite (La3Ga5.5Nb0.5O14) ceramic doped with Tm3+(1%) and Yb3+(3%) for upconversion luminescence was synthesized, by solid state reaction, for the first time, from stoichiometric quantities of high purity oxides (La2O3, Ga2O3, Tm2O3, Yb2O3, Nb2O5). The langanite sample was characterized by XRD and optical spectroscopy techniques (absorbtion, luminescence excited directly or by upconversion, kinetics of the luminescence,reflectance). Luminescence intensity vs. IR pump intensity measurements have shown that 1G4 level was populated by a three-photon process, 3H4 level by two-photon process and 3F4 by one-photon process.

P3. Efficient second harmonic generation of blue-violet light in type-I **noncritical phase matching**

Alexandru Achim, Lucian Gheorghe, George Stanciu, Flavius Voicu
National Institute for Laser, Plasma and Radiation Physics, Solid-State Quantum Electronics Laboratory, P.O. Box MG 36, 077125 Magurele, Bucharest, Romania alexandru.achim@inflpr.ro

$YCa_4O(BO_3)_3$ is a congruent melting nonlinear optical material allowing the growth of large dimensions and high optical quality crystals to be used as frequency converters in solid-state laser systems. In YCOB crystal, the Y^{3+} ions can be partially substituted by smaller radius ions Sc^{3+} or Lu^{3+} (r_{Lu} = 0.861 Å, r_{Sc} = 0.745 Å, r_Y = 0.9 Å) to tune the chemical composition. New nonlinear crystals of $Y_{1-x}Lu_xCa_4O(BO_3)_3$ and $Y_{1-x}Sc_xCa_4O(BO_3)_3$, with x =

0.19, 0.29, 0.39 and x = 0.07, 0.11, respectively, of good quality have been grown by Czochralski method, and their noncritical phase matching properties were investigated.

P4. **Upconversion luminescence in erbium/ytterbium and thulium/ytterbium doped langatate ceramics**

S. Georgescu[1], A. M. Voiculescu[1], C. Matei[1,2], A. Stefan[1,2], O. Toma[1]
[1] *National Institute for laser, Plasma and Radiation Physics, 409 Atomistilor street, Magurele-Ilfov, 077125, Romania*
[2] *University of Bucharest, Faculty of Physics, 405 Atomistilor street, Magurele-Ilfov, 077125, Romania;* serban.georgescu@inflpr.ro

Langatate (La3Ga5.5Ta0.5O14 – LGT) ceramic samples, doped with 3 at.% Yb3+ and 1 at.% Er3+ (or 1 at.% Tm3+) are synthesized from La2O3, Ga2O3, Ta2O5 and Er2O3 (Tm2O3) by a solid state reaction in air, at 1350ºC. The ceramic samples are characterized by XRD, reflectance, absorption, luminescence and kinetics of the metastable levels. Under IR pump at 973 nm, the LGT:Yb:Er shows near-UV, violet, green and red luminescence while LGT:Yb:Tm shows near-UV, blue and red luminescence. The multiphoton processes involved in the population of the emitting levels are also discussed.

P5. **Upconversion luminescence properties of La3Ga5.5Ta0.5O14 doped with Yb and Tm**

Ana-Maria Voiculescu[1], Serban Georgescu[1], Cristina Matei[1,2], Angela Stefan[1,2], R. Birjega[1]
[1]*National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Street, Magurele, Ilfov, 077125, Romania,*
[2]*University of Bucharest, Faculty of Physics, 405 Atomistilor Street, 077125, Magurele-Ilfov, Romania;* *ana.voiculescu@inflpr.ro*

In this paper we investigate, for the first time, the upconversion luminescence in a La3Ga5.5Ta0.5O14 (langatate, LGT) ceramic sample doped with thulium (1 at. %) and ytterbium (3 at.%). The LGT:Tm:Yb ceramic sample was synthesized by solid-state reaction. The purity of the langatate phase was checked by X ray diffraction. The sample was characterized by optical spectroscopy (luminescence, absorption, decay measurements). For upconversion measurements the luminescence was excited at 973 nm with various pump powers and emits UV, blue, red and infrared luminescence. The strong blue luminescence of LGN:Tm:Yb recommends this material as upconversion blue phosphor.

P6. Optical and structural characterization of In_2O_3 thin films grown by radiofrequency discharge assisted pulsed laser deposition

A. Nedelcea, **M. Dumitru***, M. Filipescu, V. Ion, D. Colceag , F. Stokker, M. Dinescu
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Indium oxide is used in several types of batteries, hot mirrors, and some optical coatings. The simplest optical coatings are thin layers of metals which are deposited on glass substrates to make mirror surfaces. The metal used determines the reflection characteristics of the mirror.

In this work, In_2O_3 thin films are grown by PLD using different laser wavelengths, Their properties are controlled by adjusting chamber atmosphere, radiofrequency plasma discharge power and laser fluency in order to obtain crystalline and amorphous films and to eliminate the metallic Indium droplets build-up. The samples are investigated with Atomic Force Microscopy, Scanning Electron Microscopy, Secondary Ion Mass Spectrometry, Spectroscopic Ellipsometry, and X-Ray Diffraction.

P7. Rapid identification of pollen species using autofluorescence spectra and fluorescence decay times combined with principal component analysis

Adriana Puiu*, D. Sporea
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The air we breathe may contain a wide variety of solid particles: toxic, infectious or "innocuous" such as airbone allergens. The airbone allergens (pollens, spores, dust mites, and pet allergen) are usually harmless, but can trigger allergic reactions when inhaled by susceptible individuals. They may induce some diseases such as hay fever, asthma, and conjunctivitis. Many people suffer from pollen allergies accompanied by symptoms like sneezing, itchiness, a runny nose, and watering eyes during periods when the pollen of plants are suspended in the air. Thus, accurate, reliable and fast methods able to provide information about the airborne pollen can greatly help allergic people to manage allergy symptoms and in consequence to improve their daily life. This work presents a method for rapid pollen identification based on the registration of both autofluorescence spectra and fluorescence decays at the excitation wavelength of 263 nm. The pollen grains have the peculiarity of showing strong autofluorescence. According to Pinnick et al., fluorescence is a useful parameter to distinguish between biological and non-biological airborne particles; thus autofluorescence is a practical technique for the investigation of pollen grains. The recent advances in the instruments used for acquiring, processing, and analyzing fluorescence signals and application of multivariate statistics such as Principal Components Analysis (PCA) have made possible identifying pollen grains with no miss-assignment. The pollens of different flower species (*Paeonia, Lilium, Tulipa and Tilia*) were selected, and their autofluorescence spectra and fluorescence decays were acquired by a PicoQuant spectrofluorometer. Differences in the autofluorescence spectra of the analyzed pollen species were put in evidence through PCA applied to the spectral data matrix, in groups with high likeness (i.e. Liliacea family) , which could identify the sample type (see Fig. 1). The results demonstrated that the pollen identification is very efficient with such methodology. The obtained data could be used to complete the information given by other analytical methods such as flow citometry, which is based on fluorescence measurement and light scattered from particles. Generally, flow citometry is employed for real time analysis of airbone particles, but the information regarding the fluorescence time decay is missing in this approach.
In conclusion, in this study, we analyzed the autofluorescence and fluorescence decay times of pollen grains from several species and found that they could be clearly distinguished by the PCA.

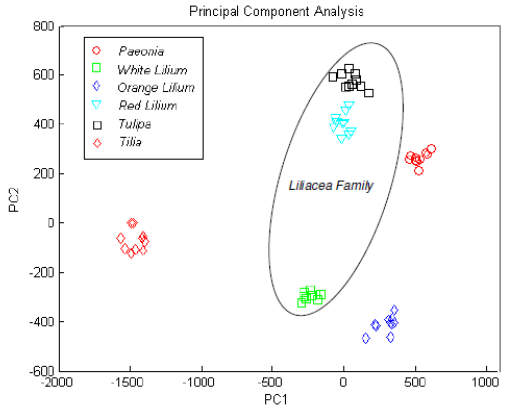

Fig. 1 Classification and identification of six different types of plen grains by PCA

P8. An improved version of the single photon detector module designed in Romania

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The quantum photon pairs already have a lot of applications in metrology, cryptography, telecommunications, optoelectronic instruments, quantum computers. The observations on our first single photon detector revealed both the necessity and the solutions to increase the linear measuring range and the detection efficiency, to reduce the dark counting rate and the sensitivity to mechanical tolerancies of the optical fibres used for coupling the instrument to the optical field. The principle of the adopted solutions and the measured characteristics of our new single photon detector are reported.

P9. The influence of the microstructure and morphology of CeO_2 buffer layer on the properties of YBCO films PLD-grown on Ni tape substrates

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$YBa_2Cu_3O_{7-\delta}$ films were grown by pulsed laser deposition on different thickness CeO_2/Ni tape buffered substrates obtained by chemical solution deposition for 2-GCCs.

CeO_2 and YBCO films' structure, the critical temperature and CeO_2 film morphology, with different degrees of agglomeration (de-wetting), responsible for YBCO properties, are all dependent on buffer thickness. Only a narrow window of CeO_2 buffer thicknesses (~180 nm) can provide surfaces thermally stable with high flat area fraction, free of defects, suitable for nucleation of c-axis-oriented YBCO phase, promoting epitaxy through the whole film thickness. The YBCO films grown on CeO2/Ni buffers are highly textured with T_C=90.5 K.

P10. Passively Q-Switched Vanadate Lasers for Medicine Applications

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We have demonstrated a low-cost, compact, high-efficiency passively Q-switched UV-VIS-IR laser for medicine systems based on the variable-cut Nd:$GdVO_4$ laser with Cr^{4+}:YAG saturable absorber crystal.
Spectroscopic polarization and angular dependences of the luminescence intensity of Stark transitions in vanadate crystalswere investigated. The frequency shift and redistribution of the luminescence intensity of Stark transitions are observed.
We have shown experimentally that the variable-cut ($\theta=25^o$, $\varphi=0$) Nd:$GdVO_4$ laser could have good passively Q-switched performance (pulse of 2.5 ns with the highest peak power of 12 kW).
The average power of visible and UV radiation up to 310 and 7 mW has been obtained in crystals PPLN and BBO, respectively.

P11. Combinatorial Matrix-Assisted Pulsed Laser Evaporation Applied to Biopolymer Thin Film Assemblies

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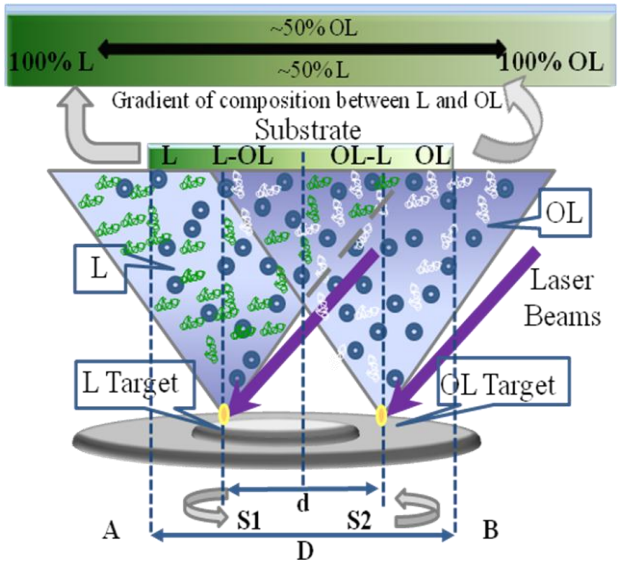
Combinatorial chemistry is a field which revolutionized the drug industry by its capacity to combine different innovative materials and biological entities. Here we introduce a new combinatorial approach for the fabrication of organic thin films with compositional gradient obtained by the simultaneous laser irradiation and vaporization of two distinct targets. Synchronized matrix-assisted pulsed laser evaporation of biopolymers was applied to transfer and assemble a two-compound thin film structure. The gradient of film composition and structure was demonstrated by infrared spectroscopy and fluorescence studies while *in vitro* cell culture assays illustrated characteristic responses of cells to specific surface regions.



P12. Acquisition and electrical signals processing in an experimental CW-Diffuse Optical Tomography system

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Diffuse Optical Tomography (DOT) is a diagnostic tool for detecting inhomogeneities in translucent soft tissue based on the distribution of the absorption coefficient and reduced scattering coefficient. Its principle is to use multiple movable light sources and detectors attached to the tissue boundary to collect information on light attenuation, and to reconstruct the internal 3-D absorption and scattering distributions. This work describes methods and protocols in generation, modulation and signal acquisition and processing to operate an experimental DOT system.

P13. Hreath ethylene assessment at subjects under haemodialysis treatment

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This research was intended to evaluate breath ethylene for monitoring under haemodialysis treatment.
Oxidative stress contributes to morbidity at haemodialysis patients. So, we analyze the impact of oxidative stress and its related species (ethylene) immediately after dialysis treatment at subjects with renal disease. Ethylene concentrations were higher in laser photoacoustic spectroscopy-haemodialysis patients than in healthy subjects (Hs). Breath monitoring of ethylene with LPAS technique could be useful to assess the near real time clinical status of subjects and to prevent trauma in renal disease of patients during haemodialysis treatment.

P14. **Ana Maria Bratu**[a,*], M. Petrus[a], M. Patachia[a], C. Matei[a], C. Popa[a], S. Banita[a], and D. C. Dumitras[a]
Laser photoacoustic analysis of surgical smoke produced by tissue ablation
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The potential risks associated with the emission of hazardous products emitted by surgical smoke are of high concern. Operating room personnel is exposed to surgical smoke daily. The risk of surgical smoke is due to the odor, size of particles and gas concentration. Using laser photoacoustic spectroscopy (LPAS), chemical compounds of surgical smoke produced in vitro by CO_2 laser ablation on fresh animal tissues, in nitrogen were investigated. Traces of benzene, ethylene, ammonia, acetonitril, acrolein and toluene were detected in surgical smoke in the ppb and ppm range. The relationship between gas concentration and laser power, exposure time and the type of tissue were investigated.

P15. **Studies about the stability of Promethazine hydrochloride exposed to 266 nm laser beam**

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Promethazine hydrochloride (PMZ), a phenothiazine derivative, is a medicine which has a very strong antiemetic effect beeing also used for its antihistaminic effect. In the present work, PMZ has been studied using spectrophotometry, laser induced fluorescence (LIF) and Fourier Transform Infrared Spectroscopy (FTIR) measurements. PMZ, dissolved in ultrapure water, was utilized for the stability analysis using different concentrations. The conditions used to investigate the stability properties were: room temperature (exposure to white light), room temperature (in the dark), 2-5 ^{0}C (in the dark). After stability experiments, PMZ at 20 mg/mL was exposed to 266 nm Nd:YAG laser beam for specific time intervals.

P16. Surface-enhanced raman spectroscopic study of the molecular relaxation processes in genomic dna from leaves of *in vitro*-grown plant species
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We have shown that surface-enhanced Raman scattering can be used to study the fast subpicosecond dynamics of DNA in the proximity of a metallic surface. The dependencies of the total half bandwidths and of the global relaxation times, on DNA molecular subgroup structure and on the type of genomic DNA, are reported. *It is shown that changes in the subpicosecond surface dynamics of molecular subgroups in genomic DNAs from leaf tissues can be monitored with surface-enhanced Raman spectroscopy.* For the case of aqueous solutions of DNA molecules, we can suppose that the dominant relaxation mechanism is the vibrational one.

P17. Dust rod bouncing in the sheath of radio-frequency (RF) plasma
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P18. **Thermal phenomena induced in a W sample by irradiation with 6.2 MeV electron beam**
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The energy released by relativistic electron beams at the interaction with a material sample produces a thermal field that can affect its physical integrity. Such situations are found in fusion technology where streams of energetic electrons can destroy the walls of the machine. In this paper we present a semi-analytical study of these thermal fields induced in C by accelerated electrons to 6.23 MeV. As absorption law we use the Tabata-Ito-Okabe formula. The average power of the considered beam is 81 W. A sample with a reduced size is considered (1 cm x 1 cm x 1.5 cm) having a surface comparable with the beam cross section. A significant difference is observed in the case of large irradiated samples (e.g. 1 m x 1 m x 1 m). For small samples the heat transfer coefficient and the boundary conditions are key elements in determining the thermal field in the sample volumes whereas for large samples this is not the case.

P19. **Coaxial plasma gun used in dusty plasma experiments**
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A miniature coaxial gun inserted between the plane parallel electrodes of a radio-frequency (rf) plasma was used to produce a plasma jet consisting of electrons and ions. Particles were expelled at a speed of a few km /s. The coaxial gun had two electrodes made of stainless stell, a long center rod and a coaxial outer cylindrical shell. We used a compressor coil to radially compress the plasma jet, mounted at the gun nozzle. The axial JxB force ejected plasma out of the gun. We were interested in producing a well collimated jet stream which was put to interact with a dusty plasma crystal, particularly made out of cilindrical particles. It was observed waves and instabilities after the collision. The discharge voltage that we used was between 0.1kV and 2 kV and the current intensity was a few hundred mA. We recorded images with the PhastCam- 1024 PCI model 100k , a lens provided with a set of 3 spacers (68 mm in length) and a teleconverter 3x. The camera speed was set at 250 fps with an exposure of 4 ms. Interesting phenomena could be studied in this type of experiment such as waves and instabilities, dust particle acceleration or particle oscillations.

P20. **Protein Absorption and Cell Attachment on copolymer thin films obtained by MAPLE**

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An important aspect in the field of biomedical research and tissue engineering is given by the biological reactions which occur at proteins and cell-surface interfaces.

For this, many approaches are used for designing specific biomaterials substrates for studying cellular interactions and functions. In this study, thin films of PEG-PCL-Me copolymer with different surface topography were obtained by Matrix Assisted Pulsed Laser Evaporation technique for studying protein adsorption and fibroblast cells behaviors on its surfaces. Fourier Transform Infrared Spectroscopy (FTIR), contact angle measurements and atomic force microscopy (AFM) were used to determine the chemical, morphological and surface wettability of the PEG-PCL-Me copolymer thin films characteristics.

The FTIR data demonstrates that the functional groups in the MAPLE-deposited films remain intact for fluences lower than $1Jcm^{-2}$. From the AFM studies it was shown that the homogeneity, density and the roughness of the coatings are related mainly to the laser parameters. Surface roughness was the main factor for influencing the protein adsorption and the cellular response.

P21. **The study of the influence of biopolymer patterns on cell behavior in vitro**

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The modifications of biocompatible materials are among the main factors used for enhancing and promoting specific cellular activities (e.g. spreading, adhesion, migration and differentiation) within various types of medical applications such as implants microfluidic devices or tissue engineering scaffolds.
In this work, our approach was to combine the advantages given by the characteristics of natural biopolymers (chitosan CS, collagen) with the advantages of femtosecond laser processing in order to obtain chitosan based microstructures. The laser based technique presented here addresses the problem of flexibility in structuring surfaces in a bioabsorbable chitosan polymer and introduces the possibility of tailored microscale and nanoscale topography control. Atomic force microscopy, scanning electron microscopy and optical microscopy were used for the morphological characterization. Our efforts were aimed to corelate the mechanisms controlling the interaction between proteins and cells and engineered substrates for an optimized geometries design of materials to be used as surfaces for cellular studies

P22. **Roughness inspection for tablet using white light profilometry**

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The compressed tablet represents the most popular type of dosage used today. A tablet is a combination of active and inactive substances, in the form of a powder, which is pressed and compacted into a solid. The active substance is not easily administered and absorbed by the human body and it can be mixed or dissolved into an excipient. Using white light interference we try to measure and compare surface roughness values of different types of tablets. White light interferometry is an suitable method for height profile measurement of objects. In contrast to classical interferometry, this method can be used for measurement of objects with rough surface even in the case of speckle imaging. This is an important advantage. The white light interferometer is in principle a Michelson interferometer with a broad-band light source and a CCD camera as a detector.

P23. **Penning source for the extraction of electron beams**

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The current-voltage characteristic of a glow discharge used for the extraction of electron beams of a few keV is discussed. Plasma is obtained in a Penning source with the anode in the shape of a hollow cylinder bounded by two cathodes. The magnetic field, the gas pressure inside the plasma source and the applied voltage are important parameters that determine the discharge current and the electron extraction current. These parameters have been studied experimentally for different geometries which involve the variation of the magnetic field inside the plasma source and of the anode-cathode distance.

P24. **Radiation energy and direction determination after an interaction with a dense medium**

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Detection of an radiation energy and direction with effect in radio frequency require the development of a detector that consists of multiple arrays of antennas. Radio pulse generated by incident radiation represent a ring structure that is spread over a cone surface (Cerenkov cone). In his way the radio pulse meets antennas that can measure his properties. The data from all antennas are used in order to find the incident radiation energy and direction. The noise level in salt medium it is low and the development of an cosmic radiation detector for this medium assume the determination of the particles charged with high energies (10^{12} - 10^{18} eV) and very high (10^{18} - 10^{20} eV).

P25. **Evaporation measurements of pendant droplets which contain different solutions**

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There is currently significant interest in using micro- and nano-droplets in different areas of interest such as: pharmaceutical studies, clinical medicine, micro- and nano lasers study. One of the issues encountered while working with micro- and nano-droplets is the evaporation of the liquid, and consequently the modifications that occur: changes in shape, volume, concentration of the solutions. In other words the time stability of the micro- and nano-droplets is an important issue to study. In this paper are reported results about the time of evaporation measured in several environmental conditions such as: controlled humidity, isolated chamber to avoid air flow, standard room temperature and in opened atmosphere in normal laboratory conditions.

P26. Investigation of interaction mechanisms of a water microdroplet with a focused 532nm laser pulse for different irradiation conditions

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This paper reports results concerning the study of one laser pulse interaction effects on water pendant microdroplets. The beam is emitted at 532nm by SHG of a Nd:YAG laser radiation. The pulse FTWHM is 5ns; the beam waist on the droplet is around 90µm. The water absorption is very low and the interaction is dominated by unresonant phenomena. Function of laser pulse fluence and irradiation geometry the interaction could lead to droplets shape modifications, loss of materials and even destruction accompanied of microjets and nanodroplets generation. Investigations were made by drop shape analysis using a high speed camera at 10kfps.

P27. Doped biological hydroxyapatite thin films synthesized by Pulsed Laser Deposition

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We report comparative studies on HA materials of synthetic or biological origin. SEM-EDS, XRD, FTIR and pull-out tests were performed. SEM investigations proved the existence of particulates with a mean diameter of ~2 µm. EDS analysis revealed the presence of Na, Mg, Cl, and Si. XRD and FTIR evidenced the monophasic HA structure of the films, with their crystallinity degree being influenced by biological origin. Animal origin films exhibited a higher value of adherence compared to synthetic HA. Due to their improved performances and low cost fabrication, animal origin materials could represent a prospective competitor to synthetic HA for implantology applications.

P28. **Finishing treatment of textile materials with ZnO thin films or nanoparticles. Influence of a hydrophobin buffer layer**

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Woven fabrics were functionalized with ZnO films or nanoparticles by PLD. By modifying the ambient gas pressure in the deposition chamber, hydrophilic or hydrophobic surfaces were obtained. This modification is linked to the microstructural differences and surface electrical charging. We got a significant increase of adhesion to substrate and antimicrobial efficiency by means of a buffer layer of hydrophobin. The interposition of the layer

boosted the biocide effect of ZnO films in case of *C. albicans* cultures and mold mix inoculum up to 100%. No such action was observed for the hydrophobin layer alone. A model is proposed for the interpretation of these phenomena.

P29. **Biomimetic nanocrystalline apatite coatings synthesized by Matrix Assisted Pulsed Laser Evaporation for medical applications**

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We report the deposition by Matrix Assisted Pulsed Laser Evaporation technique of biomimetic nanocrystalline apatite coatings on titanium substrates, with potential application in medicine. Metastable, nanometric, poorly crystalline apatites, analogous to mineral bone, were synthesized through a biomimetic approach by double decomposition process. For the deposition of thin films, a KrF* excimer laser source was used (λ = 248 nm, $\tau_{FWHM} \leq$ 25 ns).
The results validate that for the MAPLE method used, the transfer has been proved to be appropriate for a phase which is more hydrated than hydroxyapatite, i.e. closer to the actual structure composition of human body.

P30. **Characteristics and biodegradation properties of polycaprolactone -polyethylene glycol coatings for tissue engineering applications**

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We report polycaprolactone (PCL)-polyethylene glycol (PEG) deposition on titanium and (100) double side polished silicon substrates via Matrix Assisted Pulsed Laser Evaporation (MAPLE) and dip coating (DC) techniques. PCL is known for its excellent tensile properties, flexibility and biodegradability while PEG is recognized for its good biocompatibility.
The composite coatings were characterized by Fourier Transform Infrared spectroscopy, Scanning Electron Microscopy and Atomic Force Microscopy. We also examined the influence of laser fluence on both thin film structure and morphology.
All results proved a stoichiometric and functional transfer of the deposited systems.

P31. Release profile of proteins encapsulated in biodegradable calcium phosphates/ poly(3-hydroxybutyrate-*co*-3-hydroxyvalerate) nanocomposite coatings

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We report the deposition of lysozyme embedded in nanocomposite polymeric coatings on grade 4 CP titanium substrates by Matrix Assisted Pulsed Laser Evaporation (MAPLE) and Dip Coating (DC) techniques. The physico-chemical properties of the coatings were investigated by Fourier Transform Infrared spectroscopy, Scanning Electron Microscopy and Atomic Force Microscopy. We proved that the addition of β-tricalcium phosphates (β-TCP) or hydroxylapatite (HA) into different PBHV polymeric matrixes induces enhanced bioactivity, compared with simple PBHV coatings. The results showed the decrease of nanocomposite biodegradability with the increasing of calcium phosphate amount. The release profile of proteins was evaluated for each nanocomposite system.

P32. Laser speckle pattern techniques applied to corrosion monitoring

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We present an experimental study on corrosion monitoring by using speckle pattern techniques. Our setup includes a three-electrode corrosion cell connected to a PGstat device as commonly used for studying corrosion by standard electrochemical methods. The corrosion cell has a special design to support a video camera, so that we can inspect the probe surface. The probe is illuminated by a laser diode and a speckle patterns is acquired. The speckle pattern has statistical properties and we are studying how they are related to the corrosion state of the probe, which undergoes a corrosion process at a rate controlled by the PGstat.

P33. Investigation of FBGs temperature responsivity

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Fibre Bragg Grating (FBG) optical sensors are particularly attractive for remote and distributed sensing of strain and temperature as the intrinsic sensor is embedded into the fibre. They are good candidates to monitor the environmental temperature. As a first step in the evaluation of such sensors behavior under irradiation conditions, for special applications, we investigated different approaches to be used for on-line measurements of these sensors. We compared the temperature response of FBG sensors manufactured by different technologies, in order to define the most suitable measuring solution. We used several techniques to compare the changes intransmitted spectrum of the FBG shifts subjected to temperature stress.

P34. Optical arrangement for real time viewing of laser ablation and beam analysis

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We describe a new optical arrangement for ablating optical surfaces and for real time viewing of the irradiated area, and simultaneously performing the laser beam analysis. It is based on the ISO 21254-1:2011 standard, fulfills its requirements, but differs from the schematic illustrated in that standard. The arrangement uses a 1064 nm laser and allows a perpendicular viewing of the irradiated area. Fig.1 shows the schematic of our arrangement. The operating principle of the system and the characteristics of the main optical elements are described.

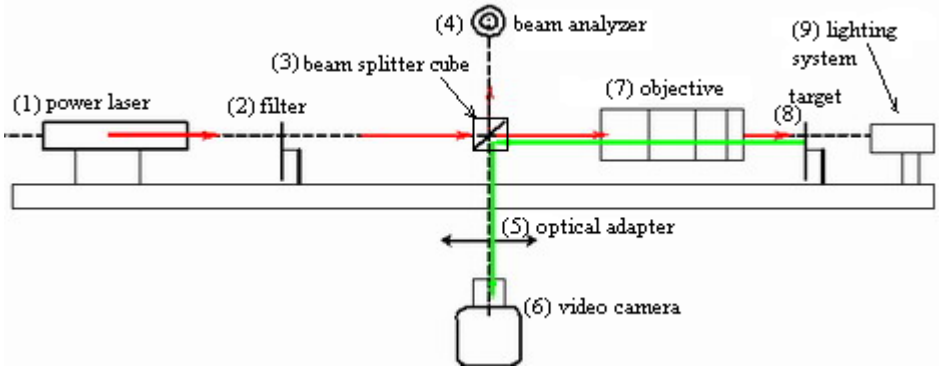

Fig. 1. Schematic of the experimental arrangement for laser ablation, direct viewing, and simultaneous beam analysis.

P35. Silk Fibroin - Poly(3-HydroxyButyric Acid-Co-3-HydroxyValeric Acid) composite biodegradable coatings for biomedical applications

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Composite SF-PBHV (silk fibroin – poly (3-hydroxybutyric-acid-co-3-hydroxyvaleric-acid)) biodegradable coatings were deposited by Matrix Assisted Pulsed Laser Evaporation – MAPLE method, studying their applicability for controlled drug release and/or tissue engineering and regeneration applications in medical implants.
Individually, the chosen biopolymers show excellent biocompatibility, but different degradability and tensile strength properties, herewith combined for attending the targeted biomedical uses.
The stoichiometric transfer as composite thin films was demonstrated by FTIR and XRD, SEM showed the resulted morphology of the obtained coatings and wettability measurements proved them highly hydrophilic surfaces. The degradation and biological assays provided supporting results for drug delivery applications.

P36. Nanoparticles obtained through the process of laser ablation in liquid

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Production of nanoparticles through the pulsed laser ablation of solid targets situated in liquids, can be an efficient method, because of its simplicity, the variety of materials to be produced and dimensions control. The method can be applied to a large class of materials due to the possibility to ablate under the action of laser radiation very hard but also soft materials with a proper selection of incident laser radiation parameters. We have measured by different methods the nanoparticles size and analyzed by optical microscopy and white light interferometry the irradiated surface as a function of some ablation conditions, like incident fluence and irradiation pulses number.

P37. **Vitreous phosphate materials doped with transition, post transition and rare-earth ions**

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The vitreous phosphate materials were intense studied past decades for their interesting applications due to their composition and properties. By adding suitable ions as dopants these materials can be used in optoelectronics [1-4], bio applications [5-6], drugs delivers, and agricultural fertilizers [7-12]. Between the materials which exhibit a relatively large Faraday effect some of the most sensitive materials are the diamagnetic glasses and ferromagnetic crystals [13]. The wavelength dispersions of the Faraday Effect in typical diamagnetic glasses, i.e., silica, borate, silicate, telluride, lead-bismuth-gallate, and As_2S_3, have been examined [14]. Phosphate glasses containing MnO_2, Co_3O_4 and CuO analyzed by Rutherford backscattering spectroscopy (RBS) have higher transition-metal (TM) concentrations in the glass than in the initial batch compositions, change which appears as result of the vaporization of some components, such as phosphorus oxide or alkaline oxides during the melting process [15].
Complex potassium-magnesium-phosphate glasses containing molybdenum, boron, vanadium and iron oxides in 1-7 weight % amounts were prepared using p.a. reagents by melting in electric furnace at 1200-1450 ^{0}C for 2-4 hours. The sol-gel method and pulsed laser deposition from vitreous targets were used for thin film preparations in binary and ternary phosphate systems. The complex bulk materials and thin films were structurally characterized by FTIR, Raman, SEM and EDAX. The optical transmission was measured in UV-Vis-NIR domain, between 200 and 1000 nm.
The obtained materials were tested for biocompatibility, the samples being kept in BSF for 1-21 days and the results were evidenced by using Digital Optical Microscope (MOTIC). The cell morphology was studied for biocompatibility tests, by seeding cells on glass substrates in the presence of the phosphate vitreous materials. The color of cell was done by using a Giemsa 10% solution for 20 min. The samples were analyzed with the Leitz ORTHOPLAN microscope. The MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) method was used to indicate the cells proliferation in Vero cells (cell line isolated from munchies kidney). The results showed no decrease of the life of cells when using vitreous phosphate materials.
The chemical solubility of complex bulk phosphate materials in water was dynamically measured using conductmetric method and the results indicate the possibility of introducing these materials in optoelectronic chemical stable systems but also for alternate uses of some of them as agrofertilizers.