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Report

69th International IUVSTA Workshop on Oxidation of organic materials by excited radicals created in non-equilibrium gaseous plasma (Cerklje na Gorenjskem, Slovenia, 9th – 13th December 2012)

The workshop was organized in a remote Hotel Raj in Slovenian mountains not far from Ljubljana International airport. It addressed open questions in interaction between excited radicals created in non-equilibrium gaseous plasma and organic materials including biological cells, tissues, polymers and simple organic materials. The scope of the proposed workshop was to discuss possible interaction mechanisms. The workshop gathered together scientists working on detection and measurements of metastable oxygen particles, theoreticians working on production of metastables as well as their loss on surfaces, experimentalists working on etching of organic materials in plasma, early and late afterglows and scientists involved in development of novel technologies based on preferential etching of organic materials. Distinguished scientists from world leading groups in this field were invited to attend the workshop and we received good response. 19 leading scientists from all over the world presented recent achievements in this rapidly growing field, and discussed the results and prepared the roadmap for future research. The rest of 38 participants were predominantly PhD and postdoc students. Most of them presented their works in 2 poster sessions. Invited speakers came from Australia, Czech Republic, France, Germany, Japan, Korea, Portugal, Serbia, Slovenia, Spain, UK, USA. The list is presented in the attached table. The schedule was concentrated to 4 days and is presented in the attached table. Ample time was dedicated to formal as well as informal discussions. Formal discussion was organized as topical round tables in four sessions (see attached table) while isolation of the hotel allowed for informal discussions.

The general conclusion has been drawn: although a substantial progress is noticeable in past few years on characterization of low-pressure plasma as well as surface effects the lack of methods for separation of reactive particles does not allow for developing a generally acceptable theory on interaction of specific plasma particles with organic materials. Synergistic effects of atoms and metastable molecules definitely play an important role in material functionalization, etching and functional disturbances. The interaction of radicals prepared with atmospheric discharges with organic materials is even less understood due to complications resulting from very short life-time of reactive particles.

The IUVSTA grant of 6.000 Euro was gratefully acknowledged and was spent to subsidize a part of invited speakers' expenses, as well as to cover general organization costs.

Ljubljana, 27th December 2012

Workshop president
Prof. Dr. Miran Mozetič

Attachment: the workshop schedule, some photos



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Teslova 30, 1000 Ljubljana, Slovenija, TRR: 02083-0014712647, DŠ: 71918639

SLOVENIAN SOCIETY FOR VACUUM TECHNIQUE

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69th IUVSTA Workshop schedule

Sunday	Dec. 9th
12:00 - 18:30	Arrivals
19:00 - 20:00	Dinner
20:00 - 22:00	Welcome reception



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Monday	Dec. 10th	
7:30 - 9:20	Breakfast	
9:20 - 9:30	Opening	
9:30 - 10:00	F. Poncin-Epaillard (France)(invited)	Towards a comprehensive approach of plasma-degradation of polymers
10:00 - 10:30	T. Belmonte (France)(invited)	Oxidation of organic materials by excited radicals created in non-equilibrium gaseous plasma
10:30 - 12:00	Topical discussions: The basic mechanisms on plasma interaction with organic materials	
12:00 - 14:00	Lunch	
14:00 -14:30	M. Hori (Japan)(invited)	Comprehensive study of atmospheric pressure plasma oxidation on organic materials and organisms
14:30 - 15:00	T. Gans (UK)(invited)	Diagnostics and simulations of reactive oxygen species in cold non-equilibrium atmospheric pressure plasmas for healthcare technologies
15:00 - 15:30	S. Lazović (Slovenia)(invited)	Properties and bio-medical applications of non-thermal plasma
15:30 - 16:00	D. O'Connell (UK)(invited)	Cold atmospheric pressure plasma jet interactions with different biological materials
16:30 - 17:00	Coffee break	
17:00 - 17:30	H. Kersten (Germany)(invited)	On the energy balance during removal of organic compounds by oxygen-containing plasmas
17:30 - 18:00	S. Tajima (Japan)(invited)	The effect of active species in the plasma on the change in nanomechanical properties of polymers
18:00 - 18:30	C. Canal (Spain)(invited)	Plasmas in organic biomaterials: a case study of polypropylene meshes for soft tissue repair
19:00 - 20:00	Dinner	
20:00 - 22:00	Poster section 1	



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Tuesday		Dec. 11th	
7:30 - 9:30	Breakfast		
9:30 - 10:45	Topical discussions: Low-pressure plasmas for oxidation of organic materials		
10:45 - 12:00	Topical discussions: Atmospheric-pressure plasmas for oxidation of organic materials		
12:00 - 14:00	Lunch		
14:00 -14:30	D. N. Ruzic (USA)(invited)	Ozone generation with atmospheric pressure micro-plasma array	
14:30 - 15:00	V. Guerra (Portugal)(invited)	Afterglow kinetics in oxygen pulsed discharges	
15:00 - 15:30	K. Kutasi (Hungary)(invited)	Characteristics of a small volume Ar-O ₂ afterglow	
15:30 - 16:00	D. Mariotti (UK)(invited)	Plasma-liquid interactions for nanoscale engineering	
16:30 - 17:00	Z. Lj. Petrović (Serbia)(invited)	Electrical breakdown in water vapor and ethanol	
17:00 - 17:30	Coffee break		
17:30 - 18:00	V. Švrček (Japan)(invited)	Non-equilibrium plasmas for engineering composition bandgap, build-in-charge and interface of silicon nanocrystals with conjugated polymers	
18:00 - 18:30	G. Uchida (Japan)(invited)	Application of Si nanoparticles to energy devices: quantum-dot solar cells and Li ion batteries	
19:00 - 20:00	Dinner		
20:00 - 22:00	Poster section 2		

Wednesday

Dec. 12th



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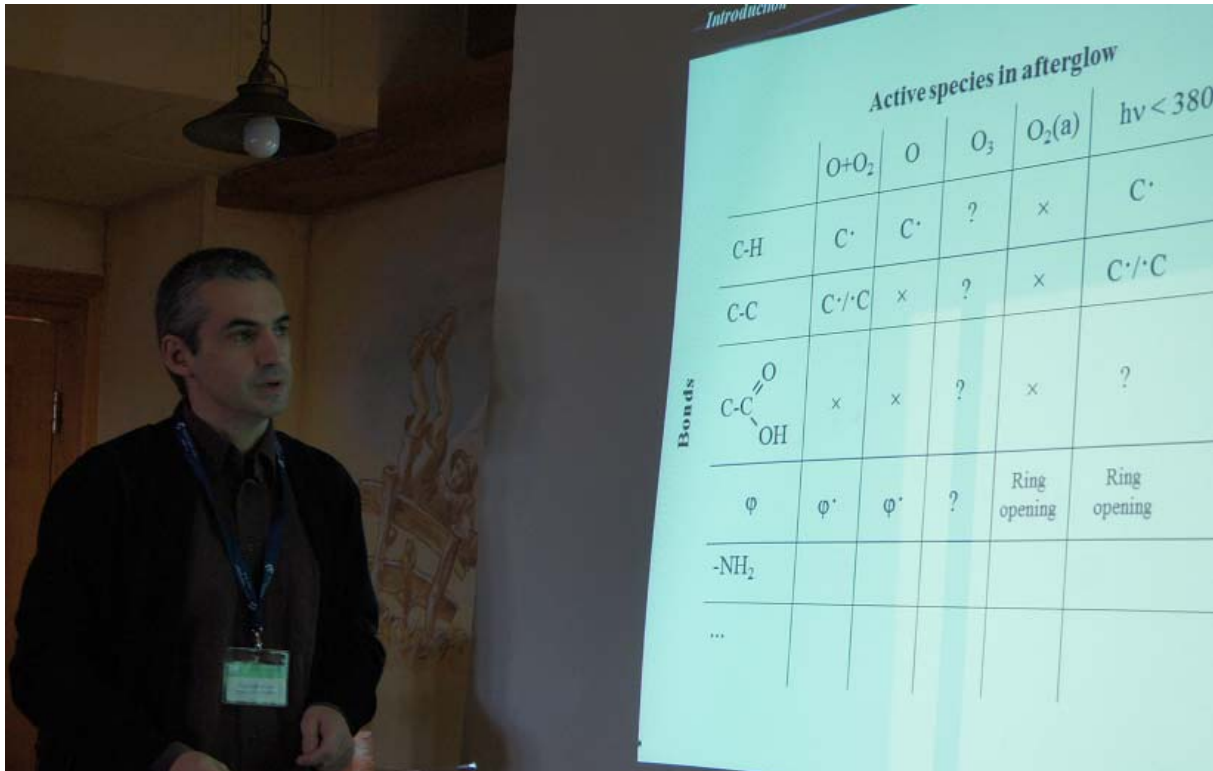
7:30 - 9:30	Breakfast	
9:30 - 10:00	W. Choe (Korea)(invited)	Tomographic and lens optical diagnostics of filtered emissivity and excitation temperature (as an alternative to electron temperature) profiles for large area plasmas
10:00 - 10:30	K. Ostrikov (Australia)(invited)	Effects of atmospheric-pressure plasma-generated species in functionalization of organic nanomaterials and organic-inorganic nanocomposites
10:30 - 11:00	M. Lehocky (Czech R.)(invited)	Allylamine grafting, attachment and antibacterial agent and antibacterial activity assessment of plasma pre-treated LDPE
11:00 - 12:00	Conclusions on future perspectives	
12:00 - 14:00	Lunch	
14:00 - 14:30	Departures	



Some attendees in the lecture room.



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Prof. Thierry Belmonte from Nancy, France, presented a novel hypothesis of interaction between particles found in oxygen plasma afterglow and specific surface groups.



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Prof. Masaru Hori from Nagoya, Japan, described the role of oxygen particles in apoptosis of cancer cells.



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Dr. Deborah O'Connor from York, England, presented cold atmospheric pressure plasma jet interactions with different biological materials.



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Dr. Kinga Kutasi discussed experimental and theoretical results on life-time of excited particles in oxygen plasma and afterglow.