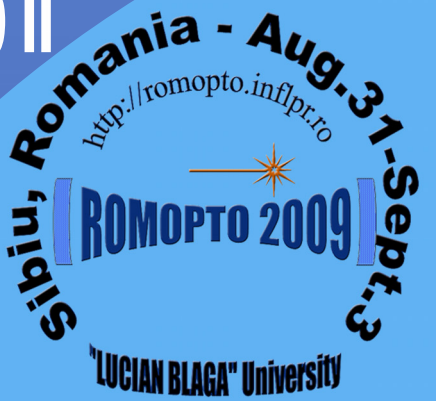
Intl. Conference Micro- to Nano-Photonics II

ROMOPTO 2009

Aug. 31 - Sept. 3, 2009
Sibiu, Romania



PROGRAMME

Topics:

Lasers and Radiation Sources
Lasers in Material Science
Nanophotonics and Quantum Optics
Non-linear and Information Optics
Biophotonics and Optics in Environment Research
Optoelectronics and Optical Components

ORGANISED BY:

Romanian Academy - Division of Physics

National Institute for Laser, Plasma and Radiation Physics (NILPRP), Romanian Center of Excellence in Photonics (ROCEP)

National Institute for R&D in Optoelectronics – INOE 2000

Romanian Physical Society - Division of Optics and Quantum Electronics, The Romanian Territorial Committee of ICO

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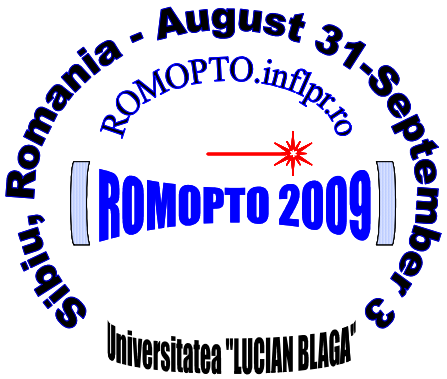

Micro- to Nano-Photonics II

ROMOPTO 2009

9th International Conference on Optics

PROGRAMME

August 31 - September 3, 2009
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TABLE OF CONTENTS

KEY TOPICS:

Section I:	**LRS**	Lasers and Radiation Sources
Section II:	**LMS**	Lasers in Material Science
Section III:	**NQO**	Nanophotonics and Quantum Optics
Section IV:	**NIO**	Non-linear and Information Optics
Section V:	**BOER**	Biophotonics and Optics in Environment Research
Section VI:	**OEOC**	Optoelectronics and Optical Components

MEETING INFORMATION:

Conference Chair:

Prof. Valentin I. Vlad
The Romanian Academy,
National Institute for Laser, Plasma and Radiation Physics, Laser Dept.,
Bucharest University

Phone: +40 (0) 21 457.44.67
Fax: +40 (0) 21 457.44.67; +40 (0) 21 457.42.43
E-mail: vlad@nipne.ro

Period: August 31 (Monday) – September 3 (Thursday), 2009

Venue: The Conference will take place in the “Lucian Blaga” University, "Hermann Oberth" Faculty of Engineering, Sibiu.

Language: The official language of the meeting is English, which will be used for all presentations and printed matters.

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CONFERENCE SCHEDULE

Date	*Time*	*Hall I*	*Hall II*	*Hall III*
August 31 Monday	08.00 – 09.00	**Registration**		
	09.00 – 09.45	**Opening session (Aula "Avram Iancu")**		
	09.45 – 10.45	**Plenary Session 1 (Aula "Avram Iancu") –** Chair: V. I. Vlad **Asher A. Friesem** - "New developments in passive combining of lasers"		
	10.45 – 11.00	***Coffee Break***		
		NIO 1	***LRS 1***	***LMS 1***
		Chair: E. Fazio	Chair: A. A. Friesem	Chair: A. Andriesh
	11.00 – 11.30	**I 1** Maria Calvo	**I 1** V. Lupei	**I 1** I. N. Mihailescu
	11.30 – 12.00	**I 2** Anna Consortini	**I 2** T. Dascalu	**I 2** Carmen Ristoscu
	12.00 – 12.15	**I 3** A. Kamshilin	**O1** N. Pavel	**O1** Tara Desai
	12.15 – 12.30		**O2** Laura Ionel	**O2** V. G. Abashkin
	12.30 – 12.45			**O3** G. Socol
	12.45 – 14.30	***Lunch***		
	14.30 – 15.30	**Plenary Session 2 – (Aula "Avram Iancu") –** Chair: Maria Calvo **Colin J. R. Sheppard** - "Image formation in divided aperture and focal modulation microscopy"		
	15.30 – 16.30	**Johann Peter Reithmaier** - "Single Photon Sources: An Overview of Recent Results"		
	16.30 – 17.00	***Coffee Break***		
		NIO 2	***LMS 2***	***OEOC 1***
		Chair: Anna Consortini	Chair: J. Sagiv	Chair: M. L. Pascu
	17.00 – 17.30	**I 4** M. Chauvet	**I 3** Roberta Ramponi	**I 1** A. Andriesh
	17.30 – 17.45	**I 5** H. Leblond	**I 4** Rodica Cristescu	**O1** Constanta Dascalu
	17.45 – 18.00			**O2** I. Grossinger
	18.00 – 18.15	**O1** D. Mihalache	**O4** C. Isarie	**O3** A. Popescu
	18.15 – 18.30	**O2** E. Fazio	**O5** F. Sima	**O4** D. Sporea
	18.30 – 19.30	**Poster Session**		
	19.45	***Get Together Party***		
Sept. 1 Tuesday	09.00 – 10.00	**Plenary Session 3 (Aula "Avram Iancu") –** Chair: J. P. Reithmaier **Richard M. De La Rue** - "Silicon Nanophotonics Plus"		
	10.00 – 11.00	**Jean Pierre Huignard** - "Nonlinear and adaptive optics for high brightness coherent laser beam combining"		
	11.00 – 11.15	***Coffee Break***		
		NIO 3	***NQO 1***	***BOER 1***
		Chair: M. Chauvet	Chair: S. V. Gaponenko	Chair: Roberta Ramponi
	11.15 – 11.45	**I 6** E. Fazio	**I 1** S. Hickey	**I 1** M. L. Pascu
	11.45 – 12.00	**I 7** H. Leblond	**I 2** D. Cojoc	**O1** T. Dascalu
	12.00 – 12.15			**O2** Maria Mernea
	12.15 – 12.30	**O3** M. Alonzo	**O1** Magda Ulmeanu	**O3** S. B. Yermolenko
	12.30 – 12.45	**O4** S. Popescu	**O2** M. Zamfirescu	**O4** Marina Tautan
	12.45 – 13.00	**O5** M. M. Shabat	**O3** I. Dancus	
	13.00 – 14.30	***Lunch***		

Date	*Time*	*Hall I*	*Hall II*	*Hall III*
	14.30 – 15.30	**Plenary Session 4 (Aula "Avram Iancu")** – Chair: J. P. Huignard **Jacob Sagiv** - "Contact Electrochemical Patterning: Toward Effective Micro-to-Nano-Fabrication by the Bottom-up (Chemical) Approach"		
	15.30 – 16.30	**Poster Session + *Coffee Break***		
		NIO 4	***LRS 2***	***OEOC 2***
		Chair: A. Petris	Chair: E. Turcu	Chair: R. Medianu
	16.30 – 17.00	**I 8** Crina Cojocaru	**I 3** Ph. Zeitoun	**I 2** D. Sporea
	17.00 – 17.15	**I 9** O. Angelsky	**I 4** C. Florea	**O5** Mona Mihailescu
	17.15 – 17.30			**O6** S. Fara
	17.30 – 17.45	**O6** M. Mitrea	**I 5** R. Dabu	**O7** L. Bogdan
	17.45 – 18.00	**O7** Claudia Zenkova		**O8** P. C. Logofatu
	18.00 – 18.15	**O8** H. J. El-Khozondar	**O3** T. Dascalu	**O9** D. Ursu
	18.15 – 18.30	**O9** M. Ciobanu	**O4** Laura Ionel	
	19.00	***Collegial Dinner***		
Sept. 2 Wednesday	09.00-18.00	***Trip***		
Sept. 3 Thursday	09.00 – 10.00	**Plenary Session 5 (Aula "Avram Iancu") –** Chair: R. De La Rue **Sergey V. Gaponenko** - "Plasmonic enhancement of spontaneous emission and scattering of light in nanostructures"		
	10.00 – 11.00	**Edmond Turcu -** "Ultrafast Science and Development at the Astra-Artemis Facility"		
	11.00 – 11.15	***Coffee Break***		
		NIO 5	***NQO 2***	
		Chair: D. Mihalache	Chair: S. Hickey	
	11.15 – 11.45	**I 10** I. Culeac	**I 3** A. Isar	
	11.45 – 12.15	**I 11** I. Mokhun	**I 4** J. J. Simon	
	12.15 – 12.30	**O10** O. Angelsky	**O4** D. Chicea	
	12.30 – 12.45	**O11** E. Scarlat	**O5** I. Nistor	
	12.45 – 13.00			
	13.00 – 13.30	**CLOSING SESSION**		
	13.30 – 14.30	***Lunch***		

LEGEND:

I. Lasers and Radiation Sources	*II. Lasers in Material Science*	*III. Nanophotonics and Quantum Optics*	*IV. Non-linear and Information Optics*	*V. Biophotonics and Optics in Environment Research*	*VI. Optoelectronics and Optical Components*
LRS	***LMS***	***NQO***	***NIO***	***BOER***	***OEOC***

AUGUST 31, MONDAY

<table>
<tr><th>Time</th><th>Hall I</th><th>Hall II</th><th>Hall III</th></tr>
<tr><td>08.00 – 09.00</td><td colspan="3">Registration</td></tr>
<tr><td>09.00 – 09.45</td><td colspan="3">Opening session</td></tr>
<tr><td rowspan="3">09.45 – 10.45</td><td colspan="3">Plenary Session 1 (Aula “Avram Iancu”)</td></tr>
<tr><td colspan="3">Chair: V. I. Vlad</td></tr>
<tr><td colspan="3">Pl. 1. New Developments in Passive Combining of Lasers
<u>Asher A. Friesem</u> and Nir Davidson

Dept of Physics of Complex Systems, Weizmann Institute of Science, Rehovot, Israel

Recent methods for passive phase locking and combining of several laser distributions include coherent, spectral and polarization additions. With these methods, which are based on introducing either intra- cavity or outer- cavity phase elements, it is possible to obtain compact, stable, and practical laser configurations that can generate high output powers concomitantly with good output beam quality. The principles of the methods, considerations for up scaling the number of lasers that can be phase locked and combined, efficient laser configurations, experimental procedures and recent results with solid state lasers and fiber lasers will be presented.</td></tr>
<tr><td>10.45 – 11.00</td><td colspan="3">Coffee Break</td></tr>
<tr><td></td><td>NIO 1</td><td>LRS 1</td><td>LMS 1</td></tr>
<tr><td></td><td>Chair: E. Fazio</td><td>Chair: A. A. Friesem</td><td>Chair: A. Andriesh</td></tr>
<tr><td>11.00 – 11.30</td><td>IV.I.1. Fundamentals and advances in holographic photomaterials for optical data processing and applications
<u>Maria L. Calvo</u>[1], Pavel Cheben[2], Oscar Martínez-Matos[1], Maria Paz Hernández-Garay[1], Jose A. Rodrigo[3]

[1]Departamento de Optica, Facultad de Ciencias Fisicas, Universidad Complutense de Madrid, 28040 Madrid, Spain
[2]Institute for Microstructural Sciences, National Research Council of Canada, Ottawa, K1A 0R6 Canada
[3]Consejo Superior de Investigaciones Científicas (CSIC), Instituto de Óptica “Daza de Valdés”, 28006 Madrid, Spain
E-mail: mlcalvo@fis.ucm.es

The idea of using holograms for storing data was first suggested by van Heerden in 1963, who proposed that the interference pattern, formed in a three dimensional medium could be used for the</td><td>I.I.1. New laser materials and emission processes for non-conventional energy sources – nuclear fusion, solar-hydrogen cycle
<u>V. Lupei</u>

Romanian Academy, Section Physics, 010071 Bucharest, Romania
National Institute of Laser, Plasma and Radiation Physics, 077125 Bucharest, Romania

The paper discusses new laser materials and laser emission schemes with innovative potential of application in new energy sources. The search of laser materials for use in nuclear fusion involves new systems for high energy or ultrashort high peak power laser emission under direct laser diode or lamp pumping, whereas the search for active materials for lasers with solar pumping of potential utilization in production of hydrogen or for spatial applications</td><td>II.I.1. Nanostructured thin coatings synthesized by advanced pulsed laser technologies for biomedical applications
<u>Ion N. Mihailescu</u>

National Institute for Lasers, Plasma and Radiation Physics, Lasers Department, RO-77125, Bucharest-Magurele, Romania

Calcium Phosphates (CaPs), bioglasses or glass-ceramics are promising substitutes for human bones and candidates for the manufacturing of medical implants. <u>Pulsed laser deposition (PLD)</u> proved a competitive method to grow high quality biomaterial thin films. In case of the very complex delicate biomolecules (such as organic and biopolymeric materials), a new deposition technique <u>matrix assisted pulsed laser evaporation (MAPLE)</u> is applied, which is capable to transfer high molecular mass compounds at very low temperatures. Results</td></tr>
</table>

	recording and reading of data. He also predicted that the minimum volume necessary to record a bit of information is $\sim\lambda^3$, (λ: holographic recording wavelength). Since then an impressive amount of work has been developed with the aim to synthesize an optimal photomaterial accomplishing the expected high performances. The Interdisciplinary Group for Optical Computing (GICO-UCM) of the Complutense University of Madrid develops new photomaterials based on the so called photopolymerizable glasses, belonging to the sol-gel class, and study new improvements and applications.	involves systems with increased absorption of solar radiation and with emission in various laser regimes, from CW to short pulse.	by physical-chemical investigations will be evaluated demonstrating that PLD of simple or doped CaP films has the capacity of yielding pure, crystalline, stoichiometric nanofilms and flexibility that allow good control of their morphology, phase, crystallinity, and chemical composition. *In vitro* biocompatibility, bioactivity and biodegradability tests will be assessed proving that human osteoblasts proliferate faster, reach a normal morphology and remain viable when cultured on PLD and MAPLE coatings. Cells cultured on protein modified structures displayed normal morphology, very good viability and optimal spread. *In-vivo* pull out tests of doped CaPs showed that these coatings have strongly activated and enhanced the bone repairing.
11.30 – 12.00	**IV.I.2. Wandering of laser beams: a useful tool for local atmospheric investigations** *A. Consortini*[1], *C. Innocenti*[2] [1]Dipartimento di Fisica, Università degli Studi di Firenze, 50019 SestoFiorentino, Florence, Italy. [2]Dipartimento di Chimica, Università degli Studi di Firenze, 50019 SestoFiorentino, Florence, Italy. E-mail: anna.consortini@unifi.it Wandering of a laser beam in the atmosphere is due to fluctuations of the refractive index of the atmosphere and, having a strong dependence on the path length, is very useful to investigate random or continuous changes of the refractive index during time. First, we describe methods we developed and applied to locally investigate the parameters of turbulence (inner scale, outer scale and structure constant) based on our previous theory of propagation of "thin" beams. Then we describe use of thin beams to investigate the evolution of the refractive index gradient and show experimental results including non stationary and non isotropic conditions.	**I.I.2. Progress in Passively Q-switched Laser** *T. Dascalu and N. Pavel* National Institute for Laser, Plasma and Radiation Physics, Laboratory of Solid-State Quantum Electronics, Magurele, R-077125 Bucharest, Romania E-mail: traian.dascalu@inflpr.ro Passive Q-switched method and several saturable absorbers in various Nd- and Yb- doped crystals, both in lamp-and diode- pumped systems are discussed. We shall focus on understanding the physics of the saturation process in saturable absorbers and new modeling methods for improving the utilization of these materials. Phenomenon like heat loading, range of operation temperature, jitter, and improving slope efficiency are analyzed for various combinations of crystal gain and saturable absorber. Several systems of passive Q-switched lasers and their current application will be discussed.	**II.I.2. Fs pulse shaping for morphology control in PLD** *C. Ristoscu*[1], *G. Socol*[1], *I. N. Mihailescu*[1], *C. Ghica*[2], *D. Gray*[3], *E. Papadopoulou*[3], *C. Fotakis*[3*] [1]NILPRP, Lasers Dept., Bucharest-Magurele, 077125, Romania [2]Natl. Inst. for Material Physics, Bucharest-Magurele, Romania [3]Foundation for Research and Technology – Hellas (F.O.R.T.H.) – I.E.S.L., Crete, Greece; [*]University of Crete, Greece E-mail: carmen.ristoscu@inflpr.ro High intensity fs laser ablation deposition produces amorphous structures with a prevalent content of nanoparticulates. This seems to be the consequence of coupling features of usual fs laser pulses to solid targets. We extended the pulse shaping technique to control the crystallinity and growing morphology of SiC and AlN films on Si (100) substrates by Pulsed Laser Deposition. Pulse shaping introduces the method that makes possible the production of tunable arbitrary shaped train of pulses. We used a laser system generating 200 fs pulses duration at 800 nm with 600 mJ at 1 kHz. The obtained structures are investigated by electron microscopy and X-ray diffraction. We present a comparison of deposited films with and without pulse shaping. Pulse shaping promotes increased crystallization and results in the

			deposition of thin structures with a strongly reduced density of particulates, under similar deposition conditions.
12.00 – 12.15	**IV.I.3. Distance measurements by using dynamic speckles** *Alexei A. Kamshilin, Igor Sidorov, and Ervin Nippolainen* Department of Physics, University of Kuopio, FIN-70211 Kuopio, Finland E-mail: alexei.kamchiline@uku.fi An optical technique of distance measurements using spatially filtered dynamic speckles is very promising for industrial applications because of its very high speed and simplicity of implementation. Here we analyze a limiting accuracy which can be achieved in such a system. We show that in spite of stochastic nature of dynamic speckles it is feasible to design a range sensor capable of measuring distance with submicron accuracy within a 1-ms time window. However, there is a trade-off between the accuracy of z-distance measurements and lateral resolution. Theoretical estimations are supported by the experiments.	**I.O.1. Passively Q-switched Nd:YAG/Cr^{4+}:YAG Laser with a Volume Bragg Grating** *Nicolaie Pavel[1,2], Masaki Tsunekane[1], Takunori Taira[1]* [1]National Institutes for Natural Sciences, Institute for Molecular Science, Laser Research Center, Okazaki 444-8585, Japan [2]National Institute for Laser, Plasma and Radiation Physics, Laboratory of Solid-State Quantum Electronics, Bucharest R-077125, Romania Email: nicolaie.pavel@inflpr.ro; taira@ims.ac.jp Stabilization of the wavelength of emission of a passively Q-switched Nd:YAG/Cr^{4+}:YAG laser at variation of temperature was realized by employing a volume Bragg gratings (VBG) as an output mirror. Comparative results obtained with a classical output mirror are given. It is argued that a VGB device can be used for increasing the pulse energy delivered by a Nd:YAG/Cr^{4+}:YAG laser.	**II.O.1. High power laser ablation and Planetary study** *Tara Desai[1,2], D. Batani[2], M. Bussoli[2], Annamaria Villa[3], R. Dezulian[2], E. Krousky[4], A. A. Aliverdiev[5], M. Kubkowska[6] and J. Wolowski[6]* [1]National Research Institute for Applied Mathematics, Bangalore – 560 082, India [2]Dipartimento di Fisica, Università Milano-Bicocca, 20126-Milano, Italy. [3]Dipartimento di Biotecnologie e Bioscienze, Università Milano-Bicocca, 20126-Milano, Italy [4] PALS, Academy of Sciences, Prague, Czech Republic. [5] Institute of Physics DSC of RAS, 377003, Yaragskogo Str., 94, Makhachkala, Russia. [6] Institute of Plasma Physics and Laser Microfusion, Warsaw, Poland In the recent years, high power lasers have emerged as a potential tool for many exciting research including mega scale astrophysical phenomenon. In this talk we discuss the possibility of extending laser ablation craters to study the impact of meteorite craters in natural environment on earth. We have experimentally studied the laser produced craters using aluminum and natural-granite as targets. Targets were irradiated using different laser facilities under several experimental conditions. Crater dimensions and contours were measured by adopting SEM, FIB, Laser confocal microscope etc. We have observed two types of laboratory craters; Circular, bowl shaped simple craters and intricate structures with central uplift resembling complex craters. 2-D Multi simulations were performed to corroborate the experimental results which interestingly predict the possibility of generating complex craters. Formation of the central peak due to laser ablation is well explained in the case of complex craters. Details of the experimental results will be discussed.

12:15 – 12:30		**I.O.2. Multiple pulses generation for collinear pump-probe experiments** *D. Ursescu, L. Ionel* [1]NILPRP, Lasers Dept., Bucharest-Magurele, R077125, Romania E-mail: daniel.ursescu@inflpr.ro An optical stretcher and a compressor were developed for a laser system with 200 femtosecond pulses. In order to generate multiple pulses, passive pulse shaping technique in the spectral domain was used by introducing a dispersive element in the stretcher. The ratio of the intensity of the pulses can be easily controlled in this way. The system will be used experimentally for multi pulses generation for collinear pump probe experiments.	**II.O.2. Power laser application for security glass production** *V. Abashkin[1,2], Elena Achimova[1]* [1]Center of Optoelectronics, Institute of Applied Physics, Moldova [2]Università Politecnica delle Marche, Ancona, Italy Modern glass application needs to move from traditional tempering with only average controlled fragmentation of security glass to computerized controlled fragmentation by developing engineered stress profiles (ESP) in glass article. The new treatment methods of soda-lime float glass using the energy of power laser which is moved by robot will be discussed.
12.30 – 12.45			**II.O.3. Photocatalytic activity of C, N doped TiO_2 and ZrO_2 thin films synthesized by pulsed laser deposition** *G. Socol[1], S. Nicolae[1], I. N. Mihailescu[1], Yu. Gnatyuk[2], N. Smirnova[2], C. Sutan[3], V. Malinovski[3], A. Stanculescu[4]* [1]NILPRP, Bucharest-Magurele, R077125, Romania [2]Inst. of Surface Chemistry of NAS of Ukraine, Kyiv, Ukraine [3]University of Pitesti, 110040, Pitesti, Arges, Romania [4]Natl. Inst. of Material Physics, Bucharest – Magurele, Romania We report on the deposition of C or N doped TiO_2 thin films on glass substrates by PLD. The influence of the deposition parameters was studied in respect with the catalytic activity of the obtained TiO_2 nanostructured thin films. The photocatalytic activity of doped TiO_2 thin films was investigated during the photoreduction of toxic Cr(VI) ions to Cr(III) in aqueous media under irradiation with visible and UV light. It was demonstrated that TiO_2 films deposited in nitrogen and methane atmospheres have a larger photocatalytic activity under visible light irradiation than undoped TiO_2 structures proving that titania reduction activity is enhanced by doping.
12.45 – 14.30	***Lunch***		

Plenary Session 2 (Aula "Avram Iancu")

Chair: Maria Calvo

14.30 – 15.30

Pl.2. Image formation in divided aperture and focal modulation microscopy

***Colin J. R. Sheppard*[1,2,4], *Wei Gong*[1], *Ke Si*[1,2], *Nanguang Chen*[1,3]**

[1]*Division of Bioengineering, National University of Singapore, Singapore 117576*
[2]*NUS Graduate School for Integrative Sciences & Engineering, National University of Singapore, Singapore 117456*
[3]*Department of Electrical & Computer Engineering, National University of Singapore, Singapore 117576*
[4]*Department of Biological Sciences, National University of Singapore, Singapore 117543*
E-mail: colin@nus.edu.sg

The divided aperture technique improves the rejection of scattered light in confocal reflectance microscopy. Focal modulation is a fluorescence technique that uses divided aperture illumination to modulate temporally the fluorescence signal, combined with detection at the modulation frequency, again to reject scattered light. Image formation in these systems is analyzed, and it is found that resolution is improved compared with conventional confocal systems.

15.30 – 16.30

Pl.3. Single Photon Sources: An Overview of Recent Results

Johann Peter Reithmaier

Institute of Nanostructure Technologies and Analytics, University of Kassel, Germany

New types of single photon emitters were developed based on semiconductor quantum dots (QD) embedded into nanostructured devices in the framework of an European project (QPhoton). The talk will give an overview about recent results of the consortium, which includes new fabrication technologies to allow a very high placement accuracy of single QDs down to the sub-50 nm regime, the realization of ultra-high Q micropillar and photonic crystal cavities as well as the implementation of site-controlled QDs into high-Q cavities. Single photon emission could be demonstrated with < 1% probability of photon bunching. Ultra-high efficiency emitters could be demonstrated by using a new type of nanostructured photonic wires with optimized 3D geometry, which may allow a breakthrough in future quantum key distribution systems.

16.30 – 17.00 ***Coffee Break***

	NIO 2	*LMS 2*	*OEOC 1*
	Chair: Anna Consortini	**Chair: J. Sagiv**	**Chair: M. L. Pascu**
17.00 – 17.30	**IV.I.4. Beam self-trapping by pyroelectric effect** *Mathieu Chauvet, Jassem Safioui, Kien Phan Huy, Fabrice Deveaux* Département d'Optique, Institut FEMTO-ST, UMR CNRS 6174, Université de Franche-Comté, 25030 Besançon cedex, France E-mail: mathieu.chauvet@univ-fcomte.fr Spatial solitons which are self-confined beams can be formed in a variety of optical nonlinear materials. Photorefractive effect is particularly versatile to form such self-trapped beams for very low light power but requires application of high voltage. We instead show that beam self-trapping can occur in	**II.I.3. Fabrication of micro-optofluidic devices by means of femtosecond laser pulses** *R. Ramponi, R. Osellame, R. Martinez Vazquez, K. C. Vishnubhatla, G. Cerullo* Politecnico di Milano, Department of Physics and CNR-IFN (Istituto di Fotonica e Nanotecnologie), , 20133 Milano, Italy E-mail: roberta.ramponi@fisi.polimi.it Femtosecond-laser micromachining is an enabling technology that allows the realization of 3D devices for optofluidic applications. Direct femtosecond laser writing can be used both for the fabrication of high-quality waveguides, and, combined with chemical	**VI.I.1. Fiber optic sensors based on optical interference and mode conversion** *A.M. Andriesh, I.P. Culeac, M.S. Iovu, Iu. H. Nistor* Institute of Applied Physics of the Academy of Sciences of Moldova, Chisinau MD 2028, Republic of Moldova E-mail: ion_culeac51@yahoo.com The report represents a review of state of the art on optic sensors based on optical interference and mode conversion. Fiber optic sensors classification, advantages, and experimental results are examined. It is indicated that optical sensors are very attractive due to many advantages. Optical sensors permit the non-contact determination in the regime on-line of

	photorefractive material by simple crystal temperature adjustment. The pyroelectric effect at the heart of the observed phenomena is shown to lead to spatial soliton formation. Experimental demonstrations are realized in $LiNbO_3$ crystals for moderate temperature change of about 20°C. Results are accurately described by a two-dimensional pyroelectric-photorefractive numerical model.	etching, for the realization of microfluidic channels. On-chip integration of optical waveguides intersecting the microfluidic channels makes it possible to implement photonic functionalities in lab-on-chips, as, for example, spatially-selective excitation and collection of the fluorescence of the microchannel content. By taking advantage of the unique three-dimensional capabilities of femtosecond laser writing, also complex functionalities, such as splitters or Mach-Zehnder interferometers, can be implemented.	such parameters as vibration, displasement, pressure, mechanical defects, distribution of temperatures, deformations etc.) in the conditions of strong electro/magnetic fields, high temperatures and other hazard conditions. The fiber optic sensors can be basically divided in two groups – intrinsic and extrinsic sensors. The report focuses on elaborated and tested in the Center of Optoelectronics of the Institute of Applied Physics of the Academy of Sciences of Moldova of fiber optic sensors for pressure control and optical fiber sensors for registration of low Intensity IR radiation using modal interference.
17.30 – 17.45	**IV.I.5. Spatiotemporal vortex solitons in waveguide arrays** *Hervé Leblond*[1], *Boris A. Malomed*[2], *Dumitru Mihalache*[3,4] [1]Laboratoire POMA, CNRS FRE 2988, Universit´e d'Angers, 49000 Angers, France [2]Department of Physical Electronics, School of Electrical Engineering, Faculty of Engineering, Tel Aviv University, Tel Aviv 69978, Israel [3]Horia Hulubei National Institute for Physics and Nuclear Engineering (IFIN-HH), Department of Theoretical Physics, Magurele-Bucharest 077125, Romania [4]Academy of Romanian Scientists, Bucharest 050094, Romania E-mail: herve.leblond@univ-angers.fr Two-dimensional arrays of optical waveguides, which feature dispersion, nonlinearity and discrete diffraction, support the propagation of spatiotemporal solitonic structures. Several structures with intrinsic vorticity S = 1 and 2 are studied by means of the variational analysis and numerical methods. It is shown that some vortices with S = 1 are stable. Numerical studies of interactions between them make it possible to identify four typical outcomes of the collisions, depending on the initial relative velocity of colliding solitons: rebound of slow solitons, fusion, splitting, and quasi-elastic interactions of fast solitons.	**II.I.4. Functionalized nanostructured thin films of biopolymers synthesized by advanced pulsed laser methods for drug delivery and fast diagnostic/medicine applications** *R. Cristescu*[1*], *I. N. Mihailescu*[1], *I. Stamatin*[2], *D. B. Chrisey*[3] [1]National Institute for Laser, Plasma and Radiation Physics, RO-77125, Bucharest, Romania [2]University of Bucharest, 3Nano-SAE Research Center, Bucharest-Magurele, Romania [3]Department of Material Science and Engineering, Rensselaer Polytechnic Institute, 12180-3590, Troy, NY USA E-mail: rodica.cristescu@inflpr.ro We report on the extension of Matrix-Assisted Pulsed Laser Evaporation (MAPLE) method to the deposition of polymers, biopolymers and organic materials as thin films. The obtained structures were tested for applications in drug delivery and fast diagnostic/medical purposes.	**VI.O.1. Study on Laser-Induced Ripple Structures in Dye-Doped Liquid Crystal Films in High-Intensity Regime** *Ion Palarie*[1], *Constanta Dascalu*[2], *Gabriela E. Iacobescu*[1] [1]Faculty of Physics, University of Craiova, Romania [2]Faculty of Applied Sciences, University Politechnica of Bucharest, RO 060042, Bucharest, Romania E-mail:dascaluc@yahoo.com The photoalignment effect induced by an Ar^+ linearly polarized laser beam on a dye-doped nematic liquid crystal in a pump-probe experiment is investigated. A symmetric capillary cell with two polymer coated glasses was used. An easy axis was induced by rubbing both surfaces in the same direction. The exciting Ar^+ laser beam has the polarization direction perpendicular to the easy axis. The time dependent transmitted intensity of the probe He-Ne laser beam (polarized parallel to the easy axis) has been measured for various power of Ar^+ laser in high-intensity regime and the beginning time of the ripple structure formation has been estimated. The spacing and the depth of the ripple structure were measured by using atomic force microscopy and the induced azimuthal anchoring energy has been evaluated.

17.45 – 18.00			**VI.O.2. Recent Applications of Diffractive Elements** *Israel Grossinger* Holo-Or Ltd, Kiryat Weizmann Rehovot 76114, Israel This paper will cover the most recent applications of diffractive optical elements (DOE) that proved to give significant added value: - 1-D and 2-D multi-spots for laser perforation and medical treatment, in which the splitting of one beam into many beams with one DOE is used - Homogenizers / Diffusers / Top-Hats, which change the power distribution of the beam according to a predetermined function - Samplers to measure and monitor portion of the main beam - Dual Wavelengths DOE
18.00 – 18.15	**IV.O.1. Formation and stability of light bullets: recent theoretical studies** *Dumitru Mihalache*[1,2] [1]Horia Hulubei National Institute for Physics and Nuclear Engineering (IFIN-HH), Department of Theoretical Physics, Magurele-Bucharest 077125, Romania [2]Academy of Romanian Scientists, Bucharest 050094, Romania The spatiotemporal optical solitons (alias "light bullets") are non-diffracting and nondispersing wavepackets propagating in nonlinear optical media. They are localized (self-guided) in two transverse (spatial) dimensions and in the direction of propagation due to the balance of anomalous group-velocity dispersion of the medium in which they form and nonlinear self-phase modulation. The formation of fully three-dimensional light bullets is one of the most exciting, yet experimentally unsolved problems in nonlinear photonics. A brief up-to-date survey of recent theoretical studies of light bullet formation and stability in various settings is given.	**II.O.4. Optimizing the process of multi layer melted powder deposition by laser beam** *Claudiu Isarie* "Lucian Blaga" University of Sibiu, Romania E-mail: claudiu.isarie@ulbsibiu.ro By means of electron and laser beam we could obtain a rapid local heating of the base material and in the same time of the powder which may coat a determined surface. The heat affected zone (HAZ), have relatively small grain size compared to those in arc welds. Also, the HAZ is much narrower comparatively with other deposition processes. Coating ordinary steels with Wolfram or Titanium powder ensures a longer life of utilization for the considered pieces. In this way we could optimize the production, performance and costs. Beam pulsing improves weld quality, by reducing porosity.	**VI.O.3. Refractive index anisotropy in non-crystalline As_2S_3 films** *A. Popescu, D. Savastru, S. Miclos* National Institute of R&D for Optoelectronics INOE 2000, Magurele, Ilfov, RO-077125, Romania E-mail: apopescu@inoe.inoe.ro The refractive index in As_2S_3 non-crystalline thin films was investigated by m-line spectroscopy waveguide method. In order to get a high accuracy of about 10^{-3} the measurements were done on the extraction prism and assuring a waveguide modes coupling as weak as possible. Solving the dispersion equation for TE and TM permitted to put in evidence an optical anisotropy of $20 \cdot 10^{-3}$ in thin films. It was found that the anisotropy diminishes in thicker films and as a result of illumination. These results support the stratified model of the glass matrix in non-crystalline As_2S_3 compounds.

18.15 – 18.30	**IV.O.2. Self-trapped beams in lithium niobate crystals doped with erbium** *M. Alonzo[1], F. Pettazzi[1], M. Bazzan[2], C. Sada[2], A. Petris[3], V.I. Vlad[3], A. Toncelli[4], F. Deveaux[5], M. Chauvet[5], D. Wolfersberger[6] and E. Fazio[1]* [1]Ultrafast Photonics Lab, Dipartimento di Energetica, Sapienza Università di Roma, Roma Italy-UE [2]Dipartimento di Fisica G.Galilei, Università di Padova and CNISM, Padova, Italy-UE [3]National Institute for Lasers, Plasma and Radiation Physics, Lasers Department, Bucharest - Magurele, RO-77125, Romania [4] Dipartimento di Fisica E. Fermi, Università di Pisa and INFM, Italy-UE [5]Département d'Optique, Institut FEMTO-ST, Université de Franche-Comté, Besançon, France-UE [6]LMOPS Laboratory, SUPELEC & University Paul Verlaine, Metz, France E-mail: eugenio.fazio@uniroma1.it We report on the formation of spatially trapped light beams in erbium doped lithium niobate crystals. The generation of such beams is really important for application like active-passive volume interconnections, soliton-waveguide lasers, single-mode integrated amplifiers etc… Starting from the microscopically characterisation of the electro-optic properties of such material, we shall demonstrate the formation of self-trapped beams using either light directly absorbed by the host medium or through photo-induced luminescence. In such last case self-trapped beams result extremely stable in time and space.	**II.O.5. Protein immobilization by pulsed laser techniques to modify cell/biomaterial interactions** *F. Sima[1], E. Axente[1], C. Ristoscu[1], C.N. Mihailescu[1], I.N. Mihailescu[1], K. Anselme[2], L. E. Sima[3], S. M. Petrescu[3], E. Pauthe[4], O. Gallet[4]* [1]National Institute for Lasers, Plasma and Radiation Physics, Bucharest, [2]IS2M, CNRS LRC7228, Haute-Alsace University, 68057 Mulhouse Cedex, France [3]Institute of Biochemistry, Romanian Academy of Sciences, Bucharest, Romania [4]ERRMECE, Cergy-Pontoise University, 95302 Cergy-Pontoise Cedex, France E-mail: felix.sima@inflpr.ro Cell adhesion on different biomaterials is a key factor for cell spreading, growth, and differentiation. In this respect, the design of suitable surfaces for improving the cellular adhesion stands for an essential issue in tissue engineering. We report on the successful deposition of extracellular matrix (ECM) proteins on different substrates by matrix assisted pulsed laser evaporation (MAPLE). The uniform distribution of proteins was put in evidence by Ponceau S Staining Solution on nitrocellulose membranes. Similar protein depositions were performed on biomedical titanium and hydroxyapatite covered titanium to investigate the cellular response of these modified surfaces. The quantitative reproducibility was monitored by spectrofluorimetry assay. Normal morphology and optimal spread with differentiation potential were evidenced by fluorescence and scanning electron microscopy when human osteoblast precursor cells were cultivated on ECM protein modified surfaces. The cellular distribution, viability and morphology were evaluated by comparison with negative and positive controls.	**VI.O.4. Comparative evaluation of two optical spectrum analyzers** *D. Sporea, Laura Mihai, and Adelina Sporea* National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor St., RO-077125, Romania E-mail: dan.sporea@inflpr.ro The paper reports our investigation concerning a comparative evaluation of two optical spectrum analyzers (OSA) capabilities. For this purpose, the two instruments were calibrated for their wavelength indication by separate methods (using a tunable laser source and standard absorption cells). The optical power calibration was done against the laboratory primary standard at 1310 nm and 1550 nm. In both cases the linearity calibration was also performed. The calibrations are traceable to the Swiss National Institute of Metrology - METAS. Additional tests were run for the comparative evaluation with the two OSA of a distributed- feedback laser diode, a Fabry-Perot laser diode, and several optical fiber patch cords.
18.30 – 19.30	**Poster Session**		
19.45	***Get Together Party***		

SEPTEMBER 1, TUESDAY

<table>
<tr><th>Time</th><th>Hall I</th><th>Hall II</th><th>Hall III</th></tr>
<tr><td></td><td colspan="3">Plenary Session 3 (Aula “Avram Iancu”)</td></tr>
<tr><td></td><td colspan="3">Chair: J. P. Reithmaier</td></tr>
<tr><td>09.00 – 10.00</td><td colspan="3">Pl.4. Silicon Nanophotonics Plus
<u>Richard M. De La Rue</u>

Optoelectronics Research Group, Department of Electronics and Electrical Engineering, University of Glasgow, Glasgow G12 8QQ, Scotland, U.K.

The technological processes, starting with high-resolution electron-beam lithography (EBL), and the intrinsic purity of the material available make silicon a vitally important photonic medium. High quality photo-detectors for visible light can be organised on a massive scale, on a single chip - and arrays of silicon-based electron devices can be formed for use in displays. Efforts continue on embedding light emission into silicon in a form that will be useful for telecom applications. This presentation will concentrate on functionality that can be produced by using silicon-on-insulator (SOI) as a nano- and micro-structured light-guiding medium. It will highlight technological challenges that remain.</td></tr>
<tr><td>10.00 – 11.00</td><td colspan="3">Pl.5. Nonlinear and adaptive optics for high brightness coherent laser beam combining
<u>J. P. Huignard</u>, A. Brignon

THALES Research and Technology, 1 Avenue A Fresnel - 91767 Palaiseau, France

The extraction of more energy from solid state lasers, and I particular from fiber lasers, is challenging innovative architectures emitting very high brightness beams whose spatial quality is close to the diffraction limit. The lecture will review the Nonlinear beam interactions and Adaptive optics technologies which permit energy scaling through coherent beam combining of the sources. Experimental demonstrations include the use of Stimulated Brillouin Scattering for nonlinear beam cleanup of multimode fiber lasers and also the phasing of an array of single mode fiber lasers. For coherent combining a novel concept based on digital holography is presented. Experimental results and the potential performances of these different methods will be discussed.</td></tr>
<tr><td>11.00 – 11.15</td><td colspan="3">Coffee Break</td></tr>
<tr><td></td><td>NIO 3</td><td>NQO 1</td><td>BOER 1</td></tr>
<tr><td></td><td>Chair: M. Chauvet</td><td>Chair: S. V. Gaponenko</td><td>Chair: Roberta Ramponi</td></tr>
<tr><td>11.15 – 11.45</td><td>IV.I.6. Photorefractive Simulton in Lithium Niobate
<u>E. Fazio</u>[1], A. Belardini[1], M. Alonzo[1], M. Centini[1], M.Chauvet[2], F. Deveaux[2] and M. Scalora[3]

[1]Ultrafast Photonics Lab, Sapienza Università di Roma, IT-00161 Roma, Italy-UE
[2]Département d'Optique, Institut FEMTO-ST, UMR CNRS 6174, Université de Franche-Comté, F-25030 Besançon, France-UE</td><td>III.I.1. Synthesis and Characterisation of Semiconductor Nanoparticles: Optically Active Centres for Addressing Across the Visible to the Near Infrared.
<u>Stephen G. Hickey</u>

TU Dresden, Physikalische Chemie und Elektrochemie Bergstr. 66b, 01062 Dresden.</td><td>V.I.1. Microdroplets behaviour when exposed to laser radiation field
<u>M. L. Pascu</u>, Adriana Smarandache, I.R. Andrei, V. Nastasa, C.M. Ticos

National institute for Lasers, Plasma and Radiation Physics, Bucharest, Romania;
E-mail: mihai.pascu@inflpr.ro</td></tr>
</table>

	[3]Charles M. Bowden Research Facility, RDECOM, US Army Aviation and Missile Command, Redstone Arsenal, AL-35803, USA The second harmonic generation process strongly depends on the phase-matching condition of the interacting waves. Very far from perfect phase-matching, the wave coupling at the input interface of the nonlinear material generates two second-harmonic pulses, one propagating at the speed given by its refractive index, and one perfectly locked in time with the pump field, and consequently propagating exactly with the same group and phase velocities. If the second harmonic signal is generated in lithium niobate crystals with an external electric bias applied, it will induce a spatial soliton by means of the photorefractive effect, inside which the fundamental can be trapped as well. Consequently we obtain the spatial and temporal locking of the fundamental and second harmonic pulses which travel simultaneously without separating one each other.	The aim of this presentation is to introduce the synthesis of a number of nanocrystalline materials active in the visible or the near infrared, their spectral properties and characterisation and further to discuss the use of a number of combined optical and electrochemical approaches in order to aid research into charge carrier transport and recombination in nano-particulate materials.	The generation of microdroplets in suspended positions containing volumes of liquid samples from 2µl to 10µl (i.e. having diameters between 300µm and 3mm) is reported. The liquid samples were: distilled water, solutions of medicines and laser dyes in distilled water, typically at low concentrations (10^{-5}M). The dynamics of the microdroplets produced by the impact with laser beams focused on them is measured and characterized, for different levels of laser beam powers, microdroplets dimensions and positions of the impact point on the microdroplets surface. The LIF spectra emitted by the laser dyes and medicines solutions contained in the microdroplets as monomers are measured.
11.45 – 12.00	**IV.I.7. Models for few-cyles optical solitons** *Hervé Leblond[1] and Dumitru Mihalache[2,3]* [1]Laboratoire POMA, CNRS FRE 2988, Universit´e d'Angers, 49000 Angers, France [2]Horia Hulubei National Institute for Physics and Nuclear Engineering (IFIN-HH), Department of Theoretical Physics, Magurele-Bucharest 077125, Romania [3]Academy of Romanian Scientists, Bucharest 050094, Romania E-mail: herve.leblond@univ-angers.fr The propagation of few-cycle optical pulses (FCPs) in nonlinear media can be described by means of a model of modified Korteweg-de Vries-sine Gordon (mKdV-sG) type. This model has in some special situations the advantage of being 'integrable', which allows us to study the interactions between FCPs. This model is very general: we show that all other non-SVEA models of FCP propagation which can be	**III.I.2. Optically driven motors: complex or simple configuration for the rotors ?** *Dan Cojoc, Enrico Ferrari, Silvia Santucci, Lara Selvaggi, Paolo Beuzer* CNR-INFM National Laboratory TASC, Trieste, Italy Different versions of micro-motors have been developed in the last two decades based on the transfer of the linear and angular momentum of laser beams to micro-particles. The goal of this work is to review the most significant achievements and discuss their advantages and drawbacks. Some examples of optically driven motors developed in our laboratory are also shortly presented and a simple solution using a trapped piece of capillary as rotor is finally proposed.	**V.O.1. THz Time Domain System for Biomolecules Spectroscopy** *Traian Dascalu[1], Aurel Leca[1], Mihai Dinca[2], Dan Apostol[1], Maria Mernea[3], Octavian Calborean[3], Dan F. Mihailescu[3]* [1]National Institute for Laser, Plasma and Radiation Physics, Laboratory of Solid-State Quantum Electronics, Bucharest R-077125, Romania [2]Universitatea Bucuresti Facultatea de Fizica, Romania [3]Universitatea Bucuresti Facultatea de Biologie, Romania Email: traian.dascalul@inflpr.ro The spectral characteristics of a THz time domain spectroscopy system are investigated and the results for polyethylene, Teflon and BSA-bovine serum alumina are presented. On the spectral range 0.2 THz to 3 THz the spectral resolution is 7.4 GHz when data are averaged by a factor of 10.

12.00 – 12.15	found in the literature, especially the so-called 'short pulse equation', are in fact approximations or special cases of the mKdV-sG model. Finally, an analogous model valid in the case of a quadratic nonlinearity will be discussed.		**V.O.2. THz vibrational spectra simulated by molecular dynamics** *Maria Mernea[1], D. F. Mihailescu[1], O. Calborean[1], A. Leca[2], D. Apostol[2], M. Dinca[3], T. Dascalu[2]* [1]Dept. of Anatomy, Animal Physiology and Biophysics, Faculty of Biology, University of Bucharest, 050095, Bucharest, Romania [2]Solid State Quantum Electronics Laboratory, National Institute for Laser, Plasma and Radiation Physics, Bucharest, Romania [3]Faculty of Physics, University of Bucharest, Romania E-mail: maria.mernea@bio.unibuc.ro THz spectroscopy is a very powerful tool in investigating the vibrational modes and conformational transitions of biomolecules. Here we have used THz spectroscopy to study the vibrational spectrum of bovine serum albumin, a protein with unknown 3D structure. The experimental data was fitted with a theoretical spectrum obtained by molecular dynamics simulations on a BSA structure generated by homology modeling.
12.15 – 12.30	**IV.O.3. Coherent collisions in photorefractive InP:Fe** *M. Alonzo[1,2], C. Dan[2], D. Wolfersberger[2], E. Fazio[1]* [1] Ultrafast Photonics Lab, Sapienza Università di Roma, IT-00161 Roma, Italy-UE [2]LMOPS UMR 7132 – Unité de Recherche commune à l'Université Paul Verlaine et SUPELEC, 50070 Metz , France E-mail: massimo.alonzo@uniroma1.it Collisions between two coherent parallel beams in photorefractive indium phosphide have been studied by taking into account the effects of light intensity, temperature and mutual distance. This material is one of the best candidates to realize all-optical reconfigurable guiding device, an all-optical router, for fast signals in the range of telecommunication wavelengths. In fact iron doping makes this material photorefractive and sensitive to infrared wavelengths in the telecommunication window, and the semiconductor nature offers a very fast response time which is in the order of milliseconds to attain the stationary regime.	**III.O.1. Picosecond laser assisted surface nanostructuring with optical near-field enhanced effects** *M. Ulmeanu, M. Zamfirescu, L. Rusen, C. Luculescu, A. Moldovan, A. Stratan, R. Dabu* National Institute for Laser, Plasma and Radiation Physics, Laser Department, 077125 Magurele - Bucharest, Romania E-mail: magda.ulmeanu@inflpr.ro The effects of optical near-field in the interaction of transparent particles on different substrates: Au, Ag, Co thin films and glass substrates have been examined experimentally and theoretically. It has been found that nano-holes in a regular arranged structure can be created at the contacting point between colloidal particles and the substrates by laser irradiation (λ = 532 nm, pulse duration τ = 400 ps) with a single pulse. The influence of the laser fluence on the nano-structuring of the substrate surfaces has been investigated. The morphologies of the nano-holes have	**V.O.3. Optical pre-clinical diagnostics of the prostate tissues malignant changes** *O. V. Angelsky[1], S. B. Yermolenko[1*], A. O. Angelskaya[1], O. G. Prydij[1], I. Gruia[2], M. I. Gruia[3]* [1]Correlation optics department, Chernivtsi National University, Chernivtsi, 58012, Ukraine [2]University of Bucharest, Optics-Spectroscopy-Plasma-Lasers Dept., Bucharest, Romania [3]Institute of Oncology, Bucharest, Romania E-mail: yeserg@rambler.ru This work is directed to the investigation of the scope of the technique of laser polarimetry of oncological changes of the human prostate tissue under the conditions of multiple scattering, which presents a more general and real experimental clinical situation. To compare the above mentioned scope of biotissue laser polarimetry on the first stage the research of human prostate tissue in the conditions of single scattering was performed. It was established than a combination between the

	The photorefractive nature allows self-trapping of a beam propagating inside it by means of the Pockels effect which can induce a positive refractive index variation able to compensate the diffraction of the light and create a guide for the light. This in turn offers many advantages like for example very low propagation losses, all-optical reconfigurability and the possibility of being written in any point of the volume of the material. Self-trapping has been demonstrate for λ=1.3μm and both at λ=1.064μm and λ=1.55μm. The microscopic charge movements giving rise to photorefractivity in indium phosphide are sensitive both to the light intensity and the temperature, and because of this, its behavior has been investigated by changing these two parameters. We experimentally demonstrate that it is possible to make the two parallel beams fuse so to create only one waveguide (Y junction) or to repel one each other by simply changing the relative phase between them: $\Delta\Phi=0$ and $\Delta\Phi=\pi$. Furthermore the dependency of this behavior from light intensity, temperature and distance between the two beams has been investigated.	been characterized by an atomic force microscope and a scanning electron microscope. The diameter and the depth of the created nano-holes are in the range of 125 – 250 nm and 30-50 nm, respectively, depending on the substrate surface. Theoretical calculation using the FDTD (finite-difference time-domain) technique indicates that incident light produces enhanced light intensities on the contacting area (substrate surface). Experimental results are explained in respect with the theoretical calculations.	spectropolarimetry methods with biochemical essays can deliver new date to identify the cell transformation. These data followed in the experimental tumoral growth dynamic became useful to establish the optimum moment for the oncostatic treatment application.
12.30 – 12.45	**IV.O.4. Arrays of soliton waveguides in lithium niobate for parallel coupling** *S. T. Popescu[1], A. Petris[1], V. I. Vlad[1], E. Fazio[2]* [1]National Institute for Laser, Plasma and Radiation Physics, Bucharest-Magurele, Romania [2]University "La Sapienza", Rome, ITALY Lithium niobate is a promising material for all-optical integrated photonics, particularly for soliton waveguides. An array of 13 x 10 soliton waveguides has been induced in a lithium niobate crystal using c.w. extraordinary polarized laser light at 532 nm wavelength. The recording parameters have been selected in order to obtain slightly tapered circular soliton waveguides. The spatial separation between waveguides (100 μm) ensures their good recording,	**III.O.2. Submicrometer geometries produced by Two Photon Polymerization technique** *Florin Jipa[1], Marian Zamfirescu[1], Iulian Ionita[2], Catalin Luculescu[1], Razvan Dabu[1]* [1]National Institute for Laser Plasma and Radiation Physics - INFLPR , 077125 Magurele, Bucharest, Romania [2]Bucharest University, Faculty of Physics, Romania E-mail: florin.jipa@inflpr.ro Submicrometer 3D structures can be created in photoresists by two photon photopolymerisation (TPP) effect induced by nonlinear absorption of femtosecond laser pulses. In this work we present the experimental setup and the results obtained in SU-8 commercial photopolymer using the TPP technique. The control software was developed in order to create complex structures in the volume of the photoresist. The	**V.O.4. Optospectral techniques for mining waste characterization in Baia Mare region, Romania** *Maria Zoran[1], Roxana Savastru[1], D. Savastru[1], Marina Tautan[1], S.Miclos[1], D.C. Dumitras[2],T. Julea[2]* [1]National Institute of R&D for Optoelectronics, Bucharest Magurele, RO-077125, Romania [2]National Institute for Laser, Plasma and Radiation Physics -Laser Department, RO-077125, Bucharest, Romania E-mail: mzoran@inoe.inoe.ro Spectral patterns of different mining waste can identify certain compounds, materials, and conditions based on the interaction of photons with the molecular structure of the target material. Based on such methods, the objective of this research was to evaluate and characterize selected hazardous waste disposal sites in Baia Mare region, Romania,

	avoiding the possible deformation of soliton channels over a long distance (more than 15 diffraction lengths) and allowing the individual addressing of each soliton waveguide. The coupling and guiding properties of this parallel optical coupler at different wavelengths with c. w. and pulsed laser signals are investigated.	processing parameters are fully controlled by computer, such as translation speeds in XYZ directions, laser energy, and structures geometry. Structures with dimensions down to 1 μm were obtained on photopolymers deposited on glass and fused silica. Woodpile structure, microfibers, 3D blocks, etc. are presented, as applications for MEMS, photonic crystals, or more complex photonic microdevices.	where the tailings pond and deposited waste endanger natural and cultural values of environment. Based on Landsat TM, ETM and IKONOS satellite data over 1989- 2007 period, have been investigated landcover changes in some mining industry test areas. Accuracy of image processing results (mineralogical classification) was confirmed through ground sampling and analysis of reflectance spectra with portable GER 2600 spectroradiometer.
12.45 – 13.00	**IV.O.5. Nonlinear Slab waveguide optical sensor using double-negativity materials** *Sofyan A. Taya and Mohammed M. Shabat* Physics Department, Islamic University, Gaza, Gaza Strip, Palestinian Authority E-mails: staya@iugaza.edu.ps, shabatm@googlemail.com An increasing attention has been paid to the nonlinear optical waveguides after many of their promising properties. In this work, we investigate the properties of nonlinear slab waveguides in the optical sensing. These sensors are field resistant, small sized, safe when used in aggressive environments and mechanically stable. We present an extensive theoretical analysis of different waveguide structures as optical sensors. In these structures we introduce nonlinear materials with an intensity dependent refractive index and left-handed materials with simultaneously negative permittivity and permeability. TE and TM modes are both considered. In each case, the dispersion relation and the sensitivity of the proposed sensor are derived. The variation of the sensitivity with different parameters of the structure is discussed. The conditions of the maximum sensitivity are presented. The theoretical requirements for reaching high sensitivity of the proposed nonlinear waveguide sensor will also be determined which will allow the designer to find the work basis of maximum sensitivity and to create the right dimensioning of the proposed structure.	**III.O.3. Optical limiting and phase modulation in colloidal CdTe nanocrystals** *I. Dancus[1], V. I. Vlad[1], A. Petris[1], N. Gaponik[2], V. Lesnyak[2]* [1]NILPRP, Department of Lasers , 077125 Bucharest - Magurele, Romania [2]TU Dresden, Physical Chemistry/Electrochemistry, 01062, Dresden, Germany E-mail: ioan.dancus@inflpr.ro In this work we are demonstrating optical functionality obtained with colloidal CdTe nanocrystals in water. We based our research on the previously observed huge and controlled nonlinear optical properties of CdTe nanocrystals due to the strong quantum confinement and near resonant interaction with the excitation light. For this investigation we take into account two basic types of functionalities: optical limiting and phase modulation, presenting theoretical demonstrations and experimental proof of concept. These types of functionalities are of special interest for integrated optical devices with application in imaging and telecom.	
13.00 – 14.30	***Lunch***		

14.30 – 15.30

Plenary Session 4 (Aula "Avram Iancu")

Chair: J. P. Huignard

Pl.6. Contact Electrochemical Patterning: Toward Effective Micro-to-Nano-Fabrication by the Bottom-up (Chemical) Approach

Rivka Maoz, Assaf Zeira, Jonathan Berson, and Jacob Sagiv

Department of Materials and Interfaces, The Weizmann Institute of Science, Rehovot 76100, Israel

Nanofabrication by chemical means (the so-called *bottom-up* approach) holds great promise as an advanced strategy for the future assembly of new types of devices. At present, however, we are still lacking an effective chemical assembly methodology applicable over the entire lateral dimensions range from *nano* to *macro* (i.e. from nanometer to centimeter), which is required if this approach is going to become technologically relevant.
We report a series of novel advances toward this goal, deriving from the basic working concept of *Constructive Lithography* (R. Maoz et al., *Adv. Mater.* **2000**, *12*, 725-731; S. Hoeppener et al., *Nano Lett.* **2003**, *3*, 761-767), which offer the unprecedented capabilities of: (i) direct one-step printing (*contact electrochemical printing, CEP*) and replication (*contact electrochemical replication, CER*) of organic monolayer surface patterns consisting of hydrophilic domains surrounded by a hydrophobic background, and (ii) transfer, between two contacting solid surfaces, of monolayer-supported metal patterns (*contact electrochemical transfer, CET*). Recent proof-of-concept experiments show that *CEP*, *CER,* and *CET* may be implemented under a variety of different experimental conditions, regardless of whether the initial "master" pattern was created by a parallel (fast) or serial (slow) patterning process. In principle, such contact electrochemical processes could thus offer a straightforward means for rapid generation of multiple copies of surface patterns spanning lateral length scales from nanometer to centimeter, including the rapid parallel reproduction of master nanopatterns created by serial scanning probe techniques such as AFM.

15.30 – 16.30

Poster Session + *Coffee Break*

	NIO 4	***LRS 2***	***OEOC 2***
	Chair: A. Petris	**Chair: E. Turcu**	**Chair: R. Medianu**
16.30 – 17.00	**IV.I.8. Phase Locked second and third harmonic localization in semiconductor cavities** *C. Cojocaru[1], V. Roppo[1,3], G. D'Aguanno[3], F. Raineri[2], J. Trull[1], R. Vilaseca[1], R. Raj[2], M. Scalora[3]* [1]Universitat Politècnica de Catalunya, ETSEIAT, E-08222, Barcelona, Spain [2]Laboratoire de Photonique et de Nanostructures, CNRS UPR20, 91460 Marcoussis, France [3]C. M. Bowden Research Facility, Redstone Arsenal, USA Email: crina.maria.cojocaru@upc.edu In this work we investigate from both experimental and theoretical point of view the behavior of the phase-locked second and third harmonic generated signal when it propagates in a cavity made of an absorbing material for the harmonics and designed to be resonant only for the fundamental field. We show	**I.I.3. Intense pulsed lasers : carried out researches and their applications in the LOA - laboratory of applied optics, a French, European and World leader center of the domain** *A. Rousse, P. Zeitoun, C. Florea* Laboratoire d'Optique Appliquée, Palaiseau, France The research activity of LOA is divided into 7 groups making it possible to cover at the same time the development of the intense lasers femtosecondes, the interaction laser-matter and plasma physics, the production of particle and radiation sources per laser, and the applications of the femtosecondes sources. The researchers have at disposal 9 rooms of experiments on site, and also collaborate in a constant way with our	**VI.I.2. Assessment of irradiation effects in multimode optical fibers** *D. Sporea[1], Adelina Sporea[1], C. Oproiu[1], I. Vata[2], D. Negut[2]* [1]National Institute for Laser, Plasma and Radiation Physics, RO-077125, Romania [2]National Institute for Physics and Nuclear Engineering – "Horia Hulubei", Magurele, RO-077125, Romania E-mail: dan.sporea@inflpr.ro The paper focuses on the investigation of color center dynamics in multimode optical fibers, as they are irradiated with gamma-rays, neutron and electron beams. The optical measurements reported were performed both on-line and off-line, mostly in the UV spectral range as the most effective colour

	that not only that the phase locked components are transmitted trough the opaque material (inhibition of the absorption), but also that the conversion efficiency of this components are substantially increased when propagation occurs in a cavity designed to be resonant for the fundamental beam. The consequences can be far reaching, because they open the door to the examination of new optical phenomena at or near resonance. Direct applications can be the achievement of subwavelength resolution and a new management of etalon effect that can lead to a new, low cost and easy to build, UV sources.	national and international partners. The activities are supported by the SELF (System Experimental and Laser Femtosecondes) and the DSG (Direction of the General Services). The laboratory continues a policy of strong search for contracts that is at the national level that international. The annual budget of the laboratory is around 3 M€, and are resulting from the contracts and from the basic support granted by 3 supervisions (ENSTA, Polytechnic School and CNRS).	centers are generated there. The temperature recovery effect related to the irradiation induced colour centers is also discussed. The goals of these investigations were: to further improve the optical absorption measurements in the UV-visible spectral range in fibers; to evaluate the possibility of using alternative methods for identifying colour centers in fibers (i.e. EPR).
17.00 – 17.15	**IV.I.9. About the polarization peculiarities of vector optical fields** *Oleg V. Angelsky[1], Sergij B. Yermolenko[1], Claudia Yu. Zenkova[2], Alla O. Angelskaya[1]* [1]Department of Correlation Optics, Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi 58012, Ukraine, E-mail: angelsky@itf.cv.ua [2]Optics and Spectroscopy Department, Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi 58012, Ukraine, E-mail: zenkova@itf.cv.ua The statement is substantiated that the experimental estimation of the degree of correlation of statistical vector optical fields must include not only the measurement of the visibility of the interference pattern, but also the deepness of the polarization modulation (degree of polarization) in the resulting spatial distribution of a field. The mathematical approach, experimental methods and arrangement for the estimation of polarization properties of optical fields have been proposed in this paper.	**I.I.4. Better contrast ratio of high-intensity ultra short laser pulses generated by CPA – Applications** *Cristian Florea[1], Guy Hamoniaux[2], Mihai Ganciu[3], Rares Medianu[4]* [1]ESIEE Engineering Paris - Université Paris Est / ESYCOM & LOA / UMR 7639 du CNRS / Laboratoire Commun de l'X et de l'ENSTA, France [2]LOA / UMR 7639 du CNRS / Laboratoire Commun de l'X et de l'ENSTA, France [3]INFLPR Bucharest, Romania & Université Paris Sud, France [4]INFLPR Bucharest, Romania E-mail: cristian.florea@univ-paris-est.fr Various factors affecting the contrast and pulse shape of ultra short light pulses from a chirped pulse amplification (CPA) laser system are identified. The possibility of using high-power lasers to generate high-quality beams of energetic ions is attracting large global interest. The prospect of using laser-accelerated protons in medicine attracts particular interest, as these schemes may lead to compact and relatively low-cost sources. The machined quality of the parts by using the impulses of laser of femto seconds (fs) with the fluency of high energy proved to be limited by the contrast of intensity of laser. Measuring of the ratio of main pulse energy to that of pre-pulses or to the spontaneous emission (ASE) level	**VI.O.5. Wavelet filters for programmable object investigation in digital holographic microscopy** *M. Mihailescu, A. M. Preda, E. I. Scarlat* POLITEHNICA" University from Bucharest, Physics Department,060042 – Bucharest, Romania E-mail: mona_m@physics.pub.ro Digital holographic microscopy is a technique which permits the investigation of the transparent objects. In the experimental setup, based on Mach-Zehnder interferometer with microscope objectives in both reference and object arms, we record on the CCD the hologram of a liquid crystal display, an electronically addressable device. The advantage of the digital processing of the recorded holograms is the fact that we can apply numerical filters (wavelet filter in our case), and study their effect in the image of the reconstructed object, with the aim to line out the object details. Based on Fresnel transform, we simulate the propagation of the diffracted wave after it passes through the hologram and obtain information about the phase of the holografied object. The simulation and experimental results are presented. The advantages of the programmable device for small phase shift investigation and the effectiveness of wavelet filtering are discussed.

17.15 – 17.30		is very important in experiments on generation of dense plasma (solid target experiments) where the intensities as high as 10^{20} W/cm^2 are produced. For such laser systems, weak pre-pulses or even the amplified spontaneous emission (ASE) could still be intense enough to ionize the matter and produce plasmas that expand significantly before the main pulse interacts with the target. Different kind of antireflection-coated targets for plasma mirror experiments will be investigated. The third order cross-correlation dispositive is provided for measuring the contrast ratio of laser pulses to pulse pedestal, before and after peak -pulses, or to ASE level in high-energy fs systems. The ratio of main pulse before and after the peak is decisive in time resolved experiments. It is shown that a contrast ratio exceeding 10^{10} is achievable with appropriate techniques.	**VI.O.6. Influence of the optical parameters of the Quantum Well Solar Cells upon solar cells conversion efficiency** *S. Fara[1], P. Sterian[2], L. Fara[2], M. Iancu[1]* [1]IPA SA Bucharest, 014459, Bucharest, Romania [2]University „Politehnica" Bucharest, Bucharest 060042, Romania E-mail: sfara@ipa.ro This paper tackles different original aspects regarding the influence of the optical parameters of the quantum well solar cells, upon conversion efficiency, based on modelling and simulation approach. The main results obtained during simulation: - One can evaluate the effect of the number of quantum wells upon the refraction index, as well as upon the losses through reflection; - The reflectance model can be used to determine the effects of variations in the number of quantum wells upon the refraction index. - External and internal quantum efficiencies of the quantum dots were computed depending on the absorption spectrum coefficient.
17.30 – 17.45	**IV.O.6. Monte-Carlo Simulations for Image Watermarking Purposes** *Mihai Mitrea[1], Afef Chammem[1], Françoise Prêteux[1], Adriana Vlad[2,3]* [1] Institute TELECOM, Department ARTEMIS, Evry, France [2] Faculty of Electronics and Telecommunications, POLITEHNICA University, Bucharest, Romania [3] The Research Institute for Artificial Intelligence, Romanian Academy, Bucharest, Romania E-mail: mihai.mitrea@it-sudparis.eu By exploiting and extending the Shannon's information theory, image watermarking aims at protecting the intellectual property rights associated to visual content (still and motion pictures). Under this framework, the authors' previous work brought into evidence how the related natural noise and information sources can be theoretically modelled with accuracy. The present study goes one step	**I.I.5. TEWALAS, 20-TW femtosecond laser facility** *R. Dabu, R. Banici, C. Blanaru, C. Fenic, L. Ionel, F. Jipa, L. Rusen, S. Simeon, A. Stratan, M. Ulmeanu, D. Ursescu, M. Zamfirescu* INFLPR, Magurele, Romania E-mail: razvan.dabu@inflpr.ro TEWALAS, a 20 Terawatt laser system is installed in 2009 at National Institute for Laser Plasma and Radiation Physics in Magurele, Romania. The system is based on the Chirped Pulse Amplification technique and delivers pulses as short as 22 fs with energies up to 450 mJ per pulse at 10 Hz repetition rate. Key features are the amplitude and phase shaping of the femtosecond pulses and the contrast of the pulse down to 10^{-8}. The system aims to become a national research facility and supports the Romanian efforts for hosting Extreme Light Infrastructure European facility.	**VI.O.7. Stop band filter with monomod resonator, built inside a square symmetry 2D photonic crystal** *Lazar Bogdan, Paul Sterian* Bucharest Polytechnic University, Academic Center for Optical Engineering and Photonics, 77206 Bucharest, Romania E-mail: lbogdan2001@yahoo.com In this paper a stop band filter with monomod resonator, having potential applications in photonic crystal microcircuits, is studied. The analysis is based on "coupled mode theory" which is an approximate method that allows relatively simple derivations of optimal design parameters. Coupled cavities appear everywhere in optical circuits. In many cases, they induce parasitic effects like big reflections back to the source. In other situations, if carefully designed, optical devices

	further: it develops and implements Monte Carlo tools able to deploy such statistical models into real life watermarking applications. The first main advantage is the possibility of theoretically designing and controlling the watermarking features. Actually, the robustness (*i.e.* the resistance against malicious users) can be tuned by sampling changing the Monte Carlo parameters while the transparency (*i.e.* the possibility of protecting the visual content without altering it) is to be ensured by simulating the human visual system. Note that from the computational point of view, these simulations are very simple and allow a speed-up by a factor of about 100 (when compared to the reference methods).		consisting of micro cavities and guides can act as filters. The purpose of this paper is to establish a procedure for designing efficient stop band filters with monomod, laterally coupled, cavities using a combination of analytical formula and numerical simulations.
17.45 – 18.00	**IV.O.7. Optical Bistability of Layer Crystals** *Claudia Yu. Zenkova* Optics and Spectroscopy Department, Chernivtsi National University, 2 Kotsyubynsky Str., Chernivtsi, 58012, Ukraine E-mail: zenkova@itf.cv.ua The influence of outside factors on the formation of the multilevel measuring and controlling system has been analyzed. The use of the optical bistability (OB) phenomenon, as an alternative mechanism for creating such systems, has been proposed. Using layer crystals of the PbI_2-type as an example, we have demonstrated the possibility of operating the development of nonlinear outgoing characteristics with the aim of controlling the size of signals in metrology systems.		**VI.O.8. Classical holographic experiments in digital terms** *Petre Cătălin Logofătu, Dan Apostol, Adrian Sima* Laser Department, National Institute for Laser, Plasma and Radiation Physics, Măgurele, Ilfov, Romania E-mail: petre.logofatu@inflpr.ro In this paper we present some classical holographic experiments only this time performed in an all-digital experimental setup. The information of the hologram is either calculated using discrete light diffraction formulae or recorded on a CCD, which takes the place of the registration holographic plate. The information of the hologram is coded on a SLM which reproduces the effects of the diffraction through the hologram. Experiments starting from the simple playback of computer generated Fourier holograms, going through basic interference experiments such as obtaining fringes of equal inclination up to more sophisticated configurations such as Fresnel holograms, are presented with a stress on the digital special aspects that make these experiments depart from their classic counterpart.

18.00 – 18.15	**IV.O.8. Electromagnetic Surface Waves of a Ferrite Slab Bounded by Metamaterials** *Hala J. El-Khozondar[1], Zeyad I. Al-Sahhar[2], Mohammed M. Shabat[3]* [1]Electrical and Computer Engineering Department, Islamic University, Gaza, Palestinian Territory [*]Instutite for Measurement Systems and Sensor Technology, Technical University Munich, D-80290 Munich, Germany [2]Physics Dept., Al-Aqsa University, Gaza, Palestinian Territory [3]Physics Dept., Islamic University, Gaza, Palestinian Territory E-mail: shabatm@gmail.com The dispersion characteristics of electromagnetic surface waves (EMSW's) supported by a ferrite film of finite thickness magnetized parallel to the planes of its interfaces with metamaterials (MTMs) surroundings are numerically investigated. MTMs have simultaneously negative permeability μ and negative permittivity ε. The dispersion equation is analytically derived and magnetostatic approximation is considered. The surface wave frequency plotted versus effective index for different slab thicknesses. Results show that wave in microwave range can only satisfy the condition of negative effective permeability of the ferrite slab. Surface waves propagate through the film for the considered values of ε and μ.	**I.O.3. Passively Q-switched Nd:YAG/Cr^{4+}:YAG Laser Operated at High Temperature** *Traian Dascalu, Nicolaie Pavel, Nicoleta Vasile, Aurel Leca, Gabriela Salamu, and Oana Sandu* National Institute for Laser, Plasma and Radiation Physics,Laboratory of Solid-State Quantum Electronics, Bucharest R-077125, Romania E-mail: traian.dascalul@inflpr.ro The characteristics of a compact Nd:YAG laser passively Q-switched by Cr^{4+}:YAG saturable absorber are investigated function of temperature. Pulse energy and duration vary less than 20% over the 25°C to 150°C temperature range.	**VI.O.9. The interferential alignment of optical surfaces** *Dan Ursu[1], Georgeta Sorohan[1], Fanel Stegaru[1], Henri Courbet[2], Marius Gurau[2]* [1]PRO OPTICA - Romania [2]LORD INGENIERIE– France The alignment is a very important problem in the process of achieving the design performances of the optical systems. There are numerous methods used for the alignment of optical surfaces of the optical systems. A lot of them need the rotation of the optical component. None of them is general suitable. The use of a long coherence length laser gives the possibility to use the interference of reflected beams from different surfaces of the optical system to evaluate the alignment errors. The method is useful in the case of the optical surfaces with big radiuses (small curvatures) and relatively big dimensions, where the turning of the optical component is difficult to be achieved. The paper is dedicated to presentation of the results of the application of the above mentioned technique to manufacturing of a lens with 340 mm diameter and about 950 mm focal distance having three components with spherical or plane surfaces.
18.15 – 18.30	**IV.O.9. Method of secure information transmission using chaos** *M. Ciobanu, D. Savastru, M. I. Rusu, D. Tenciu, V. Savu* National Institute of R&D for Optoelectronics – INOE2000, Romania We extract a message masked by a chaotic signal. The chaos was generated by the two ODE describing the chaotic behaviour of four-level laser with periodic pump modulation. The mask removal can be accomplished for digital signals as well as for analogue ones.	**I.O.4. Ultra-short Pulses Coherent Beam Combining** *D. Ursescu, L. Ionel* INFLPR, Magurele, Romania A 2D study for ultra-short pulses Coherent Beam Combining method was performed. It is analysed the focal region of two coherent laser sources introducing a temporal displacement. Numerical simulation shows the spatial and temporal properties of the electromagnetic field.	
19.00	**Collegial Dinner**		

SEPTEMBER 2, WEDNESDAY

Time	
09.00 – 18.00	***TRIP TO ALBA IULIA CITY***

SEPTEMBER 3, THURSDAY

Time	*Hall I*	*Hall II*
	Plenary Session 5 (Aula "Avram Iancu")	
	Chair: R. De La Rue	
09.00 – 10.00	**Pl.7. Plasmonic enhancement of spontaneous emission and scattering of light in nanostructures** ***S. V. Gaponenko*** Stepanov Institute of Physics, NASB, Minsk 220072 Belarus E-mail: s.gaponenko@ifanbel.bas-net.by Mechanisms and experimental performance of photoluminescence and Raman scattering enhancement are considered in the context of their application in novel luminophores and high sensitive spectral analysis. So-called "hot spots" are treated as local areas in plasmonic nanostructures where high Q-factors develop both for incident light frequency and for emitted or scattered light frequency. Feasibility of 10- to 10^2-fold enhancement is highlighted for luminescence. Rationale is provided for 10^{14} enhancement factor for Raman scattering which has been claimed based on experimental observation but to date has never been reported in the theory.	
10.00 – 11.00	**Pl.8. Ultrafast Science and Development at the Astra-Artemis Facility** ***Edmond Turcu[1], Emma Springate[1], Chris Froud[1], John Collier [1,5], Jon Marangos[2], John Tisch[2],Ricardo Torres La Porte[2], Thomas Siegel[2], Yasin C. El-Taha[2], Nathaniel Kajumba[2], LeonardoBrugnera[2], Immacolata Procino[3], C. Altucci[14], R. Velotta[14], Roy Newell[3], Ian Williams[4], Jason Greenwood[4], Chris Calvert[4], Orla Kelly[4], Raymond King[4], William Bryan [5,1], Jamie Nemeth[5,1], Andrea Cavalleri [6,8], Sarnjeet Dhesi[7], Jonathan G. Underwood [3,1], Ian Mercer[9], Mads Gabrielsen[10], Richard J. Cogdell[10], Luca Poletto[11], Paolo Villoresi [12,11], Fabio Frassetto[11], Stefano Bonora[11], Mark Roper[13]*** [1]Central Laser Facility, STFC Rutherford Appleton Laboratory, UK. [2]Blackett Laboratory, Imperial College London, UK. [3]Department of Physics and Astronomy, University College London, UK. [4]School of Mathematics and Physics, Queen's University Belfast, UK. [5]Department of Physics, Swansea University, UK. [6]Department of Physics, Clarendon Laboratory, University of Oxford, UK, [7]Physical Science Division, Diamond Light Source Ltd, UK. [8]Max Planck Research Group for Structural Dynamics, Centre for Free Electron Laser Science and University of Hamburg. [9]School of Physics, University College Dublin, Ireland. [10]Faculty of Biomedical and Life Sciences, University of Glasgow, Glasgow, UK. [11]LUXOR, CNR-INFM, Padova, Italy. [12]DEI-University of Padova, Italy. [13]STFC Darsebury Laboratory, UK, [14]CNSIM and Dipartimento di Scienze Fisiche, Universita di Napoli 'Federico II', Naples, Italy. Astra-Artemis is a unique, new, ultrafast science facility under development in the UK. The paper will report on the: (a) ultrafast science experimental results obtained with Artemis on: HHG mapping of electronic structure; ultrafast molecular process; HHG with 2-colour laser fields, energy transfer in photosynthesis and (b) Artemis facility development of new ultrafast XUV and laser beamlines and time-resolved science end-stations.	
11.00 – 11.15	***Coffee Break***	

	NIO 5	*NQO 2*
	Chair: D. Mihalache	**Chair: S. Hickey**
11.15 – 11.45	**IV.I.10. Speckle-based fiber optic method for registration of IR radiation** *Ion P. Culeac, Iurie H. Nistor, Mihail S. Iovu, Andrei M. Andriesh* Institute of Applied Physics of the Academy of Sciences of Moldova, MD-2028 Chisinau, Republic of Moldova E-mail: ion_culeac51@yahoo.com We propose a high sensitivity speckle-based fiber-optic method for registration of low intensity infrared radiation. The method is based on the effect of variation of the speckle pattern in the far-field of a multimode fiber. IR radiation that falls on a multimode fiber leads to variation of the speckle image in the far-field of the fiber. The variation of the phase difference between the propagating modes in the fiber gives rise to variation of the speckle pattern in the far-filed of the fiber. Computer processing of the far-field speckle image provides information on the amplitude of the perturbation that hits the fiber. An algorithm has been developed for processing of the speckle image and determining of the amplitude of perturbation. The results of computer simulation correlate sufficiently well with experimental ones. The method can be applied for registration and measurement of low intensity IR radiation, as well as for temperature measurements, registration of mechanical vibrations, etc.	**III.I.3. Time evolution of entanglement in open quantum systems** *Aurelian Isar* Department of Theoretical Physics, Institute of Physics and Nuclear Engineering, Bucharest-Magurele, Romania E-mail: isar@theory.nipne.ro The physics of quantum entangled states, an interdisciplinary field of research involving quantum optics, physics of quantum information and foundations of quantum theory, has been intensively exploited over the last years in connection with quantum information processing, quantum communication and quantum computing. It was shown that the use of entangled states opens new horizons in such practical fields like cryptography, computing, information transmission, quantum imaging and precision measurements. Essential progress has also been achieved in the area of photon squeezing, generation of nonclassical states, including Schrödinger cats, trapped ions, Bose–Einstein condensates, cavity quantum electrodynamics, Casimir effect etc. In the framework of the theory of open systems based on completely positive quantum dynamical semigroups, we study the continuous variable entanglement for a system consisting of two independent harmonic oscillators interacting with a general environment. We solve the Markovian master equation for the time evolution of the considered system and, by using Peres–Simon necessary and sufficient criterion for separability of two-mode Gaussian states, we describe the generation and evolution of entanglement in terms of the covariance matrix, for a Gaussian initial state. We show that for certain values of diffusion and dissipation coefficients describing the environment, the state keeps for all times its initial type: separable or entangled. In other cases, entanglement generation, entanglement sudden death or a periodic collapse and revival of entanglement take place. In particular, we describe the dynamics of entanglement in terms of the squeezing coefficient of the initial Gaussian state and the temperature of thermal bath. We analyze also the time evolution of the logarithmic negativity, which characterizes the degree of entanglement of the quantum state.

11.45 – 12.15	**IV.I.11. Poynting singularities, angular momentum and "anticorrelation" in the heterogeneously polarized vector field** *I. Mokhun, Yu. Galushko and Yu. Viktorovskaya* Cernivtsi University, Chernivtsi 58012, Ukraine E-mail: mokhun@itf.cv.ua Poynting singularities and their networks in the heterogeneously polarized vector field are considered. The new approach for experimental modeling of elementary field cells with heterogeneous polarization is proposed. It is shown that such cells may be obtained by the superposition of orthogonally linearly polarized waves with relatively simple phase surfaces and clouse intensities. The relation between the behaviors of intensity and parameters of the transversal component of the Poynting vector is analyzed. The results of experiment and data of computer simulation are presented.	**III.I.4. Nanophotonics for efficient photovoltaic solar cells** *J.J. Simon, F. Flory*, L. Escoubas, P. Torchio, Yu-Jen Chen, Joao Ferreira* Paul Cézanne University, IM2NP UMR6242, Marseille, France * Ecole Centrale Marseille E-mail : jean-jacques.simon@univ-cezanne.fr Application of nanophotonics to enhance the efficiency of photovoltaic solar cells is presented. Life time of photons in the active materials of solar cells is increased by designing photonic crystals. Plasmonics can be used to enhance the optical field. Nanostructure in organic solar cells is discussed. A new model taking into account quantum confinement and classical electromagnetic theory is developed to describe the complex refractive index dispersion with wavelength of optical materials including quantum dots.
12.15 – 12.30	**IV.O.10. The Electromagnetic Degree of Coherence in the Near Field** *O.V. Angelsky[1], C.Yu. Zenkova[2], M.P. Gorsky[1], N.V. Gorodyns'ka[1]* [1]Department of Correlation Optics, Chernivtsi National University, Chernivtsi 58012, Ukraine [2]Optics and Spectroscopy Department, Chernivtsi National University, Chernivtsi 58012, Ukraine E-mail: angelsky@itf.cv.ua The situation when information on the degree of coherence of electromagnetic optical waves is contained both in intensity modulation and in spatial polarization modulation of the resulting distribution of superposing waves is considered. It is pointed out that such experimental situation is often realized in near-field optics. The possibility of experimental estimation of the degree of mutual coherence of waves polarized at the incidence plane is shown in this paper.	**III.O.4. Using CHODIN to simulate the dynamics of coherent light scattering on nanofluids** *Dan Chicea* Physics Department, University Lucian Blaga of Sibiu, Sibiu, 550012, Romania E-mail: dan.chicea@ulbsibiu.ro If coherent light is incident on a suspension containing nanoparticles, the result of the far field interference is a "speckled" image. As a consequence of the complex Brownian motion the speckle image is not static but presents time fluctuations. A computer code to simulate the dynamics of the coherent light scattering on nanofluids was written, tested and used. The results are discussed in connection with nanoparticle aggregation that occurs in diluted suspension. An alternative experimental method for fast nanoparticle physical diameter rather than hydrodynamic diameter is suggested.
12.30 – 12.45	**IV.O.11. Spatial frequency and fractal complexity in one-to-triple beam holograms** *M. Mihailescu[1], E. Scarlat[1], A. Sobetkii[2]* [1]POLITEHNICA" University from Bucharest, Physics Department, 060042 – Bucharest, Romania [2]OPTICOAT SRL, Racari Str. nr. 3, Bucharest, Romania E-mail: mona_m@physics.pub.ro In this paper we analyze some global properties of the digital holograms e.g. fractal characteristics and complexity in Fourier space as well as their frequency spectrum with the aim to obtain three spots with the same intensity in the object	**III.O.5. New nanocomposite materials for optoelectronic applications** *Iu. H. Nistor, M. S. Iovu, A. M. Andriesh, S. A. Buzurniuc, V. I. Verlan, I. P. Culeac* Institute of Applied Physics of the Academy of Sciences of Moldova, MD-2028 Chisinau, Republic of Moldova E-mail: iurienistor@gmail.com The absorption and luminescence properties of a new nanocomposites based of the tris(2-thenoyltrifluoracetonato)(monophenanthroline)europium(III)Eu(3+) (TFAP) without and with copolymer from styrene and butyl methacrilate (1:1)

	space. The global properties are assessed in terms of multifractal spectrum and Lempel-Ziv complexity. Starting with virtual objects with different dimension and position, we generate their holograms using Iterative Fourier Transform Algorithm. In diffracted pattern, the reconstructions from these holograms are studied from the point of view of diffraction efficiency, uniformity in desired spots, the ratio between zero diffraction order and the others. The simulation results reveal that the spatial frequencies in Fourier domain are influenced by the position of the virtual object, but not by its dimension and consequently, bring different parameters of the diffracted field. The experimental results obtained using spatial light modulator are in a good agreement with the simulated one. Finally, the holograms which give the maximum efficiency are then made in glass using e-beam lithography.	(SBMA) are presented. The microscopic investigations of the morphology of the nanocomposites surface show that the dimensions of TFAP particles, incorporated in the polymer matrix are less than 100 nm. For the TFAP-polymer nanocomposite exciting with N_2-laser (λ = 0.33 μm) generate in the spectral range of 300 – 800 nm some sharp emission bands located at: 579, 590, 596.5, 610, 616.5, 690, 703.5 nm (T=300 K) and at 578, 588.5, 590.5, 599.5, 610, 616, 624, 689.5, 703 nm (T=77 K) were detected. The emission bands can be attributed to the transitions $^5D_0$ - ^7F_i. More effective luminescence has the maxima at 610 nm at T=77 K which is higher of 20 times than others. Its semi half width is about 3 nm. With increasing of the temperature the intensity of this maxima decrease of 5 times and the red shift is observed (about 3 meV). Some results on organic/inorganic (polymer/chalcogenide glass) composites doped with rare-earth ions (Pr^{3+}, Dy^{3+}) are presented also. New nanocomposite materials are promising components for fabrication of different dyed and fluorescing devices, diffractive elements and sensors.
12.45 – 13.00		
13.00 – 13.30	**CLOSING SESSION**	
13.30 – 14.30	***Lunch***	

POSTER SECTION I: LASERS AND RADIATION SOURCES

I.P.1. Spectroscopic investigations of (Nd, Yb) in Y_2O_3 transparent ceramics

A. Lupei[1], V. Lupei[1], A. Ikesue[2], C. Gheorghe[1], S. Hau[1]

[1]National Institute for Lasers, Plasma and Radiation Physics, Lab. ECS, Bucharest R-077125, Romania
[2] World-Lab. Co. Ltd., Atsuta-ku, Nagoya 456-8587, Japan
E-mail: lupei_voicu@yahoo.com

Lasers based on Yb^{3+}, Nd^{3+} or (Yb, Nd) doped sesquioxide ceramics are considered recently as potential systems for petawatt lasers. Systems based on Nd→Yb energy transfer combine the Yb^{3+} ion laser characteristics with the Nd^{3+} multiple and intense pumping bands. Previous study of (Yb, Nd): Sc_2O_3 ceramic demonstrated very efficient Nd → Yb energy transfer; a lower cost system is considered in this paper, (Yb, Nd): Y_2O_3 ceramic.
The spectroscopic investigation of Nd^{3+}, Yb^{3+} inY_2O_3 transparent ceramics is extended and very efficient energy transfer from Nd^{3+} to Yb^{3+} in (Nd, Yb) co-doped samples is demonstrated by emission spectroscopy and decays.

I.P.2. High Peak-Power Passively Q-switched Nd:YAG/Cr^{4+}:YAG Lasers

Nicolaie Pavel[1,2], Masaki Tsunekane[1] and Takunori Taira[1]

[1]National Institutes for Natural Sciences, Institute for Molecular Science, Laser Research Center, 38 Nishigonaka, Myodaiji, Okazaki 444-8585, Japan
[2]National Institute for Laser, Plasma and Radiation Physics, Laboratory of Solid-State Quantum Electronics, Bucharest R-077125, Romania
Email: nicolaie.pavel@inflpr.ro; taira@ims.ac.jp

An investigation of the output performances obtained from a compact passively Q-switched Nd:YAG/Cr^{4+}:YAG laser was performed. Single crystals and poli-crystalline ceramics Nd:YAG with doping level between 1.0 and 2.0-at.% Nd, and single crystals and poli-crystalline ceramics Cr^{4+}:YAG with various initial transmission, T_i were used in the experiments. Q-switch laser pulses with energy between 1 mJ and 2 mJ, with duration below 1 ns were realized at a repetition rate of 10 Hz. This Nd:YAG/Cr^{4+}:YAG laser can be used for ignition of automotive engines. Solutions for a multi-point ignition laser system are proposed.

I.P.3. New nonlinear $Gd_{1-x}R_xCa_4O(BO_3)_3$ (R = Lu, Sc) crystals for 400nm blue-violet light generation by type-I noncritical phase-matching frequency doubling processes

L. Gheorghe[1], A. Achim[1], P. Loiseau[2], G. Aka[2]

[1]National Institute for Laser, Plasma and Radiation Physics, ECS Laboratory, PO Box MG-36, 077125 Magurele, Bucharest, Romania
[2]Ecole Nationale Supérieure de Chimie de Paris, LCMCP, CNRS-UMR 7574, 11 rue Pierre et Marie Curie, 75005 Paris, France
E-mail: alexandru.achim@inflpr.ro

New nonlinear crystals of $Gd_{0.882}Lu_{0.118}Ca_4O(BO_3)_3$ and $Gd_{0.872}Sc_{0.128}Ca_4O(BO_3)_3$ with large size and good quality have been grown by Czochralski pulling method. Theoretical and experimental investigations demonstrated that both crystals generate 400nm laser radiation by type-I NCPM SHG processes.

I.P.4. Magnetic Field for Asymmetric Two-Beam Free-Electron Laser

V. I. R. Niculescu[1], S. Miclos[2], D. Savastru[2], V. Babin[2], L. Sandru[3]

[1]Formally National Institute of Lasers, Plasma and Radiation Physics, Romania,
[2]National Inst. of R&D for Optoelectronics INOE 2000, Magurele, Ilfov, RO-077125, Romania,
[3]Physics Department, Petrol Gas University (UPG), Ploiesti, Romania
E-mails: filo_niculescu@yahoo.com, miclos@inoe.inoe.ro

Free-electron lasers (FEL) imply the elaboration of compact devices. The phenomenon of tuned coherent radiation is given by undulator - the FEL principal component. The radiation is obtained by means of a relativistic electron beam injected in a periodic magnetic field produced by spatially asymmetric periodic structures formed by permanent magnets or currents (undulator, wiggler).A new device structure for free electron lasers is presented. Current asymmetric devices produce magnetic fields which are spatially periodic, symmetric about y-axis but asymmetric about x-axis. The current has alternating directions in wires stacks. The Biot - Savart law was numerically evaluated.

I.P.5. Two-photon cooperative scattering Lasing stimulated by stream of atoms

Nicolae Enaki, Profir Bardetski and Marina Ţurcan

Center of Optoelectronics, Institute of Applied Physics, Academy of Sciences of Moldova, Chisinau MD-2028, Republic of Moldova

The cooperative two-photon scattering processes between two resonator modes stimulated by the excited atomic beam, it is studied. It is demonstrated that these collective scattering phenomena between the Stokes and Anti-Stokes resonator modes take place due to energy transfer between these fields. The quantum properties of Stokes and Anti-Stokes fluctuations of the photon numbers have been found. The correlation functions between these fields are expressed through the lasing parameters of the cavity. The experimental scheme of realization of such collective amplification of Stokes (Anti-Stokes) of photon number is proposed.

I.P.6. Gain and Ionization Dynamics in transient, collisionaly excited x-ray lasers

D. Ursescu, L. Ionel

National Institute for Lasers, Plasma and Radiation Physics, Dept. of Lasers, 077125 Magurele – Bucharest, Romania

Ionization dynamics in Transient Collisionaly Excited, Grazing Incidence Pumped Mo X-Ray laser was investigated. The generation of the active medium for an XRL was performed using three pulses to irradiate a solid target for a better control of the gain and ionization dynamics. It was found that the using two short pulses provides a better gain in the active medium of the x-ray laser.

I.P.7. Chaotic behaviour of semiconductor lasers emission when optically coupled with an external cavity

I.R. Andrei[1], C.M. Ticos[1], M. Bulinski[2] and M.L. Pascu[1]

[1]National Institute for Lasers, Plasma, and Radiation Physics, 077125 Magurele – Bucharest, Romania
[2]Facultatea de Fizica, Universitatea din Bucuresti, 077125 Magurele – Bucharest, Romania
E-mail: ionut.andrei@inflpr.ro

The chaos designates the so called dynamic instability at the initial conditions of the nonlinear systems. The experimental analysis of phenomena that appear in the laser emission process of a semiconductor laser operating with external cavity at a low-frequency fluctuations (LFFs) regime has been made. The chaotic behavior of the semiconductor lasers with external feedback are influenced by some of the intrinsic properties of the lasers. The optical feedback coefficient, the injected current level and diode temperature greatly influence the chaotic system evolution, as well. In this paper we present some aspects of chaotic dynamics control when different techniques are used.

I.P.8. Investigation on photonic quantum ring lasers using laser scanning microscopy

Radu Hristu[1], Stefan Stanciu[1], Gheorghe Stanciu[1], O'Dae Kwon[2]

[1]Center for Microscopy- Microanalysis and Information Processing – University Politehnica of Bucharest, 060032, Bucharest, Romania
[2] Department of Electrical Engineering, POTECH (Pohang University of Science and Technology), Pohang 790-784, Republic of Korea
E-mail: hristu_radu@yahoo.com

Ultralow threshold microcavity lasers are ideal candidates for high-density optical interconnect light sources. Although they have been extensively studied for the last decade, μA-level electro-pumped quantum confined lasers are still under investigation. Photonic quantum ring (PQR) lasers generate micro-to-nano-ampere thresholds, and become ideal for CMOS-driven high-density emitter arrays for intra-chip optical interconnect. The PQR lasers offer the following advantages over other semiconductor lasers presently available: ultralow threshold currents; $\sqrt{T}$ - dependent spectral red shifts, allowing uniform and reliable chip emission with minimal temperature sensitivities. Using laser scanning microscopy (LSM) we investigated the structure and the photocurrent confinement in the laser structure.

I.P.9. Numerical modeling of thermal lens induced in a diode-pumped Nd:YVO_4 grazing-incidence laser

Ş. A. Amarande

National Institute for Laser, Plasma and Radiation Physics, Laser Section, 077125 Bucharest (Măgurele), Romania
E-mail: stefan.amarande@inflpr.ro

Thermal effects in a diode-pumped Nd:YVO_4 bounce laser oscillator were investigated numerically. Contributions of quantum defect and energy transfer upconversion to thermal loading are both taken into account. Preliminary data indicate that the contribution of the pumped face deformation to optical path difference is bigger than that of refractive index thermal gradient.

POSTER SECTION II: LASERS IN MATERIAL SCIENCE

II.P.1. Spectroscopic study of the plasmas generated by nanosecond laser ablation of Er^{3+}-doped Ti:$LiNbO_3$ targets

M. Stafe, C. Negutu, I. Vlădoiu, S. S. Ciobanu, N. N. Puşcaş

University Politehnica of Bucharest, Physics Department, 060042 Bucharest, Romania

This paper presents theoretical and experimental results of a spectroscopic study on ablation plasma generated by focusing the visible radiation of a nanosecond laser pulse on a solid target of Er^{3+}-doped Ti:$LiNbO_3$, in atmospheric air.
The space variation of the temperature within the Er^{3+}-doped Ti:$LiNbO_3$ plasma plume was evaluated and the diameter and the depth of the craters in the solid target were measured. Also, the visible and near IR spectra were used in order to evaluate the spectral dependence of the real and imaginary parts of the electric susceptibility of the Er^{3+} ions from the plasma plume. The obtained results are in good agreement with other published in the literature.

II.P.2. About the influence of a divergent nozzle passed by a laser beam

Claudiu Isarie, Ilie Isarie, Corina Bokor, Sorin Ittu, Vasile Tatarciuc, Adriana Pop, Cosmin Colceriu

"Lucian Blaga" University of Sibiu, Romania
E-mail: claudiu.isarie@ulbsibiu.ro

The special properties of laser beam, as monocromaticity, coherence, concentration, linearity and high power density, recommend it for specific applications in science and technology. Since the laser was discovered, an even increasing number of applications have been found for it in the most diversified fields. The generation of the photons is in itself an optic-electronic process. The trajectory of the laser beam is linear. It could be modified by lenses or mirrors. Authors realised a lot of nozzles of particularly shapes, to study the behavior of laser beam passing the nozzles.

II.P.3. Properties of the laser annealed FeSiB thin films

F. Tolea[1], M. Stoica[2], M. Sofronie[1], M. Udrea[2], M. Valeanu[1]

[1]NIMP, Bucharest, Romania
[2]NILPRP, Bucharest, Romania

We study comparatively the nanocrystallization of ferromagnetic FeSiB thin films which is induced by excimer laser annealing and by conventional thermal treatment. Our films were prepared by r.f. sputtering with a Fe_3B target + fragments de Si, onto Si (100) substrate. The substrate temperature was water cooled and argon was used as the sputtering atmosphere with $4 \cdot 10^{-2}$ Torr pressure. The base pressure was $5 \cdot 10^{-6}$ Torr. The thickness of the thin films is about of 300 nm. Both annealed films were studied by XRD and SEM (for structural investigations). Magnetizations curves were measured with MOKE experiment.

POSTER SECTION III: NANOPHOTONICS AND QUANTUM OPTICS

III.P.1. Optical and morphologic properties of YVO_4:Eu phosphor

S. Georgescu[1], A. M. Voiculescu[1], E. Cotoi[1], O. Toma[1], L. Gheorghe[1], A. Achim[1], C. Matei[1], I. Enculescu[2], E. Matei[2], M. Osiac[3]

[1]National Institute for Laser, Plasma and Radiation Physics, Magurele, Romania
[2]National Institute of Materials Physics, Magurele, Romania
[3]Faculty of Physics, University of Craiova, Romania

In this paper we present new results concerning the optical and morphologic properties of YVO_4:Eu red nanophosphor prepared by a precipitation method and subsequently annealed in air at various temperatures. We monitored the morphologic changes induced by the thermal treatments using the fluorescence spectroscopy, XRD and electron microscopy. The annealing leads to an increase of the particle size and of the order of the crystalline lattice of YVO_4.

III.P.2. The upconversion luminescence of Y_2O_3:Er:Yb and YVO_4:Er:Yb nanophosphors

A. M. Voiculescu, S. Georgescu, E. Cotoi, O. Toma, C. E. Matei, O. Sandu

National Institute for Laser, Plasma and Radiation Physics, Magurele, Romania
E-mail: ana.chinie@inflpr.ro

The upconversion luminescence of Y_2O_3:Er:Yb (prepared by combustion of the precursor hydroxy-carbonate) and YVO_4:Er:Yb (prepared by direct precipitation reaction) nanophosphors was investigated. For Y_2O_3:Er:Yb, the strongest luminescent band is $^4F_{9/2} \rightarrow {}^4I_{15/2}$ (red, centred at ~ 15000 cm^{-1}) while, for YVO_4:Er:Yb the green band ($^4S_{3/2} \rightarrow {}^4I_{15/2}$, at ~ 18200 cm^{-1}) dominates. The fluorescence lifetimes of $^4S_{3/2}$ level for both materials are measured and the average τ_{av} and efficiency τ_{eff} lifetimes were calculated.

III.P.3. Optical properties of europium-exchanged mesoporous silicon-phosphate materials

C. Tiseanu[1], E. Cotoi[1], A. Voiculescu[1], A. Achim[1], V. I. Parvulescu[2], V. Parvulescu[3], S. Georgescu[1]

[1]National Institute for Laser, Plasma and Radiation Physics, Bucharest-Magurele, Romania
[2]Institute of Physical Chemistry "I. G. Murgulescu", Laboratory of Catalysis and Surface Chemistry, Bucharest, Romania
[3]University of Bucharest, Department of Chemical Technology and Catalysis, Bucharest 030016, Romania
E-mail: carmen.tiseanu@inflpr.ro; Web: http://nanolumin.inflpr.ro/

Europium ions were immobilized on two types of mesoporous silicon/phosphate supports. Following calcination at 450 and 900 °C, materials with great surface area (BET= 600- 705 m^2 g^{-1}) and 3.4 nm mesopores were obtained. The quantum efficiency of europium emission increased from 10% in the dried samples up to 30% in the calcined samples at 900 °C. Such effect paralled the increase of europium emission lifetime (from 370-395 μs in the dried samples up to 1060-1070 μs in the calcined samples at 900 °C) while the radiative rates were only slightly modified with the thermal treatment.

III.P.4. Study on Nucleation Seeds for Pulsed Laser Ablated Oxide Materials

A. Marcu[1], T.Yanagida[2], A. Mihailescu[1], C. Grigoriu[1] and T. Kawai[2]

[1]National Institute for Laser Plasma and Radiation Physics, Laser Department, Atomistilor 409 Bucharest-Magurele, Romania
[2]Institute of Science and Industrial Research, Osaka University, Osaka 567-0047, Japan

Nanostructures fabrication is one of the hot topics in today's technologies. There are wide used Top-Down techniques for 2D nanostructures but Bottom-Up technologies seems to be more promising in terms of cost and performances. In such an

approach, the structures are grown directly in the desired place with the desired shape and parameters. For this process, nucleation step is a critical point in fabricating such three-dimensional nanostructures.
In this paper, using pulsed laser ablation technique, we are studying surface defects and surface impurities as seeds for triggering nucleation process of few oxide materials.

III.P.5. Optical linear and third-order nonlinear properties of nano-porous Si described by Bruggeman model

Tatiana Bazaru[1], Valentin I. Vlad[1], Adrian Petris[1], Mihaela Miu[2]

[1]National Institute of Laser, Plasma and Radiation Physics, Department of Lasers, R-077125 Bucharest - Magurele, Romania
[2]National Institute for R&D in Microtechnologies, R-023573 Bucharest, Romania
E-mail: tatiana.bazaru@inflpr.ro

Nano-porous silicon is a nano-composite material with applications in photonics, due to its convenient production processing, emission and nonlinear optical properties. In this work, we simplify and apply optical modeling for the Bruggeman-type nano-composites, to the calculation of the effective optical linear and third-order nonlinear properties of nano-porous silicon. We used laser excitation with photon energy close to the estimated band-gap energy of nano-porous silicon, looking for important optical nonlinearities at low intensity levels. This regime is non-perturbative for the nano-structured sample and we observe pure optoelectronic effects in np-Si. The calculated effective refractive index and effective third-order nonlinear susceptibility (with our simplified formulae) and the corresponding measured parameters (in our experiments) are in good agreement. These results may bring a progress in silicon photonics.

III.P.6. Fourier transform spectra of quantum dots

V. Damian[1], I. Ardeleanu[2], Anca Armăşelu[3], D. Apostol[1]

[1] National Institute for Laser, plasma and Radiation Physics, 077125 - Magurele, Romania
[2] Institute of Biology, Centre of Microbiology, Bucharest 060031, Romania
[3] Transilvania University of Brasov, Departement of Physics, Brasov, Romania
E-mail: victor.damian@inflpr.ro

Semiconductor quantum dots are nanometer-sized crystals with unique photochemical and photophysical properties that are not avalaible from either isolated molecules or bulk solids. These nanocrystals absorb light over a very broad spectral range as compared to molecular fluorophores which have very narrow excitation spectra. High – quality QDs are proper to be use in different biological and medical applications (as fluorescent labels, the cancer treatment and the drug delivery). In this article, we discuss Fourier transform visible spectroscopy of commercial quantum dots. We reveal that QDs produced by Evident Technologies when are enlightened by laser light or luminiscent diode light provides a spectral shift of their fluorescence spectra correlated to exciting emission wavelenghts, as shown by the ARCspectroNIR Fourier Transform Spectrometer.

III.P.7. Quantum security in GRID computing applications

M. Dima[1], M. Dulea[1], M. Petre[1], B. Mitrica[1], M. Stoica[2], M. Udrea[2]

[1]National Institute for Nuclear Physics and Engineering, RO-077125 Bucharest-Magurele, Romania
[2]National Institute for Plasma and Laser Physics, R-077125, Magurele, Bucharest, Romania
E-mail: modima@nipne.ro

The current work, financed through the QUANTGRID Project of the National Center for Programme Management (CNMP-Romania), is the first attempt at using Quantum Crypted Communications in large scale operations, such as GRID Computing, and conceivably in the years ahead in the banking sector and other security tight communications. In relation with the GRID activities of the Center for Computing & Communications (Nat.'l Inst. Nucl. Phys. – IFIN-HH), the Quantum Optics Lab. (Nat.'l Inst. Plasma and Lasers – INFLPR) a demonstrator infrastructure has been set up for this technology, here reported, together with tests for communications in classical and quantum security modes.

III.P.8. Silsesquioxane-based hybrid nanocomposite with photoluminescence properties

I. Bordianu[1], M. Olaru[1], C. Cotofana[1], B. C. Simionescu[1,2], M. Udrea[3]

[1] „Petru Poni" Institute of Macromolecular Chemistry, 700487 Iasi, Romania
[2] „Gh. Asachi" Technical University, Natural and Synthetic Polymers Department, 700050 Iasi, Romania
[3] NILPRP, 077125 Magurele-Bucharest, Romania
E-mail: olaruma@icmpp.ro

The study is concerned with the synthesis and characterization of a silsesquioxane-based hybrid nanocomposite with self-assembling properties with potential interest for optoelectronic devices, especially for light-emitting ones, or preparation of thin films of low ε dielectrics. Photopolymerization under UV irradiation (excimer laser) and sol-gel reaction of (3-(trimethoxysilyl)propyl methacrylate) with allyl phenyl ether in the presence of a small amount of cationic surfactant, i.e., cetyltrimethylammonium bromide (CTAB) yielded a new type of hybrid nanocomposite, in which silica was dispersed as domains with nanometer range typical sizes. The self-assembling properties of the synthesized composite have been ascribed to the supramolecular assembling abilities of the surfactant, as well as to the combination of linear, ladder, and cagelike fragments of silsesquioxane type.

POSTER SECTION IV: NON-LINEAR AND INFORMATION OPTICS

IV.P.1. The qualitative analysis of the nonlinear equations using integral relations for solitons in photorefractive nonlinear crystals

V. Babin, C. Radu

National Institute of R&D for Optoelectronics INOE 2000, Magurele, Ilfov, Romania

A general model was built for spatial solitons in photorefractive crystals using the inverse problem in the scattering theory. The inverse problem in the scattering theory is defined knowing the spectral data that characterize the scattering. We present a formalism regarding the use of the inverse method in solving the nonlinear differential equations. Envelope singular analytical solutions (solitons) and asymptotically solutions of the wave equation for integral equation were obtained. The results are in good agreement with the results obtained in other papers.

IV.P.2. Electro-optic effect in nematic liquid crystals aligned with conductive polymer

M. Raicopol[1], C. Dascalu[2], R. Atasiei[2], A.-L. Alexe-Ionescu[2]

[1]Faculty of Applied Chemistry and Material Sciences, University "Politehnica" of Bucharest, RO 060042, Romania
[2]Faculty of Applied Sciences, University "Politehnica" of Bucharest, RO 060042, Romania
E-mails: dascaluc@yahoo.com, ruxandra_atasiei@yahoo.com

The influence of the ionic contribution to electro-optic effect in nematic liquid crystals aligned with conducting polymers was investigated. The study has been carried out on symmetric cells filled with nematic liquid crystal 5CB having positive dielectric anisotropy. Planar alignment of the nematic director have been imposed using unidirectional rubbed conducting polymer substrates, namely polypyrrole doped with ions having different molecular sizes and geometries. Employing a typical experimental set-up, the intensity of linearly polarized He-Ne light beam, transmitted through each cell which was submitted to an external electrical excitation, were experimentally determinate. Fast electro-optic response times measured at switching off the electric field are probably related to the accumulated charge distributions at nematic-conducting polymer interface.

IV.P.3. Interferometric patterning of the azo-polymers surface

V. Damian, I. Apostol, N. Hurduc[*]

National Institute for Laser, plasma and Radiation Physics, 077125 - Magurele, Romania
[*]Technical University of Iasi, Department of Natural and Synthetic Polymers, 700050-Iasi, Romania
E-mail: victor.damian@inflpr.ro

Direct patterning of the polymeric surface using Talbot interferometer was the solution for nanostructuring the polymers using UV short coherence laser wavelengths. A more flexible and controllable setup was developed for direct patterning by interference. Using a grating like beams splitter we used the interference of two diffracted (0, +1) or (+1,-1) orders to obtain an interference pattern. The two beams are superimposed using two parallel mirrors. In this way controllable patterns having variable grating pitch can be obtained. The article describes the setup and some results obtained on an azo-polymer (polisiloxan modified with azobenzen and naphthalene) using a 355 nm wavelength.

POSTER SECTION V: BIOPHOTONICS AND OPTICS IN ENVIRONMENT RESEARCH

V.P.1. Probing particle aggregation in aqueous suspensions by light scattering anisotropy measurements

Dan Chicea

Physics Department, University Lucian Blaga of Sibiu, Sibiu, 550012, Romania
E-mail: dan.chicea@ulbsibiu.ro

If light is incident on particles the Mie theory describes the light scattering anisotropy. A simple experiment of recording the scattered light intensity using a CCD was done and the light scattering anisotropy distribution was derived. As the scattering anisotropy parameter strongly depends of the scattering particle diameter, a simple procedure of assessing the average particle diameter was established and is presented in this work, together with the experimental results on both micron and nanometer sized particles in suspensions.

V.P.2. Measuring very small concentrations in organic suspensions by coherent light scattering

Dan Chicea

Physics Dept., University Lucian Blaga of Sibiu, Sibiu, 550012, Romania,
E-mail: dan.chicea@ulbsibiu.ro

The single act light scattering anisotropy is conveniently described using the Henyey-Greenstein phase function when the scattering centers dimension is comparable or bigger than the wave length. When the concentration increases, a different phase function can be used. For a certain scattering angle the calculated light scattering intensity variation with the optical depth of the target is analyzed and compared with the experimental data recorded on mud in aqueous suspension. The results suggest a very fast method for measuring very small concentration in suspensions, in the range of μg/l.

V.P.3. Biospeckles' statistics of the inhomogeneous multi-layer

S. B. Yermolenko, P. V. Ivashko

Correlation Optics Dept., Chernivtsi National University, Chernivtsi, 58012, Ukraine
E-mail: yeserg@rambler.ru

There have been theoretically analyzed the ways of the formation of the polarization structure of the biological tissues images of various morphological structures. The potentialities of laser polarimetry in diagnostics of oncological changes of optically thick, multilayer tissues of human prostate were determined. The analysis of the obtained results showed high diagnostic sensitivity of statistic moments of the 3rd and 4th orders of coordinate distributions of matrix elements of both types of biotissues to the changes of optical-geometric structure. It was found out that the process of the pathological change of the prostate tissue morphology leads to the demolition of the self-similar (fractal) coordinate distribution of the polarization singularities of its image.

V.P.4. Multispectral and multitemporal satellite remote sensing imagery for Bucharest land cover dynamics assessment

Maria Zoran, Roxana Savastru, Dan Savastru, Marina Tautan, Sorin Miclos

National Institute of R&D for Optoelectronics, Bucharest, Romania
E-mail: mzoran@inoe.inoe.ro

Urban areas are currently among the most rapidly changing types of land cover on the planet. Remote sensing imagery can provide a timely and synoptic view of urban land cover, as well as a means to monitor change in urbanizing landscapes and to compare urban environments globally. Based on Spectral Mixture Analysis, this papers aims to provide a spatio-temporal analysis of urban structure for Bucharest urban area based on multi-spectral and multi-temporal satellite imagery

(LANDSAT TM, ETM; MODIS, IKONOS) over 1989 – 2008 period. Accurate maps of urban tree and other surface cover types can provide critical information to better understand urban ecosystems and help improve environmental quality and human health in urban areas.

V.P.5. The efficacy of photodynamic inactivation of the microorganisms using laser souces and methylene blue as photosensitizer

Mihaela Antonina Calin[1], *Rodica Mariana Ion*[2,3]

[1]National Institute of Research and Development for Optoelectronics INOE 2000, Magurele, Romania
[2]National Institute of Research and Development for Chemistry and Petrochemistry – ICECHIM, Bucharest, Romania
[3]Valahia University, Targoviste, Romania

The large spread of pathogen microorganisms in nature and their increasing resistence to drugs, lead to alternative treatment methods, more efficient and without microbial resistance. One of these methods is the photodynamic inactivation of microorganisms. In the present paper, we examined the efficacity of the laser system SCL (INOE 2000, P = 15 mW, λ = 635 nm) on yeast cells (*Saccharomyces cerevisiae* - as model system) treated with methylene blue as sensitizer. Diffuse reflectance spectroscopy and Kramers – Kronig analysis have been used for *in vitro* determination of the refractive index changes of yeast cells induced by laser irradiation.

V.P.6. Fluorescence spectroscopy applied to the study of precipitation and its influence on river water quality

E. M. Carstea, G. Pavelescu, L. Cristescu

National Institute for Optoelectronics, INOE 2000, RO-077125 Magurele, Romania
E-mail: frida@inoe.inoe.ro

In this study, fluorescence and absorption measurements on rain water, surface runoff samples collected from different locations and samples from an urban river after a precipitation event were performed. The fluorescence spectra of precipitation samples have shown a larger contribution from the protein-like component in comparison with the humic-like fraction. The river samples fluorescence spectra show that approximately two hours after rain events the content of dissolved organic matter, protein-like and humic-like increased. After a snow event only the humic substances have presented high fluorescence intensities, no changes being observed at the protein-like component.

V.P.7. The fluorescent response of water samples under different storage conditions

L. Cristescu, E. M.Carstea, G. Pavelescu, D. Savastru

National Institute of R&D for Optoelectronics, Magurele, Romania, INOE 2000, RO-077125 Magurele, Romania
E-mail: cristescu@inoe.inoe.ro

The fluorescence signal of water samples is known to be highly influenced by the sampling, storage and measuring conditions. The dissolved organic matter fluorescence presents different characteristics with temperature, pH, turbidity, salinity. This study focuses on the effects of storage on fluorescence intensity, for samples collected from different sources. The comparison of fluorescence intensity on samples storaged at room temperature and at 5^0 was made. The fluorescence spectra show that the degradation process of protein–like components is more rapid when samples are kept at room temperature than those maintained at a constant temperature of 5^0 C.

V.P.8. Optimization of the multiwavelength Raman Lidar during EARLI09 campaign

Cristian Radu, Livio Belegante, Camelia Talianu, Doina Nicolae

National Institute of R&D for Optoelectronics INOE 2000, Magurele, Bucharest

Both air quality and climate studies require information about the vertical distribution of aerosols, as well as about their interactions with other atmospheric components (gaseous precursors, water vapor, ozone). Lidars are laser-based instrument which uses the induced backscatter signal to retrieve optical characteristics of the atmosphere. Quantitative data requires optimized instruments and algorithms. During EARLI09 (EArlinet Reference Lidar Intercomparison campaign 2009), the multiwavelength Raman Lidar of INOE was upgraded and tested against other 15 instruments. This paper presents early results of this campaign.

V.P.9. Analysis of climatic and anthropogenic changes effects on spectral vegetation indices in forest areas derived from satellite data

M. Zoran

National Institute of R&D for Optoelectronics, Remote Sensing Dept., Bucharest -Magurele, 077125 Romania
E-mail : mzoran@inoe.inoe.ro

The climate system responds in complex ways to changes in forcing that may be natural or human-induced. Thresholding based on biophysical variables derived from time trajectories of satellite data is a new approach to classifying forest land cover changes. The input data are composite values of the Normalized Difference Vegetation Index (NDVI). Fusion technique was applied to Landsat TM, LANDSAT ETM, IKONOS and MODIS imagery for a forested area placed in the neighborhood of Bucharest town, Romania, over a period 1989-2008. Specific aim of this paper is to assess, forecast, and mitigate the risks of climatic changes on forest.

V.P.10. Study of alcoholic beverages quality by ATR infrared spectroscopy

Elena Nezalzova[1], Elena Scorbanov[1], Boris Gaina[2], Dmitry Busko[3], Francesca Morgera[4], Lisa Vaccari[4], Miltcho Danailov[5], Dan Cojoc[6]

[1]Scientific-Practical Institute of Horticulture and Food Technologies, Chisinau, Republic of Moldova
[2]Academy of Sciences of Moldova, Chisinau, Republic of Moldova
[3]B.I.Stepanov Institute of Physics, National Academy of Sciences of Belarus, Minsk, Belarus
[4]SISSI Beamline, ELETTRA Synchrotron, Trieste Italy
[5]Laser Lab, Elettra Synchrotron, Trieste, Italy
[6]National Laboratory TASC, Trieste, CNR-INFM, Italy

Due to the increase in counter faction, specialists in food industry need to develop affordable measurement techniques to guarantee the authenticity of the products. In this work we report results on the measurement and data analysis using attenuated total reflection (ATR) spectroscopy for brandy samples from different countries and different aging: Divin (Moldova), Armagnac (France), Carlos I (Spain) and other alcoholic beverages: Porto (Portugal), Whisky (Scotland), Sake (Japan). Measurements have been performed at the SISSI beamline of Elettra, using the FTIR spectrophotometer Vertex 70 (Bruker). Spectra analysis shows the usefulness of this technique for the characterization of these alcoholic products.

POSTER SECTION VI: OPTOELECTRONICS AND OPTICAL COMPONENTS

VI.P.1. Effects of layer by layer deposition on the structural and optical characteristics of thin films

Petronela Prepelita, R. Medianu, A. Moldovan , N. Stefan, S. Georgescu

National Institute for Lasers, Plasma and Radiation Physics, Magurele 077125, Ilfov, Romania
E-mail: petronela.garoi@inflpr.ro

$CuIn_{1-x}Ga_xS_2$ (CIGS2) thin-films for solar cells were prepared by RF-magnetron sputtering and were deposited on a glass substrate covered with a transparent conducting ZnO layer. These films were prepared using a stepwise process consisting of succesive deposition (e.g. layer by layer) of ZnS and CuInGa layers on ZnO film. Full characterizations have been carried out using XRD, XPS, AFM and optical absorption measurements. The microstructural and optical properties of ZnO and CIGS2 component films of the solar cell in comparison with those of ZnO, ZnS and CuInGa films separately deposited, under the same conditions onto glass substrates, were studied. Transmission spectra of our thin films are strongly influenced by the deposition conditions. Values for the optical parameters were determined from transmission spectra, using Swanepoel's method.

VI.P.2. Method and equipments for testing of the road profiles in dynamic regime

Axente Stoica, Dan Savastru, Marina Tautan

National Institute of R&D for Optolectronics – INOE 2000

In conformity with the INOE 2000 Invention Patent no. 122.109/12.30.2008 by the displacement on the tested pavement of a lab vehicle on whose lateral side is mounted a couple of laser sensors in differential montage the determination of the road longitudinal profiles is possible. In a similar way, by means of the same lab vehicle, as it is specified in the patent request no. A/00846/12.12.2007, the road transversal profiles are tested by simultaneously marking two distinct transversal sections of the road with the planar beams continuously emitted by laser sources.

VI.P.3. Novel optoelectronic system for fast acquisition of reflectance spectra

V. Teplov, L. Fauch, E. Nippolainen, A. A. Kamshilin

Department of Physics, University of Kuopio, P.O. Box 1627, FIN-70211 Kuopio, Finland
E-mail: victor.teplov@uku.fi

We present novel optical system capable for fast acquisition of two-dimensional distribution of reflection spectra with high spatial resolution. It is based on a subspace vector model of surface reflections. The system consists of a computer controlled set of light-emitting diodes and a monochrome CCD camera. Spatial distribution of reflection spectra is acquired in the compressed form. These compressed data can be directly used for accurate classification or recognition of different parts of the surface under study. Such a fast instrument of multispectral imaging is extremely useful particularly for researchers who study living biological objects.

VI.P.4. Evaluation of accelerometers' responce by laser vibrometry

D. Sporea, Adelina Sporea, Flavia Frumosu[*]

National Institute for Laser, Plasma and Radiation Physics, RO-077125, Romania
[*]"Politehnica" University, Spaliul Independentei 313, Bucharest, Romania
E-mail: dan.sporea@inflpr.ro

The paper reports our investigation related to the comparative evaluation of the vibration present in several hand-held tools by using different types of accelerometers and a laser-based 1D vibrometer. The analyses with the laser-based instrument refers both to the absolute temporal measurements of the velocity and to the frequency analyses for the velocity,

displacement and acceleration. The research was focused on the influence of various parameters in evaluating a mechanical vibration: the accelerometer sensitivity, its mass, the location and the way the accelerometer is mounted on the tested object. Uncertainties related to these variables are estimated with the laser vibrometer.

VI.P.5. Transfer of the laser power calibration at 1 mW

D. Sporea, Adelina Sporea and Simona Iconaru[*]

National Institute for Laser, Plasma and Radiation Physics, RO-077125, Magurele, Romania
[*]Bucharest University, Faculty of Physics, RO-077125, Magurele, Romania
E-mail: dan.sporea@inflpr.ro

The paper reports the investigations carried out for the transfer of optical power calibration from the Laboratory primary standard to two Si photodide-based detectors, one with an enhanced UV response and one built around an integrating sphere, at the power level of 1 mW, for the following wavelengths: λ_1 = 632.8 nm, λ_2 = 611.8 nm, λ_3 = 604.6 nm, λ_4 = 593.9 nm, λ_5 = 543.4 nm. The substitution method was used in connection either with the laser power monitoring or its active electro-optic stabilization. The sources of uncertainties for these calibrations were identified and the corresponding uncertainties budget was derived. The effects of the laser beam parameters and of the measuring conditions on the output signal for each investigated detector are reported.

VI.P.6. Interferometric vibration displacement measurement

F. Garoi, P. C. Logofatu, V. Damian and D. Apostol

National Institute for Lasers, Plasma and Radiation Physics, Magurele 077125, Ilfov, Romania
E-mail: florin.garoi@inflpr.ro

A method to measure vibrations by means of interferometry is described in the present work. For this purpose a Twyman-Green interferometer with expanded and collimated beam was realized. Interference fringes are processed with the Minimum Point Method and displacement information is extracted. Vibration displacements of the order of microns were obtained for the measured vibrations. With this setup a resolution of $\lambda/2$ was used.

VI.P.7. Optical choppers: modulators and attenuators

V.-F. Duma, M. F. Nicolov

Dept. of Product Design, Aurel Vlaicu Univ., Arad 310130, Romania
E-mail: dumavirgil@yahoo.co.uk

The paper achieves an approach on optical choppers for two of their possible functions, i.e. attenuators and modulators. An overview of the application fields of choppers is made, as well as a systematization of the different types of optical attenuators and modulators. Constructive and design considerations are discussed with regard to choppers used for the attenuation of light. Various possible configurations of rotating wheels are considered in order to produce a certain signal modulation, i.e. a required profile of the transmitted flux. While in previous analytical studies we have considered top hat light beam distributions, in the experimental part of this paper we are using mostly Gaussian profiles of the beam. Both collimated light sources and lasers are used in the experiments, while a special wheel has been designed in order to allow for the adjustment of the main parameters of the chopper. Thus a correlation of the chopper design can be achieved with regard to the transmission function to be obtained. The experimental results confirm the theoretical findings.

VI.P.8. Manufacturing and control technology for small-diameter telescope mirrors

V.-F. Duma, G. Beches

Dept. of Product Design, Aurel Vlaicu Univ. of Arad, 310130 Arad, Romania
E-mail: dumavirgil@yahoo.co.uk; Web: www.uavsb.xhost.ro; www.ad-astra.ro/Duma_Virgil.

The paper presents the main features of the manufacturing and control technique we have used for obtaining small size (up to 300 mm in diameter) mirors, e.g. for telescopes. The manufacturing technique developed has been applied in the making of more than 50 mirrors, both spherical and parabolic, that now equip telescopes of astronomic observatories in Romania, but also amateurs telescopes throughout the country. An efficient measuring experimental stall has been developed, for both the inter-phases and the final testing of mirrors. Its principle, regarding both the application of the Schlieren-Foucault test for spherical mirrors, and of the Couder test for parabolic mirrors is discussed, with regard to several mirror defects that were encountered and are usual in the manufacturing process. These defects of the mirrors are presented in relationship with the results of the different optical tests used. A final example, of a mirror profile manufactured, polished and measured, is presented.

VI.P.9. Modelling of the Er^{3+}-doped Ti:$LiNbO_3$ optical waveguide couplers

N. N. Puscas

Physics Department, University "Politehnica" of Bucharest, 060042, Bucharest, Romania
E-mail: pnt@physics.pub.ro

This paper reports some modelling results concerning a novel optical directional coupler in Er^{3+}: Ti:$LiNbO_3$. Based on the mode coupling theory we evaluated the coupling coefficient between the straight and curved waveguides of the directional coupler. Also, using a quasi-two-level model in the small gain approximation and the unsaturated regime in this paper we report some original results concerning the evaluation of the spectral optical gain, spectral noise figure and spectral signal-to-noise ratio in the bent Er^{3+}:Ti:$LiNbO_3$ waveguide of the directional coupler pumped near 1484 nm performed for erfc, Gaussian and constant profile of the Er^{3+} ions in $LiNbO_3$ crystal.

VI.P.10. Reverse engineering for heritage conservation

D. Apostol, Mihaela Bojan, Iuliana Iordache, V. Damian , Ileana Apostol

Laser Department, National Institute for Laser, Plasma and Radiation Physics, Măgurele, Ilfov, Romania

Reverse engineering technology enables the creation of a digital model using data collected from an existing object. In recent years, laser scanning technology was extensively used in the field of culture heritage surveying and the scanner is already very useful in large scenes (historical site), statues or large objects digitization. We presents reverse engineering application to small objects like coins and mint marks using alternative methods like white light interferometry, fringe projection or stylus profilometry.

VI.P.11. Preliminary experiments in THz spectroscopy

G. Mogaldea[1], M. Mogaldea[1], A. Leca[2], Veta Ghenescu[1], M. Piso[3], D. Apostol[2]

[1]Institute for Space Sciences, RO 077125, Magurele, Ilfov, Romania
[2]National Institute for Laser, Plasma and Radiation Physics, 077125, Magurele, Ilfov, Romania
[3]Romanian Space Agency, 010362, Bucharest, Romania

THz spectroscopy has found widespread applicability with studies ranging from condensed matter physics to gas-phase spectroscopy to biomedical imaging. THz Spectroscopy Kit from EKSPLA Company, Latvia includes all necessary components for assembling of optical system for Time Domain THz Spectroscopy. THz emitter and/or THz detector consists of a microstrip photoconductive antenna fabricated on low-temperature grown GaAs (LT-GaAs) substrate pumped by ultra fast laser. Usable spectral range extends from 100 GHz to 3THz. THz radiation penetrates clothing and many other organic materials and furthermore offers spectroscopic information on safety-relevant materials such as explosives and pharmacological substances. Biological and chemical samples emit characteristic spectra of terahertz radiation, but detecting and measuring them is difficult because the signals are weak and absorbed by the atmosphere. Absorption spectra for several materials are presented in this paper.

VI.P.12. THz spectral imaging for security applications

M. Mogaldea[1], G. Mogaldea[1], A. Leca[2], Veta Ghenescu[1], M. Piso[3], D. Apostol[2]

[1]Institute for Space Sciences, RO 077125, Magurele, Ilfov, Romania
[2]National Institute for Laser, Plasma and Radiation Physics, 077125, Magurele, Ilfov, Romania
[3]Romanian Space Agency, 010362, Bucharest, Romania

Recent advances in laser and semiconductor technology have made possible the production and detection of THz radiation with solid-state devices. The so cold THz gap in electromagnetic spectrum is now open to research and practical applications. Two main directions are scrutinized by researchers: anti terrorist actions and biological impact. Imaging is the bases for both of them. We present an experimental set-up, based on EKSPLA spectroscopic kit, to observe metallic objects covered by visible absorbing layers like paper. As much as covering layers could have different spectral absorbtion range, spectral imaging is compulsory. Images of hidden metallic objects are presented.

VI.P.13. Excimer laser micro-machining optimization by using beam homogenizers based optical system

Vasile Sava[1], Cristinel Ilie[2], Marius Popa[2], Mihaela Stoica[3], Mircea Udrea[3]

[1]Apel Laser srl, Bucharest, Romania
[2]ICPE- CA, Bucharest, Romania
[3]NILPRP, Bucharest, Romania

This paper describes the experimental results in MEMS micro-machining technology which were performed by using a 248 nm KrF excimer laser, beam homogenizer, mask image, projection lens and a XYZ CNC stage. The optical system was composed by two beam homogenizers of different focal lengths, a condenser lens that takes and reshapes the laser beam, the field lens that collimate the beam, the mask that defines the image and the projection lens. The demagnification of our system was maximum 10X. The shape of the mask was kept almost identical on the target in the micrometric scale.

AUTHOR INDEX