



ANNOUNCEMENT - CALL FOR ABSTRACTS

## ISPC 2015 - 22<sup>nd</sup> International Symposium on Plasma Chemistry

Sunday 5 July – Friday 10 July 2015  
University of Antwerp, Belgium

### WELCOME

On behalf of the International Plasma Chemistry Society (IPCS), we welcome you to the 22<sup>nd</sup> International Symposium on Plasma Chemistry, which will be held from the 5<sup>th</sup> to the 10<sup>th</sup> of July 2015 in Antwerp, Belgium.

ISPC 22 will be held at the City Campus of the University of Antwerp. The symposium venue is within the city centre and close to the central railway station. Antwerp is only 42 km from Brussels (Zaventem) National Airport, and 165 km from Amsterdam Schiphol Airport; both airports have numerous connections to major airports all over the world. Antwerp is an international city (population ~500,000), which has nevertheless succeeded in remaining pleasantly cosy and in keeping everything within convenient reach. The numerous historical monuments and museums are a tribute to its glorious past. Some of the museums have a worldwide reputation, such as the Rubens House and the Plantin-Moretus printing museum, containing unique collections.

The ISPC has gained popularity over the past few years and represents scientists from all major continents of the world. Its breadth of subject matter has now expanded and we will have sessions on both thermal and non-thermal plasmas, with emphasis ranging from fundamentals, diagnostics and modelling, plasma sources, microdischarges, plasma in liquids, to the many applications, such as plasma medicine, environmental applications and renewable energy, materials science, microelectronics, ...

We look forward to welcoming you to ISPC 22 in Antwerp!

Yours sincerely,

**Annemie Bogaerts** and **Richard van de Sanden**

*Symposium co-chairs*

### CO-ORGANIZED BY



University of Antwerp, Department of Chemistry, [Research group PLASMANT](#), Antwerp, Belgium  
[DIFFER - Dutch Institute for Fundamental Energy Research](#), Rijnhuizen, The Netherlands

## SCOPE OF THE SYMPOSIUM

ISPC is a major bi-annual international conference with topics encompassing the whole area of plasma chemistry and processing science. The aim of the symposium is to present and discuss the recent progress in plasma chemistry and its many applications. The whole area of plasma processing from fundamentals to applications will be covered. Topics to be treated are:

1. Fundamentals of plasma-surface interactions
2. Diagnostics and modelling in plasma chemistry
3. Plasma and liquids
4. Microdischarges and microplasmas
5. Plasma processing for microelectronics and nanotechnology
6. Plasma deposition and treatment of inorganic and organic films, incl. polymers
7. Plasma processing of clusters, particles, and powders
8. Plasma chemical synthesis and gas conversion
9. Environmental plasma applications: waste treatment and abatement, cleaning, recycling, etc.
10. Plasma medicine
11. Plasma treatment of biomaterials
12. Plasma spray and thermal plasma material processing
13. Plasma-aided combustion and aerodynamics

The symposium will include plenary lectures, invited and contributed oral presentations and poster sessions. The official language of the symposium is English.

## ISPC 2015 SYMPOSIUM SECRETARIAT

University of Antwerp, Department of Chemistry, research group PLASMANT  
Campus Drie Eiken, Universiteitsplein 1, BE-2610 Antwerp-Wilrijk, Belgium  
tel. +32-(0)3-265.23.43; fax +32-(0)3-265.23.43; e-mail: [luc.vantdack@uantwerpen.be](mailto:luc.vantdack@uantwerpen.be)  
URL: [www.uantwerpen.be/ispc2015](http://www.uantwerpen.be/ispc2015)

## ABOUT IPCS - INTERNATIONAL PLASMA CHEMISTRY SOCIETY

The International Plasma Chemistry Society (IPCS) has been formed as the successor of the association named "IUPAC Subcommittee on Plasma Chemistry". The purpose of the Society is the promotion of scientific activity, the organisation and implementation of scientific meetings and presentations, as well as the recognition of excellence in the area of Plasma Chemistry. All registered participants at the biennial International Symposium on Plasma Chemistry (ISPC) automatically become members of the IPCS for the two years following the symposium.

## PLASMA CHEMISTRY AWARD (PCA)

The Plasma Chemistry Award (PCA) is the highest recognition awarded by the International Plasma Chemistry Society (IPCS) for lifetime achievements in the field of Plasma Chemistry. Past recipients were:

- 2013 Michel Wertheimer
- 2011 Kunihide Tachibana
- 2009 Joachim Heberlein
- 2007 Ricardo d'Agostino
- 2005 Steven Girshick
- 2003 Charles Kruger
- 2001 Pierre Fauchais
- 1999 Daan Schram
- 1997 Harald Suhr
- 1995 Emil Pfender

The 2015 Plasma Chemistry Award will be given to Maher Boulos (Tekna Systèmes Plasma, Inc., Sherbrooke, Québec, Canada & University of Sherbrooke, Sherbrooke, Québec, Canada).

## SYMPOSIUM SCHEDULE

The ISPC 2015 programme will be composed of a *Summer School*, organized from Thursday July 2<sup>nd</sup> to Saturday July 4<sup>th</sup>, an *Industrial Day* on Sunday July 5<sup>th</sup>, and a *regular symposium programme* running from Monday July 5<sup>th</sup> to Friday July 10<sup>th</sup>, composed of plenary and invited lectures, parallel oral sessions, and poster sessions, as well a special workshop on Plasma-mediated effects on biological systems. One or more of the oral sessions can be combined into either a workshop or a special session.

### *Summer School - Plasma processing science and technology*

Organizers:

- Richard Engeln, Eindhoven University of Technology (The Netherlands)
- Gerard van Rooij, DIFFER – Dutch Institute for Fundamental Energy Research (Nieuwegein, The Netherlands)
- Richard van de Sanden, DIFFER – Dutch Institute for Fundamental Research (Nieuwegein, The Netherlands) and Eindhoven University of Technology (The Netherlands)

A 2.5 day summer school will be organized at DIFFER - Dutch Institute for Fundamental Energy Research (Eindhoven, The Netherlands) from Thursday July 2<sup>nd</sup> to Saturday July 4<sup>th</sup>. The summer school will concentrate on the basics of plasma physics and chemistry and its application. Internationally recognized experts will teach courses on plasma physics, plasma chemistry, plasma sources and applications (spanning the whole range from thermal to non-equilibrium plasma technology). A programme of the school and teachers will appear soon on the ISPC 2015 website.

### *Industrial Day - Re-use of carbon dioxide*

Organizers:

- Gerard van Rooij, DIFFER – Dutch Institute for Fundamental Energy Research (Nieuwegein, The Netherlands)
- Michael Gleeson, DIFFER – Dutch Institute for Fundamental Energy Research (Nieuwegein, The Netherlands)
- Richard van de Sanden, DIFFER – Dutch Institute for Fundamental Research (Nieuwegein, The Netherlands) and Eindhoven University of Technology (The Netherlands)
- Annemie Bogaerts, University of Antwerp – Research group PLASMANT (Antwerp, Belgium)

A 1-day symposium on the re-use of carbon dioxide will be organized on Sunday July 5<sup>th</sup> at the symposium venue. More details will follow soon on the ISPC 2015 webpage.

Sunday July 5th, 2015		Monday July 6th, 2015		Tuesday July 7th, 2015		Wednesday July 8th, 2015		Thursday July 9th, 2015		Friday July 10th, 2015	
09:00	Industrial day: part I	08:30	Registration	09:00	Plenary II	09:00	Plenary III	09:00	Plenary IV	09:00	Plenary V
		08:50	Welcome and opening addresses	09:40	Oral H1	09:40	Oral N1	09:40	Oral Q1	09:40	Oral W1
		09:00	Plenary I	09:45	Keynote G	09:45	Keynote M	09:45	Keynote P	09:45	Keynote V
		09:45	Oral B1	10:00	Oral H2	10:00	Oral N2	10:00	Oral Q2	10:00	Oral W2
		10:00	Keynote A	10:05	Oral G1	10:05	Oral N3	10:05	Oral Q3	10:05	Oral W3
		10:15	Oral A1	10:30	Refreshment break	10:30	Refreshment break	10:30	Refreshment break	10:30	Refreshment break
		10:30	Oral A2	11:00	Oral G2	11:00	Oral N4	11:00	Oral Q4	11:00	Oral W4
		11:00	Keynote B	11:15	Oral G3	11:15	Oral N5	11:15	Oral Q5	11:15	Oral W5
		11:15	Oral A3	11:30	Oral G4	11:30	Oral N6	11:30	Oral Q6	11:30	Oral W6
		11:30	Oral A4	11:45	Oral G5	11:45	Oral N7	11:45	Oral Q7	11:45	Oral W7
		11:45	Oral A5	12:00	Oral G6	12:00	Oral N8	12:00	Oral Q8	12:00	Oral W8
		12:00	Oral A6	12:15	Lunch break	12:15	Plasma Chemistry Award lecture	12:15	Lunch break	12:15	Concluding remarks
12:15	Lunch break	12:15	Lunch break	13:00	Plasma Chemistry Award lecture	13:00	Mid-session guided city tours	13:00	Keynote S	13:00	
14:00	Industrial day: part II	14:00	Keynote D	14:00	Oral K1	14:00	City walk A: Bank and Embarment	14:00	Oral T1	14:00	
		14:15	Oral D1	14:15	Oral K2	14:15	City walk B: In Rubens' Footsteps	14:15	Oral T2	14:15	
		14:30	Oral D2	14:30	Oral J1	14:30	City walk C: A Brilliantwerp Story & Mega Recreation	14:30	Oral T3	14:30	
		14:45	Keynote E	14:45	Oral J2	14:45	City walk D: Hip & Fun	14:45	Keynote T	14:45	
		15:00	Oral D3	15:00	Oral J3	15:00	Central Station	15:00	Oral U1	15:00	
		15:15	Oral D4	15:15	Oral J4	15:15		15:15	Oral U2	15:15	
		15:30	Oral D5	15:30	Oral J5	15:30		15:30	Oral U3	15:30	
16:00	Symposium registration	15:45	Keynote F	15:45	Oral K5	15:45	Poster session II	15:45	Oral U4	15:45	
		15:45	Oral D6	15:45	Oral K6	15:45	Belgian beers and dresses	15:45	Oral U5	15:45	
		17:00	Keynote F	17:00	Oral K7	17:00	Poster session III	17:00	Poster session III	17:00	
		17:00	Oral D7	17:00	Oral K8	17:00	Belgian beers and dresses	17:00	Poster session III	17:00	
		18:00	Oral D8	18:00	Oral K9	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D9	18:00	Oral K10	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D10	18:00	Oral K11	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D11	18:00	Oral K12	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D12	18:00	Oral K13	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D13	18:00	Oral K14	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D14	18:00	Oral K15	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D15	18:00	Oral K16	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D16	18:00	Oral K17	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D17	18:00	Oral K18	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D18	18:00	Oral K19	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D19	18:00	Oral K20	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D20	18:00	Oral K21	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D21	18:00	Oral K22	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D22	18:00	Oral K23	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D23	18:00	Oral K24	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D24	18:00	Oral K25	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D25	18:00	Oral K26	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D26	18:00	Oral K27	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D27	18:00	Oral K28	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D28	18:00	Oral K29	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D29	18:00	Oral K30	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D30	18:00	Oral K31	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D31	18:00	Oral K32	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D32	18:00	Oral K33	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D33	18:00	Oral K34	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D34	18:00	Oral K35	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D35	18:00	Oral K36	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D36	18:00	Oral K37	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D37	18:00	Oral K38	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D38	18:00	Oral K39	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D39	18:00	Oral K40	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D40	18:00	Oral K41	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D41	18:00	Oral K42	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D42	18:00	Oral K43	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D43	18:00	Oral K44	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D44	18:00	Oral K45	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D45	18:00	Oral K46	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D46	18:00	Oral K47	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D47	18:00	Oral K48	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D48	18:00	Oral K49	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D49	18:00	Oral K50	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D50	18:00	Oral K51	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D51	18:00	Oral K52	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D52	18:00	Oral K53	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D53	18:00	Oral K54	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D54	18:00	Oral K55	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D55	18:00	Oral K56	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D56	18:00	Oral K57	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D57	18:00	Oral K58	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D58	18:00	Oral K59	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D59	18:00	Oral K60	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D60	18:00	Oral K61	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D61	18:00	Oral K62	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D62	18:00	Oral K63	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D63	18:00	Oral K64	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D64	18:00	Oral K65	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D65	18:00	Oral K66	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D66	18:00	Oral K67	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D67	18:00	Oral K68	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D68	18:00	Oral K69	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D69	18:00	Oral K70	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D70	18:00	Oral K71	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D71	18:00	Oral K72	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D72	18:00	Oral K73	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D73	18:00	Oral K74	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D74	18:00	Oral K75	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D75	18:00	Oral K76	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D76	18:00	Oral K77	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D77	18:00	Oral K78	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D78	18:00	Oral K79	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D79	18:00	Oral K80	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D80	18:00	Oral K81	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D81	18:00	Oral K82	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D82	18:00	Oral K83	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D83	18:00	Oral K84	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D84	18:00	Oral K85	18:00	Belgian beers and dresses	18:00	Poster session III	18:00	
		18:00	Oral D85	18:00	Oral K86	18:00	Belgian beers and				

## REGULAR SYMPOSIUM PROGRAMME

### Plenary speakers

The following speakers have confirmed their participation:

- **Christine Charles** (The Australian National University, Space Plasma, Power and Propulsion Division, Canberra, ACT, Australia): *Plasma for space propulsion*
- **Pietro Favia** (University of Bari, Department of Chemistry, Bari, Italy): *Plasma polymers*
- **Hyun-Ha Kim** (Japan National Institute of Advanced Industrial Science and Technology (AIST), Institute for Environmental Management Technology, Tsukuba, Japan): *Plasma catalysis*
- **Uwe Kortshagen** (University of Minnesota, Department of Mechanical Engineering, Minneapolis, MN, USA): *Plasma for nanomaterials*
- **Stephan Reuter** (Leibniz Institute for Plasma Science and Technology, Greifswald, Germany): *Plasma medicine*

The 2015 Plasma Chemistry Award lecture will be given by:

- **Maher Boulos** (Tekna Systèmes Plasma, Inc., Sherbrooke, Québec, Canada & University of Sherbrooke, Sherbrooke, Québec, Canada): *Transport phenomena in thermal plasmas*

### Invited speakers

The following speakers have confirmed their participation:

- **Margarita Baeva** (Leibniz Institute for Plasma Science and Technology, Greifswald, Germany): *Chemical and thermal non-equilibrium effects in free-burning arcs*
- **Gabriela Borcia** (Al. I. Cuza University, Plasma Physics Department, Iasi, Romania): *Atmospheric pressure plasma reactors for fibres processing*
- **Ronny Brandenburg** (Leibniz Institute for Plasma Science and Technology, Greifswald, Germany): *Ultrafast diagnostics of discharge dynamics of DBDs*
- **Emilie Despiou-Pujo** (University Joseph Fournier Grenoble 1, Laboratoire des Technologies de la Microélectronique, Grenoble, France): *Plasma interactions with graphene surfaces*
- **Francesca Intranuovo** (University of Bari, Department of Chemistry, Bari, Italy): *Plasma processing of scaffolds for tissue engineering and regenerative medicine*
- **Yiguang Ju** (Princeton University, Mechanical and Aerospace Engineering, Princeton, NJ, USA): *Kinetics of low-temperature plasma-assisted combustion*
- **Christophe Laux** (Ecole Centrale Paris, Laboratoire d'Énergétique Moléculaire et Macroscopique, Combustion, (EM2C), Chatenay-Malabry, France): *Plasma-assisted combustion*
- **Petr Lukes** (Academy of Sciences of the Czech Republic, Institute of Plasma Physics, Prague, Czech Republic): *Plasma aqueous-phase chemistry*
- **Daniil Marinov** (Open University, Department of Physical Sciences, Milton Keynes, UK): *Reactive adsorption of molecules and radicals on surfaces*
- **Davide Mariotti** (University of Ulster, Engineering Research Institute, Newtownabbey, UK): *Nanoscale engineering by microplasmas*

- **Vandana Miller** (Drexel Plasma Institute, Plasma Medicine Laboratory, Camden, NJ, USA): Plasma activation of the immune system for cancer treatment
- **Shinsuke Mori** (Tokyo Institute of Technology, Department of Chemical Engineering, Tokyo, Japan): Synthesis of nanocarbon materials by PECVD: challenges to direct synthesis via CO<sub>2</sub> reduction using plasma-SOEC hybrid reactor
- **Erik C. Neyts** (University of Antwerp, PLASMANT research group, Antwerp-Wilrijk, Belgium): Modelling of plasma-surface interactions
- **Gottlieb Oehrlein** (University of Maryland, Institute for Research in Electronics and Applied Physics, College Park, MD, USA): Plasma interaction with biomolecules
- **Alexander Rabinovich** (Drexel Plasma Institute, Energy Systems, Fuel Conversion & Hydrogen Production Division, Camden, NJ, USA): Plasma desulphurisation of fuels and plasma liquefaction of shale gas
- **Osamu Sakai** (The University of Shiga Prefecture, Department of Electronic Systems Engineering, Hikone-City, Japan): Microplasmas
- **Mohan Sankaran** (Case Western Reserve University, Department of Chemical Engineering, Cleveland, OH, USA): Plasma nanotechnology and materials synthesis
- **Jochen Schein** (Universität der Bundeswehr München, Institut für Plasmatechnik und Mathematik, Neubiberg-Munich, Germany): Title to be announced
- **Young-Hoon Song** (Korea Institute of Machinery and Materials, Plasma Laboratory, Daejeon, South Korea): Plasma fuel reforming, clean diesel, and related applications
- **Angeliki Tserepi** (NCSR "Demokritos", Institute of Nanoscience & Nanotechnology, Aghia Paraskevi, Athens, Greece): Plasma deposition and treatment of polymers
- **Qi Wang** (Eindhoven University of Technology, Department of Chemical Engineering and Chemistry, Eindhoven, The Netherlands): Energy efficient nitrogen fixation by plasma

### Workshop - Plasma-mediated effects on biological systems

Organizers:

- Mounir Laroussi, Old Dominion University (Norfolk, VA, USA)
- David Graves, University of California Berkeley (Berkeley, CA, USA)
- Deborah O'Connell, University of York (York, UK)

Research on the biomedical applications of low temperature plasmas and more specifically those generated at atmospheric pressure is only about two decades old. It started with a few limited experiments mainly concerned with the ability of plasma to kill harmful microorganisms, especially bacteria as it relates to sterilization/decontamination/disinfection of abiotic and biotic surfaces (such as tissue). Low temperature plasmas produce a mixture of highly reactive chemical species including reactive oxygen species (ROS) such as O, O<sub>2</sub><sup>-</sup>, O<sub>3</sub> and OH and reactive nitrogen species (RNS) such as NO and NO<sub>2</sub>. These species and some of their reaction products are known to exhibit strongly oxidative properties and can trigger signalling pathways in biological cells. The key roles these species play in normal cellular functions, immunity and existing therapies suggests that plasma therapeutics is based on a solid foundation.

Experiments on eukaryotic cells demonstrate that under some conditions, low temperature plasmas appear to cause little damage to living animal and plant tissues. For example, skin fibroblast cells are found to remain viable under plasma conditions that can be lethal to bacterial cells. The proliferation of fibroblasts is an important step in the wound healing process. The ability of plasma to kill antibiotic-resistant bacteria and to accelerate the proliferation of specific tissue cells opens the possibility to use plasma to assist in chronic wound healing.



Low temperature plasma application can trigger cell death in cancer cells. Probably mediated through its specific chemical species, plasmas can trigger the signalling pathway that can start the cascade of events that result in cell death. These results suggest that plasma may be a powerful tool in certain cancer therapies, perhaps in combination with other anti-cancer modalities such as surgery, radiation therapy and chemotherapy.

Today, plasma medicine is a rapidly growing, vibrant interdisciplinary field of research. To capture the most recent advances in this burgeoning field, a special plasma medicine session is planned for ISPC 2015. The co-organizers of the special session will invite a number of leading scientists to present their latest results and current perspectives on the field. Attendees of ISPC are welcome to attend this special session, interact with the speakers, and contribute to the discussion. The list of the invited speakers will become available soon.

## CALL FOR CONTRIBUTIONS

Contributions for oral or poster presentations are welcome on subjects within the scope of the symposium (see Scope). The abstracts will be refereed by the International Organizing Committee and will be published in the Book of Abstracts of the Symposium.

Oral contributions will have a duration of 15 min., including time for questions. Only computer projection facilities will be provided using Microsoft PowerPoint (version 2010 preferred). Presenting authors should contact the chairperson of their session in advance of the start of their session to signal their presence. They also are requested to familiarize themselves with the controls of the projection system and place their presentations in the appropriate folder BEFORE the start of the session. The use of the author's own laptop for projection is not encouraged; if absolutely necessary, the presenting author is responsible to ensure in advance that the projection from their own computer takes place successfully.

Posters will be on view during three separate poster sessions, scheduled in the afternoons of Monday, Tuesday and Thursday, at which the authors are requested to be present for questions and discussion. Size of the display area: 1.50 m high by 0.95 m wide. The recommended format for posters is ISO A0 portrait (0.84 m x 1.19 m). Material to fix the posters will be provided.

### *Abstract submission for the ISPC 2015 symposium*

Abstracts for oral or poster contributions to be presented during the symposium should fit a minimum of two (2) and a maximum of four (4) A4 pages; please use the Word-template available on the symposium's website abstract submission page. Detailed guidelines are mentioned on the template.

The abstract has to be submitted before **January 31, 2015**. Authors will be notified of the acceptance and way of presentation of their contribution by March 31st, 2015.

To submit your abstract, please click [here](#) to be redirected to the submission form. You have to complete/verify your address data and you can choose your file to upload.

Please note the following important points that will make our life a little bit easier:

- Please follow the guidelines given in the template.
- Please submit a Word (doc, docx) file. We cannot accept PDF files.
- Please make sure that your last name is included in the name of your file.



## REGISTRATION FEES

*Standard symposium registration:* includes session attendance, Sunday industrial day attendance, admission to the industry exhibition, welcome reception, morning and afternoon refreshment breaks, lunches (Monday through Thursday), cathedral visit and organ concert, mid-session excursion, conference bag, delegate list, and USB-stick containing the proceedings.

*Student symposium registration:* delegates must be an undergraduate or graduate full-time student, who will not have completed studies by the end of the symposium; proof of student ID must be provided to the symposium organisers when registering; same benefits as with standard symposium registration.

*Summer school registration:* the 2.5-day school (Thursday July 2<sup>nd</sup> to Saturday July 4<sup>th</sup>) is aimed at Ph.D.-students, and industry professionals; the registration fee includes the summer school attendance, morning and afternoon refreshment break, lunches, a summer school dinner on Thursday evening, and transfer to Antwerp on Saturday afternoon. A separate registration fee of € 250 will be charged for summer school attendance to be paid to DIFFER; payment details to become available soon on the ISPC 2015 website.

*Industrial day:* a 1-day workshop aimed at academia, researchers, and industry professionals; the registration fee includes attendance, morning and afternoon refreshment break, and lunch.

	<i>before</i> 01 May 2015	<i>after</i> 01 May 2015
<i>Symposium attendance</i>		
● Regular participant	€ 400	€ 500
● Students (ID required)	€ 200	€ 250
<i>Optional items</i>		
● Industrial day (Sunday)		
○ with symposium registration	€ 50	
○ without symposium registration	€ 150	
● Symposium dinner (Thursday evening)	€ 60	
<i>Companion programme</i>		
● Full-day excursion to Brussels	€ 100	
● Full-day excursion to Damme & Bruges	€ 100	
● Half-day (afternoon) excursion to Lier	€ 50	

## PAYMENT OPTIONS

Payment of the total amount due, without charges to the beneficiary, should be made to ISPC 2015. Payment can be made by:

- the on-line Paypal system to debit your Paypal account or credit card;
- bank transfer to ISPC 2015 IBAN account no. BE56 7370 4210 2588 of the University of Antwerp; BIC-code: KREDBEBB; at the KBC Rubens (Eiermarkt 20, BE-2000 Antwerp, Belgium);
- a bank cheque in Euro, drawn on a Belgian bank, to the order of University of Antwerp and mailed to the symposium secretariat.

## STUDENT GRANTS

ISPC 2015 offers up to 30 student bursaries to Ph.D.-students to cover their student registration fee. Applicants have to submit an abstract through the on-line abstract submission page for either oral or poster presentation. They have to notify the symposium secretariat by e-mail of their application, mentioning the filename of their abstract. Moreover, they have to supply proof of their Ph.D.-student status (e.g., a copy of their student ID card), a 1-page curriculum vitae, and a signed letter of support from their Ph.D.-thesis supervisor to the symposium secretariat by January 31<sup>st</sup>, 2015. This letter should certify that the applicant is involved in a Ph.D. research programme and should motivate why the applicant deserves to receive a bursary.

Applicants will be notified of the results of their application by March 31<sup>st</sup>, 2015.

## CANCELLATION

Refund of the registration fee (less € 50 administrative costs) will only be granted if notification of cancellation has reached the Symposium Secretariat before 1 June 2015. After this date, no refund will be made. Refunds will be processed after the Symposium.

## INSURANCE - PERSONAL DATA USAGE

The organizers cannot be held responsible for any personal accident or damage to the property of the conference participants.

In accordance with privacy regulations the organizers state that the information you supply will only be used for the purpose of organizing this and following symposia in this series. Your data will not be made available to any other person or organisation for commercial use.

## HOTEL ACCOMMODATION

We have arranged for RESOTEL to propose a number of different accommodation facilities within about 15 to 20 minutes walking distance of both the symposium venue and the Antwerp central railway station.

A list of the proposed hotels and the applicable room rates, as well as an electronic reservation form, can be found using the following link: [www.resotel.be/ispc2015](http://www.resotel.be/ispc2015). You will be contacted by RESOTEL to arrange for a booking guarantee.

Of course, participants are free to make their own accommodation booking at any other location. Useful information can e.g., be found using the following link: [www.visitantwerpen.be](http://www.visitantwerpen.be).

Please don't wait too long before booking your accommodation, because the start of the ISPC coincides with the start of a "Tour de France" stage in Antwerp (July 06<sup>th</sup>), which might have consequences for hotel availabilities.

## SYMPOSIUM VENUE



The 22<sup>nd</sup> edition of the International Symposium on Plasma Chemistry will be held in the buildings of the University of Antwerp in the city centre, close to the "Hof van Liere", Prinsstraat 13, Antwerp. This location is at a convenient walking distance from the hotels in the city centre.



The plenary sessions of the meeting will take place in the Aula Rector Dhanis, the recently constructed conference centre of the University of Antwerp, which is situated in the heart of the old city (Kleine Kauwenberg 14, Antwerp).

The parallel oral presentation sessions, the poster sessions, and the symposium registration will be organised in a set of lecture theatres and the foyer of the Rodestraat building (bldg. R), which is across the street from the Aula Rector Dhanis.



## SOCIAL ACTIVITIES

### *Sunday 5 July 2015, 17.00 - 19.00: Registration & welcome get-together*

Complimentary welcome get-together for participants and their companions in the foyer of bldg. R (Lange Winkelhaakstraat, Antwerp) of the University of Antwerp's city campus. Symposium registration will be available.

### *Tuesday 7 July 2015, 20.00 - 21.30: Organ concert*

On Tuesday evening, all symposium participants and their companions are kindly invited for a complimentary visit to and organ concert in the Cathedral of Our Lady.

### *Wednesday 8 July 2015, 14.30 - 18.00: Mid-session excursions*

On Wednesday afternoon, after the lunch break, all symposium participants and their companions are kindly invited to one of the four complimentary excursions (English language guided walking tours; duration 3.5 hrs with a stop for refreshments), each starting off at the symposium venue at 14.30 and ending at the Groenplaats (because of the longer distances, some stairs and bumpy cobblestones, these walks are less suited to people who are not that mobile; wear good walking shoes).

There is a choice between the following excursions (pre-registration required by marking your 1<sup>st</sup> and 2<sup>nd</sup> choice on the symposium registration page; assignment will be based on first-come-first served basis):

- *City walk A: BANK AND EMBANKMENT RECREATED - a dive into the old port district (max. 10 groups of 20 persons)*



This is the city-by-the-river walk par excellence! Your guide will tell you a fascinating tale about the origin and growth of the historic city centre by the Scheldt as you follow a quirky and unusual route along the river bank, across 'Eilandje' and through the Red-Light District.

Step by step you will learn how the river bank, the dunes and canals were transformed throughout the centuries. Hidden parts of the city walls, strange place names, vaulted canals

- known as 'ruien' - and historic facades reveal the fascinating past of these old port districts. Dive into the history of Antwerp as a canal city, Gilbert van Schoonbeke's Nieuwstad, the picturesque Napoleonic docks, the sieges of 1814 and 1830 and the straightening of the Scheldt quays in the 19th century during which part of the city even disappeared into the river ...

Fortunately the beautiful St. Paul's Church survived a major fire in 1968 and this restored monument is now an eye-catching feature along our route.



Nostalgic sailor's bars, high brick warehouses and imposing port buildings as well as the tolerance zone for prostitution showcase the proud maritime past and vibrant present of this renewed part of the city by the river. The future plans for these port neighbourhoods are also addressed. Along the way you stop on a terrace with stunning views of MAS for refreshments or get a taste of the atmosphere of a real sailor's pub.

The trail takes you along: STEEN - PILOTAGE BUILDING - MAS ('EILANDJE') - FALCONPLEIN - ST. PAUL'S CHURCH. It includes short visits (if open) to the reception area of MAS and St. Paul's Church.

- *City walk B: IN RUBENS' FOOTSTEPS - past the Rubens' House, the Cathedral of Our Lady, and the Grote Markt (max. 6 groups of 20 persons)*

This Rubens walk begins near the Scheldt, the lifeline of the city. Make your way to an attractive part of the historic city centre through narrow streets with the former dwellings of stonemasons and Lombardian bankers. Today this is the place to be for antiques stores and trendy fashion stores. Visit the Rubens' House on the Wapper. With your guide, you will enter the home and studio of Antwerp's most famous inhabitant, the artist Peter Paul Rubens.



Rubens and his family lived in this unique city palace with its sweeping Renaissance garden; it is here that he created some of his most immortal works.

It becomes clear during a visit to the Cathedral of Our Lady that art can elevate the mind. On the outside, the old lady reveals some beautiful lacework in stone, on the inside it is a shrine with impressive art treasures. Among others the Cathedral prides itself on its four magnificent paintings by Rubens.

The tour ends on the Grote Markt, the most beautiful square in the historic city.

The trail takes you along: SINT-JANSVLIET - WILDE ZEE - WAPPER - MEIR - GROENPLAATS (Rubens' statue) - GROTE MARKT. It includes short visits to the Rubens' House and the Cathedral of Our Lady.

- *City walk C: A BRILLANTWERP STORY & MEGA MONUMENT CENTRAL STATION (max. 6 groups of 20 persons)*



From ordinary to monumental, the Railway Cathedral has undergone a marvellous transformation, to become the fourth most beautiful station worldwide as voted by (Newsweek, 2009). Follow the guide for the story of this metamorphosis.

From the Central Station you walk to the 'Diamond Square Mile', the Antwerp diamond district. Through the fascinating story of your guide you will relive the glory days, the near collapse and finally the resurrection of the Antwerp diamond industry in the 19th century. A motley of different nationalities finds its way through the streets here, busily negotiating from one transaction to another. Diamond workers, jewellers and diamond merchants feel at home here in their own world of grinding shops,

showrooms and exhibitions.

The trail takes you along: CENTRAL STATION - VESTINGSTRAAT - HOVENIERSSTRAAT - APPELMANSSTRAAT - DE KEYSERLEI.

● *City walk D: HIP & FUN - a stylish and fun trail (max.4 groups of 20 persons)*



If you are interested in exploring the hip lifestyle spots in the centre of Antwerp without being inundated with historic dates and architectural styles, then this is the tour for you! A relaxing and surprising city tour and some time to stop en route for some tasty snacks.

A city guide will take you from the most beautiful spots near the Grote Markt through the bustling fashion district and the elegant Quartier Latin to the beautifully renovated Festival Hall, which is now a fashionable and gilded shopping paradise.

Discover ancient alleys, beautiful squares, the elegant window displays of Antwerp's fashion mavens, the glorious botanical garden and the huge, somewhat futuristic canopy of the remodelled Theaterplein. A great deal of variety and lots of entertaining anecdotes.



Moreover, your guide will let you choose from a range of possibilities for the perfect break! Will you have coffee in a chocolate salon? A typical beer on a sunny terrace? Tea with cake in the foyer of a charming old theatre? Or a hint of luxury with a glass of sparkling champagne or exotic cocktails in a sophisticated bar? You decide!

The trail takes you along: VLAEYKENSGANG - MODENATIE - KAMMENSTRAAT - ELZENVELD - THEATERPLEIN. It includes short visits (if open) to the Gallery of the MoMu (Fashion Museum) and the Festival Hall.

*Thursday 9 July 2015, 19.15 - 23.30: Symposium dinner*

The symposium dinner is not included in the registration fee (tickets: € 60.00 / person).



A pre-dinner visit, starting at 19h15, to the Zoological Garden is possible. Guides will be present at the hippo residence, the aquarium, and the Egyptian temple housing Asian elephants and giraffes.

The dinner will be held in the Marble Hall of the Flanders Congress & Concert Centre, part of the Antwerp Zoo. The rows of pillars in "brèche rosé", with bronze bases and capitals, wall decorations in art nouveau style, exotic plants, a dark brown oak ceiling, ... What more do you

need for this hall to appeal to your imagination? Majesty and splendour are the two qualifications worthy of the Marble Hall's name. Dinner will encompass an aperitif in the winter garden, a fine four-course menu accompanied by appropriate wines, and coffee or tea.

## COMPANION PROGRAMME

### *Monday 6 July 2015: Brussels (full day)*

Full day visit to Brussels (not included in the registration fee; € 100.00 per person, light lunch included).

More details to become available later.

### *Tuesday 7 July 2015: Damme & Bruges (full day)*

Full day visit (leaving at 8 a.m.) to the historic cities of Damme and Brugge (Bruges) (not included in the registration fee; € 100.00 per person, light lunch included).



Damme, once an outpost of Bruges, now a mediaeval city frozen in time with an added dimension of being a city of books and bookstores. The guided walk will take us to the market square with typical gabled houses, the Church of Our Lady (13th century), City Hall (15th century), St. John's Hospital (Medieval) and the "Napoleon" canal.

The historical heart of Bruges beating as only it can for the countless visitors. During the guided walk, you will encounter a variety of city sights such as the Market Square, with the Belfry and historical facades, the Burg (city castle) square, with the City Hall, Holy Blood Basilica, Old Recorder's Office, the Reien, picturesque canals and waterways, the Fish Market and the College of Europe.



You will wander along famous museums, such as the Groeninge, Gruuthuse and Brangwyn, the Church of Our Lady, with the statue of a Madonna with Child by Michelangelo, the old St. John's Hospital with the Memling Museum, alms-houses, the Beguinage and the charming waters of the Minnewater.



Afterwards, we will have a different perspective on the city during a half-hour cruise along the picturesque canals of this "Venice of the North".

You will have about an hour after the boat trip to allow you to wander around the beautiful city centre or do some shopping.

Return by coach to Antwerp with estimated arrival around 19h00.



*Wednesday 8 July 2015 afternoon: Mid-session excursions*

Companions are welcome (free of charge) to join their partner for one of the guided city walks described on the 'social activities' page.

*Thursday 9 July 2015 afternoon: Lier*

Half-day visit (leaving at 2 p.m.) to the historic city of Lier (not included in the registration fee; € 50.00 per person).

A 3-hour guided historical walking tour will take you along Lier's heritage sites and best known landmarks. A perfect introduction to the city.

The tour includes visits to Grote Markt and the Vismarkt. We will also walk to the collegiate St. Gumarus's Church, built on the site where a Roman parish church dedicated to John the Baptist once stood. Its construction commenced in 1378 and took around 200 years. Hence the lower parts are pure gothic, the middle ones baroque and the roof of the tower rococo.



We will go to the Zimmerplein, site of the Zimmer Tower and the Zimmer Pavilion where you will discover the life's work of Louis Zimmer: the Jubilee Clock, the Astronomic Studio and the Wonder Clock. The former Cornelius Tower from the 14th century, part of the town ramparts at the time, was turned into a museum in 1930. You can also see Louis Zimmer's workshop. On the stroke of 12 the years 1830-1930, the Belgian coat of arms, the first three kings of Belgium, Lier's coat of arms and the six mayors who have governed Lier since Belgium's independence appear on the Jubilee clock. Four automatons depicting the four stages of life are to be found on the outside of the tower:

- the child Bertha, from the novel "Ernest Staas" by Anton Bergmann;
- the youth Anton Bergmann;
- the adult ornamental metal worker Louis Van Boeckel;
- the old man Mr. Pirroen, a character created by Felix Timmermans.



Afterwards, we will walk to the Beguinage - 13th century, UNESCO world heritage site. The beguinage in Lier was created in 1258. Beguinages were closed courtyards where widows and unmarried women led a religiously

inspired but independent life. Self-rule occurred under the leadership of a 'grand dame' (grootjuffrouw).

The beguines supported themselves by weaving, making lace or embroidering. They took a vow of purity and obedience but not of poverty. There was great harmony between the spiritual and material life. They could leave the beguinage whenever they wished. Agnes, the last beguine of Lier, died in 1994.

In the beguinage 162 houses are distributed over eleven narrow streets with St. Margaret's Church at its centre. A calvary and a small garden with a gate are found on the spot of the former orchard. There is also a convent and an infirmary, which later became an orphanage for girls. The entrance in Begijnhofstraat is accentuated by a monumental bluestone gateway (1690). Atop it is a terracotta statue of St. Begga (1777), the patron saint of the beguines. To the left of the gate is a polychrome statute of Our Lady of Remedy (14th century).

Return by coach to Antwerp with estimated arrival around 18h00.



## ANTWERP



Antwerp is an international city (population 500,000), which has nevertheless succeeded in remaining pleasantly cosy and in keeping everything within convenient reach. The numerous historical monuments and museums are a tribute to its glorious past. Some of the museums have a worldwide reputation, such as the Rubens



House and the Plantin-Moretus printing museum, containing unique collections.

A boat trip on the river Scheldt, a walk in the old city centre with a visit to some of its varied museums, or an introduction to the world of diamonds, are only a few suggestions from the wide range of possibilities.

More general and tourist information is available on the internet site of the city of Antwerp ([www.visitantwerpen.be](http://www.visitantwerpen.be)).



## WEATHER IN JULY

Belgium benefits from the proximity of the Atlantic Ocean and the Gulf Stream. In early July, temperatures show daily highs around 22 °C throughout the month, exceeding 29 °C or dropping below 17 °C only one day in ten. The average probability that some form of precipitation will be observed in a given day is 53 %, with little variation over the course of the month. The relative humidity typically ranges from 55 % (mildly humid) to 93 % (very humid) over the course of a typical July, rarely dropping below 40 % (comfortable) and reaching as high as 100 % (very humid).

## HOW TO REACH ANTWERP

### *a) By air*

#### 1) through the Brussels (Zaventem) International Airport:

The international airport at Brussels has connections to all major cities around Europe and to a wide range of intercontinental destinations.

Antwerp can be reached from the airport in Brussels by:

- regular Brussels Airlines Airport Express coach service (ca. 45 min; € 10), leaving the airport from the back of platform B at the bus station (level 0) of the terminal building, on the hour between 5 a.m. and midnight on weekdays and Saturday (between 7 a.m. and midnight on Sunday); arrival in Antwerp on the 'De Keyserlei' close to the Antwerp Central Railway Station ([www.airportexpress.be](http://www.airportexpress.be)).
- train: direct regular service, leaving 2 times an hour (ca. 35 min; € 12.50) between about 5.30 a.m. and 11.45 p.m. on weekdays, to the Antwerp Central Railway Station. Train schedules can be found on the website of the Belgian railways.

#### 2) through the Antwerp (Deurne) Airport:

- CityJet has up to 4 direct flights per day to London City airport, where you can connect to a number of other European and international cities.
- Flybe has daily connections to London Southend.
- Jetairfly has flights to Alicante (Th. & Sa.), Barcelona (We., Fr. & Su.), Berlin-Schönefeld (Mo., We. & Sa.), Malaga (Tu. & Fr.), Milan-Malpensa (Tu., Fr. & Su.), and Palma de Mallorca (Mo. & Th.).

A public transport bus (no. 31; ticket, € 2.00, can be bought from the driver) connects the airport to the 'Franklin Rooseveltplaats' near the Antwerp Central Railway Station and the symposium venue.

### *b) By train*

Antwerp can be reached by regular international train services from Amsterdam, Köln and Paris (Thalys). London is connected by the Eurostar train to Brussels "Midi" railway station. Luxembourg and Milan are connected to Brussels "Midi" railway station by regular international trains.

Antwerp is connected with Brussels by several trains per hour to the Antwerp Central Railway Station.

Train schedules can be found on the website of the Belgian railways.

### *c) By car*

Antwerp is situated at the intersection of the E17, E19, E34 and E313/E34 traffic arteries. Some of the hotels have limited parking facilities. A map of Antwerp can be found at: <http://www.traveldodo.com/webmaster/belgium/antwerp/>.



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