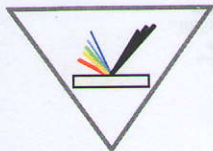


20th International Conference and School
on Quantum Electronics
LASER PHYSICS
AND APPLICATIONS



17-21 September 2018
Nessebar, Black Sea, Bulgaria



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BOOK OF ABSTRACTS



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TABLE OF CONTENTS

PD14.	FORMAMIDE-BASED PREBIOTIC COMPOUNDS SYNTESIZED AFTER STANDARD AND MICROWAVE HEATING, <i>V. Enchev, I. Angelov, N. Markova, N. Stoyanova, I. Dimcheva, M. Rangelov, L. Avramov.....</i>	103
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E - LASER SYSTEMS AND NONLINEAR OPTICS

PE1.	GENERALIZED TAPPERT TRANSFORMATION IN FEMTOSECOND NONLINEAR OPTICS, <i>V.N. Serkin, T.L. Belyaeva.....</i>	105
PE2.	VORTEX SOLUTIONS OF VECTOR NONLINEAR AMPLITUDE EQUATIONS IN OPTICS, <i>I. Bozhikoliev, K. Kovachev, A. Dakova, V. Slavchev, D. Dakova, L. Kovachev.....</i>	106
PE3.	COLLINEAR INVERTED FIELD AUTOCORRELATION OF FEMTOSECOND VORTEX PULSES/BEAMS, <i>N. Dimitrov, L. Manova, M. Zhekova, I. Stefanov, A. Dreischuh.....</i>	106
PE4.	LUMINESCENCE OF IRIIDIUM COMPLEXES UPON SHORT LASER PULSES, <i>Nikolay R. Dimirov, Georgi B. Hadjichristov, Ivan L. Stefanov.....</i>	108
PE5.	FLEXIBLE AND STRECHABLE OPTOELECTRONIC DEVICES USING GRAPHENE, <i>Chung Chin Chiou, Cvetelina Fidanova, Ina Angelova, Dimitrina Petrova, D.Z. Dimitrov, Shiuan Huei Lin, Vera Marinova.....</i>	109
PE6.	DEPOLARIZATION OF FEMTOSECOND PULSES IN AIR THROUGH NONLINEAR MECHANISMS, <i>D. A. Georgieva and L. M. Kovachev.....</i>	110
PE7.	LOW-FREQUENCY FLUCTUATIONS CHAOTIC REGIME OF LASER DIODE EMISSION DYNAMICS AT INJECTION CURRENTS ABOVE THE LASER THRESHOLD, <i>I.R. Andrei, C. Onea, A. Baleanu, M.L. Pascu.....</i>	111
PE8.	PARAMETRIC FOUR-PHOTON MIXING. EXACT ANALYTICAL SOLUTIONS IN JACOBI FUNCTIONS, <i>Z. Kasapeteva, S. Milenkova, A. Dakova, D. Dakova, V. Slavchev, L. Kovachev.....</i>	112
PE9.	PROPERTIES OF POLYMERIC MATERIALS FOR OPTICAL SYSTEMS, <i>Stefka Kasarova, Nina Sultanova, Radostin Kasarov, Ivan Nikolov.....</i>	112

POSTER SESSION

The fluorescence detected from tumor sites has a very complex spectral origin. It consists of autofluorescence, fluorescence from exogenous fluorophores and re-absorption from the chromophores accumulated in the tissue investigated. The spectral features observed during endoscopic investigations can be grouped in the following regions: 450-630 nm region, where tissue autofluorescence is observed; 630-710 nm region, where fluorescence of PpIX is clearly pronounced; 530-580 nm region, where minima in the autofluorescence signal are observed, related to re-absorption of oxy-hemoglobin in this spectral area.

The contrast was evaluated as observed in normal vs. neoplastic gastrointestinal tissues. The influence of endogenous 5-ALA/PpIX accumulation was taken into account; and the role was assessed of inflammatory processes on the PpIX distribution and accumulation into the body. The dimensionless ratio $R = I_{635}/I_{560}$ is estimated as highly informative one for the development of a simple algorithm for differentiation, which could have a high diagnostic accuracy for evaluation of tumor vs. inflammatory vs. normal mucosa using 1-D spectral results. A very good correlation between fluorescence data and histology examination of the lesions investigated is achieved as well.

A comparison will be presented and discussed between the evaluated spectroscopic parameters and their value for clinical application of the exogenous fluorescence spectroscopy in gastrointestinal cancer diagnosis. The results obtained are expected to be used for development of a system and diagnostic methodology for gastrointestinal tumor detection complementary to the existing endoscopic systems.

Acknowledgements: This collaborative work was supported in the framework of Bulgarian NSF-MES project #DFNI-B02/9/2014 and Russian Science Foundation project #18-15-00139.

PD14

FORMAMIDE-BASED PREBIOTIC COMPOUNDS SYNTHESIZED AFTER STANDARD AND MICROWAVE HEATING

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Determining the conditions allowing an efficient one-pot synthesis of the largest possible variety of biogenic compounds may shed light on a plausible scenario for origin of life. Today one of the main assumption of prebiotic chemistry is that formamide could be one of the most important compounds for synthesis of the informational polymers components such as RNA and DNA. This idea has been supported by the detection of sufficient amounts of formamide in the outer space regions with dense molecular clouds and the forming of new stars.

According to such a scenario, the processes for synthesis on the basis of formamide as a source for the origin of life-generating biomolecules will be started with high probability,

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because the chemical reactions provoked and occurring under such conditions are not reversible. Therefore, understanding the formation of biogenic molecules on the basis of formamide in abiotic conditions is a prerequisite for origin-of-life studies.

We report experiments on synthesis at high temperatures. Heating formamide up to 190 °C under vacuum in a standard furnace and in a microwave device yielded a large number of different organic compounds in the medium.

After heating for different periods of time, we obtained in this solution most of the important prebiotic compounds (purine, adenine, cytosine and uracil), amino acids (glycine, alanine), hypoxanthine, pterine, urea and urocanic acid.

We simulated the reactions leading to nucleic bases and amino acids formation by *ab initio* quantum-chemical methods (MP2 and SCS-MP2) to study the potential mechanism of the reactions.

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