

# 5th European Conference on Applications of Femtosecond Lasers in Materials Science



**FemtoMat 2013**

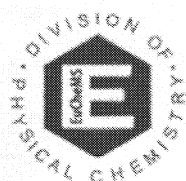


**March 18 – 20, 2013  
Mauterndorf Castle, Mauterndorf, Salzburg,  
Austria**

<http://www.nanoandphotonics.at/>

**Chair: Wolfgang Kautek**

**Organization Committee: Oskar Armbruster, Slavica Koprivica, Hannes Pöhl**



**universität  
wien**

5th European Conference on Applications of Femtosecond Lasers in Materials Science  
 March 18-20, 2013, Mauterndorf Castle, Mauterndorf, Salzburg, Austria

что сейчас не происходит?  
 или структура?  $g \approx \dots = ?$  color centres?  
 что такое кар. год - от чего? / нет?  
 нет от чего?  
 - по поводу алмаза



# Programme

Kazansky

A.P.L 90 151 1 20 (2007)

Monday, 18 March 2013

Курсовая работа

с фиды / кр = что мод

что было в работе?

- 08:30 – 09:00 **Registration**
- 09:00 – 09:15 **Opening and Greetings**
- 09:15 – 09:45 MoM1 **N. Bulgakova, V.P. Zhukov, Y.P. Meshcheryakov** (University of Southampton, UK); Invited  
*"Ultrashort-pulse laser modification of transparent materials: Insight from inside"*
- 09:45 – 10:15 MoM2 **W. Kautek, O. Armbruster** (University of Vienna, Wien, A)  
*"Non-thermal material response to laser energy deposition"*
- 10:15 – 10:45 MoM3 **J. Boneberg, A. Kolloch, P. Leiderer, E. Scheer** (University of Konstanz, D); Invited  
*"Optical nearfield photography of nanostructures"*
- 10:45 – 11:00 **Coffee**
- 11:00 – 11:30 MoM4 **N.A. Inogamov, S.I. Anisimov, Yu.V. Petrov, V.A. Khokhlov, V.V. Zhakhovskiy, Yu.N. Emirov, I.I. Oleynik, S.I. Ashitkov, M.B. Agranat, K.P. Migdal, D. Ilnitkiy** (Russian Academy of Sciences, Moscow, RUS); Invited  
*"Femtosecond ablation: two-temperature stage, super-elastic-shocks, and frozen nanostructures"*
- 11:30 – 12:00 MoM5 **K. Sokolowski-Tinten** (University of Duisburg-Essen, D); Invited  
*"Time-resolved X-ray scattering studies of ultrafast phase transitions in laser-excited materials"*
- 12:00 – 12:30 MoM6 **C. Spielmann** (Friedrich Schiller University Jena, D); Invited  
*"Towards studying femtosecond ablation dynamics with time-resolved x-ray spectroscopy"*

12:30 – 16:00 **Free Discussion**

16:00 – 16:30 **Coffee**

16:30 – 17:30 **Poster Presentations**. Oral presentations, 5 min each

17:30 – 18:00 MoA1 **G. Grabner, A. Dextl, J. Ruckhofer, H. Kraker, P. Sperl** (Paracelsus Medical University Salzburg, A); Invited  
*"Femtosecond-Laser Surgery in Ophthalmology"*

18:00 – 18:30 MoA2 **B. Chichkov** (Laser-Zentrum Hannover e.V., D); Invited  
*"Laser Printing of Nanoparticles and Living Cells"*

18:30 – 19:00 MoA3 **J. Stampfl, J. Torgersen, A. Ovsianikov, and R. Liska** (Vienna University of Technology, A); Invited  
*"Functional photopolymers for two-photon-lithography"*

Size, PRB 27 1141 1983

бумага напечатана и отпечатана

5 April 14

105 034908 (2009)

Булганов гелатин  
 бумага не с 29 и X-контраст!  
 то, что я говорю гелатин

Dance Me

gait  
 you walk  
 3 M

EDD  
 ...  
 ...



**Tuesday, 19 March 2013**

- 08:30 – 09:00 TuM1 **M. Sentis**, O. Utéza, N. Sanner, M. Lebugle, R. Clady, N. Varkentina (Aix-Marseille University, Marseille, F); Invited  
*“Control of ultrafast energy deposition at the surface of dielectrics”*
- 09:00 – 09:30 TuM2 **M. Lebugle**, N. Sanner, R. Clady, D. Grojo, O. Utéza, M. Sentis (Aix-Marseille University, Marseille, F)  
*“Femtosecond laser pulse absorption at the surface of dielectrics”*
- 09:30 – 10:00 TuM3 **J. Siegel** (Instituto de Optica, CSIC, Madrid, SP); Invited  
*“Femtosecond microscopy of laser-produced plasmas in dielectrics: A tool for optimized fs laser processing”*
- 10:00 – 10:30 TuM4 **C. Sarpe**, J. Köhler, T. Winkler, M. Wollenhaupt, **T. Baumert** (University of Kassel, D); Invited  
*“Real time observation of transient electron density in water irradiated with tailored femtosecond laser pulses”*
- 10:30 – 10:45 **Coffee**
- 10:45 – 11:15 TuM5 **K.-M. Weitzel** (Philipps-Universität Marburg, Chemistry Department, D); Invited  
*“Chirality analysis of molecules by means of laser ionization employing circularly polarized fs laser pulses”*
- 11:15 – 11:45 TuM6 **E. Stankevicius**, E. Balciunas, D. Baltrukiene, V. Bukelskiene, M. Malinauskas, G. Raciukaitis (Center for Physical Sciences and Technology, Vilnius, LIT); Invited  
*“Fabrication of scaffolds by interference lithography”*
- 11:45 – 12:15 TuM7 **R. Carley**, J. Bowlan, K. Döbrich, B. Frietsch, M. Teichmann, J. Wolter, **M. Weinelt** (Freie Universität Berlin, D); Invited  
*“Ultrafast magnetisation dynamics of Gadolinium and Terbium viewed from their non-equilibrium band-structures”*
- 12:15 – 16:00 **Free Discussion**
- 16:00 – 16:30 **Coffee**
- 16:30 – 17:00 TuA1 **H. Masuhara**, T. Sugiyama, K. Yuyama, A. Usman (National Chiao Tung University, Hsinchu, Taiwan); Invited  
*“Laser trapping assembling, scattering, and crystallization by CW and femtosecond lasers”*
- 17:00 – 17:30 TuA2 **P. Simon**, J.-H. Klein-Wiele, J. Ihlemann (Laser-Laboratorium Göttingen e.V., D); Invited  
*“Laser writing of periodic nano-structures”*
- 17:30 – 18:00 TuA3 **P. Kubis**, N. Li, T. Stubhan, F. Machui, **C.J. Brabec** (i-MEET Friedrich-Alexander-Universität Erlangen-Nürnberg, D); Invited  
*“High Resolution Laser Patterning of Organic Photovoltaic Devices”*
- 18:00 – 18:30 TuA4 **J. Krüger**, C. Symietz, R. Gildenhaar, G. Berger (Federal Institut for Materials Research and Testing, Berlin, D); Invited  
*“Covering Ti6Al4V implant material with bioactive ceramics using femtosecond laser processing”*
- 18:30 – 19:00 TuA5 **G.M. O'Connor**, N. Hastrup, C. McDonnell, A. Collins, D. Rostohar (National University of Ireland, Galway, IRL); Invited  
*“Short pulse laser ablation of very thin films on dielectric substrates for display applications”*

## Wednesday, 20 March 2013

- 08:30 – 09:00 WeM1 **J. Reif**, O. Varlamova, M. Bounhalli  
(Brandenburgische Technische Universität, Cottbus, D); Invited  
*"Influence of Irradiation Dose on Laser-Induced Surface Nanostructures on Silicon"*
- 09:00 – 09:30 WeM2 **E. Rebollar**, J.R. Vázquez de Aldana, I. Martín-Fabiani, M. Hernández, D.R. Rueda, C. Domingo, T.A. Ezquerra, P. Moreno, M Castillejo  
(Instituto de Química Física Rocasolano, CSIC, Madrid, SP); Invited  
*"Assessment of Femtosecond Laser Induced Periodic Surface Structures on Polymer Films"*
- 09:30 – 10:00 WeM3 **C. Maclair**, Y. Di Maio, R. Stoian, D. Pietroy, E. Baubeau, E. Audouard  
(Université Jean Monnet & Impulsion SAS, Saint-Etienne, F); Invited  
*"Increasing speed and flexibility of ultrafast laser micromachining with spatial beam shaping"*
- 10:00 – 10:30 WeM4 **J. Heitz**  
(Johannes Kepler University Linz, A); Invited  
*"Application of Laser-Induced Periodic Surface Structures (LIPSS) for activation of biological cells cultivated on polymer substrates and formation of gold nano-wires"*
- 10:30 – 10:45 **Coffee**
- 10:45 – 11:15 WeM5 **E.L. Gurevich**  
(Ruhr-Universität Bochum, D); Invited  
*"Turing-like Mechanism of Laser-Induced Periodic Surface Structures"*
- 11:15 – 11:45 WeM6 **O. Armbruster**, M. Lovric, W. Kautek  
(University of Vienna, A)  
*"The Role of Surface Energy on the Formation of High Spatial Frequency Laser-Induced Periodic Surface Structures"*
- 11:45 – 12:00 **Closing Words**

Invited

**Femtosecond ablation: two-temperature stage, super-elastic shocks, and frozen nanostructures**

N.A. Inogamov,<sup>1</sup> S.I. Anisimov,<sup>1</sup> Yu.V. Petrov,<sup>1</sup> V.A. Khokhlov,<sup>1</sup> V.V. Zhakhovsky,<sup>2</sup> Yu.N. Emirov,<sup>2</sup> I.I. Oleynik,<sup>2</sup> S.I. Ashitkov,<sup>3</sup> M.B. Agranat,<sup>3</sup> K.P. Migdal,<sup>4</sup> and D. Ilitskiy<sup>4</sup>

<sup>1</sup> Russian Academy of Sciences, Landau Institute for Theoretical Physics

<sup>2</sup> University of South Florida, USA

<sup>3</sup> Russian Academy of Sciences, Joint Institute for High Temperatures

<sup>4</sup> Dukhov All-Russian Science Research Institute of Automatics, Moscow, Russia

We consider processes caused by femtosecond laser irradiation. Femtosecond laser pulse, with absorbed fluence higher than few  $\text{mJ cm}^{-2}$ , transfers metal into two-temperature state. We consider properties of this state. Two-temperature relaxation lasts few picoseconds. Heating by laser initiates formation of shocks propagating into solid. We show that crystal survives in an uniaxially compressed state behind such shocks at unusually high stresses. Ablation of metals is also addressed. Processes of melting, cavitation, rupture of nanofoam, and freezing of surface structures are described.