



Electron Controlled Chemical Lithography

2010 Meeting

The third meeting of COST Action CM0601

**STERDYŃ, POLAND**

**23<sup>rd</sup> -27<sup>th</sup> August 2010**



**BOOK OF ABSTRACTS**



# INTRODUCTION

Dear Colleagues,

Welcome to Sterdyn and ECCL 2010, the Third Annual Meeting of the COST Action CM0601 on 'Electron Controlled Chemical Lithography' (ECCL).

The COST Action CM0601 was approved by the COST Committee for Chemistry and Molecular Science and Technology in 2006. The Action was initially ratified by 13 countries and officially launched in May 2007. At the meantime the number of countries that have joined the Action has increased to 17 and the Action by itself became an interdisciplinary European programme to combine state-of-the-art in electron impact induced reactions, surface science with recent advances in the field of scanning tunnelling microscopy.

ECCL network consists of three working groups:

WG 1 focuses on 'Selective bond cleavage by electron induced dissociation'  
WG 2 focuses on 'Chemical control by electron induced molecular fragmentation' and WG 3 focuses on 'Chemical control using scanning tunnelling microscope'.

Each group fulfills its own prioritized collaborative research programme also by conducting the joint research projects among the WG groups.

The previous meetings of the Action which were held in Lisboa (March 2008) and Istanbul (June 2009) were a great success and brought together the leading scientists from Europe's as well as from overseas countries.

ECCL 2010 meeting promises to be an exciting and stimulating conference with 33 oral presentations and about 30 posters providing an opportunity of scientific discussion on electron driven processes and STM research. We hope that the meeting will also offer the right forum to develop new collaborations and strengthen already existing.

Finally, we would like to express our gratitude to Iwona Szamrej, Wiesława Barszczewska, Barbara Pezler and Jolanta Wnorowska for the valuable assistance with local arrangements. We also thank our web-master Nykola Jones from the University of Aarhus for her hard work in organizing the conference website.

We hope you will experience a stimulating scientific programme and enjoy all possible comforts during your stay in Sterdyn.

Oddur Ingolfsson  
Chair of COST Action CM0601

Janina Kopyra  
ECCL 2010 Chair

Sterdyn, August 2010

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## Host Institution

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## Administrative Support

Beverley Harker (secretary)  
Nykola Jones (web-master)



# Conference Programme

## Monday 23<sup>rd</sup> August

	Arrival
16:00	Registration
20:30	Welcome reception

## Tuesday 24<sup>th</sup> August

### Session 1 Chair: Michael Allan

9:00-9:15	Opening remarks	
9:15-9:55	Control of chemical synthesis by electron impact ionization	Petra Swiderek (Universitat Bremen, Germany)
9:55-10:20	Selective fragmentation of bifunctional organic compounds induced by low energy electrons	Anne Lafosse (Universite Paris-Sud, France)
10:20-10:45	Electron induced chemistry in ice mantles - applications to astrochemistry and lithography	Nigel Mason (The Open University, UK)
10:45-11:20	<i>Coffee break</i>	

### Session 2 Chair: Nigel Mason

11:20-11:45	Halo-uracils negative ions formation in atom-molecule collisions	Paulo Limao-Vieira (Universidade Nova de Lisboa, Portugal)
11:45-12:10	<i>In vitro</i> labelling of SSBs in plasmid DNA	Małgorzata Śmialek-Telega (Gdansk University of Technology, Poland)
12:10-12:35	Control of 2D nanostructures formed by self-assembly of guanine derivatives	Ilko Bald (Aarhus University, Denmark)
12:35-14:00	<i>Lunch</i>	

### Session 3 Chair: Anne Lafosse

14:00-14:40	Dissociation cross sections for electron scattering on CF <sub>4</sub>	Grzegorz Karwasz (N. Copernicus University, Poland)
14:40-15:05	Electron transport through molecular junctions with anharmonic vibrations	Martin Cizek (Charles University in Prague, Czech Republic)
15:05-15:30	Charge transfer processes at metal/organic interfaces	Isabel Fernandez-Torrente (Freie Universitat Berlin, Germany)
15:30-15:50	HF, the ATP of DEA	Benedikt Ómarsson (University of Iceland, Iceland)
15:50-16:20	<i>Coffee break</i>	

### Session 4

16:20-17:20	Helium nanodroplets: techniques, applications and opportunities (Science Sources - Students & Younger delegates)	Andreas Ellis
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16:20-17:20	MC Meeting
18:00-19:30	Dinner
20:00-21:30	Poster session

## Wednesday 25<sup>th</sup> August

### Session 5 Chair: Armin Götzhäuser

9:00-9:40	Bond-selective molecular manipulation via thermally activated electron attachment	Richard Palmer (University of Birmingham, UK)
9:40-10:05	First-Principles modelling of Scanning Tunnelling Microscopy using Non-Equilibrium Green's Functions	Haiping Lin (University of Liverpool, UK)
10:05-10:30	Preparing and influencing a thermally driven molecular bi-stable switch by STM atomic manipulation	Sumet Sakulsermsuk (University of Birmingham, UK)
10:30-10:50	Spatial-temporal evolution of STM – triggered reaction fronts	Michaela Hager (University of Innsbruck, Austria)
10:50-11:20	<i>Coffee break</i>	

### Session 6 Chair: Richard Palmer

11:20-11:45	Electron-driven molecular switching at surfaces	Peter Saalfrank (University of Potsdam, Germany)
11:45-12:10	Switching with molecules at surfaces	Thomas Jung (Paul Scherrer Institute, Switzerland)
12:10-12:35	Selective molecule depletion as concept to control the Cobalt:Carbon ratio in planar electron-impact deposits obtained from $\text{Co}_2(\text{CO})_8$ in high-vacuum conditions	Ivo Utke (Empa - Materials Science & Technology, Switzerland)
12:35-12:55	Photoisomerization of an azobenzene derivative in direct contact with Cu(111)	Maciej Bazarnik (Poznan University of Technology, Poland)
12:55-13:15	Low energy electron interactions with nitro derivatives of benzene	Jolanta Wnorowska (University of Podlasie, Poland)
13:15-14:30	<i>Lunch</i>	
15:00-18:30	<i>Excursion to Ciechanowiec</i>	
19:00-20:30	<i>Dinner</i>	

## Thursday 26<sup>th</sup> August

### Session 7 Chair: Eugen Illenberger

9:00-9:40	Fabrication and imaging of chemical nanostructures with electron and Helium ion beams	Armin Götzhäuser (University of Bielefeld, Germany)
9:40-10:05	Ultrafast molecular reaction dynamics at metal clusters on magnesium oxide	Thorsten Bernhardt (University of Ulm, Germany)
10:05-10:30	Photon and low energy electron physics with complex nano- and pico-sized systems	Bratislav Marinkovic (University of Belgrade, Serbia)

10:30-10:55 Electron impact ionisation and electron attachment to derivatives of silane Stefan Matejcik (Comenius University, Slovakia)

10:55-11:30 *Coffee break*

**Session 8 Chair: Oddur Ingolfsson**

11:30-11:55 Nanografting with functionalized alkanethiols: Friction and stacking Sylwia Speller (Radboud U Nijmegen / IMM, Netherlands)

11:55-12:20 Field Emission Resonances on periodically rippled graphene Amadeo Vazquez de Parga (Universidad Autonoma de Madrid, Spain)

12:20-12:40 Metal atoms, clusters, and monolayers on graphite (0001): Density functional simulations and STM measurements Jaakko Akola (University of Jyväskylä, Finland)

12:40-13:00 VUV photoabsorption study of TiO<sub>2</sub> thin films deposited by DC reactive magnetron sputtering Susana Serio (FCT/UNL, Portugal)

13:00-14:30 *Lunch*

**Session 9 Chair: Petra Swiderek**

14:30-15:00 Industrial applications of electron beam induced chemistry Klaus Edinger (Carl Zeiss-NaWoTec, Germany)

15:00-15:25 Ultracold ion and electron beams for ECCL Daniel Comparat (CNRS, France)

15:25-15:50 Ion formation in doped Helium droplets Harald Schöbel (University of Innsbruck, Austria)

15:50-16:20 *Coffee break*

**Session 10 Chair: Petr Carsky**

16:20-16:45 Advanced modelling of He droplets Andreas Mauracher (Uppsala University, Sweden)

16:45-17:10 EBID-growth on ultra-thin foils: experiments and simulations Cornelis W. Hagen (Delft University of Technology, Netherlands)

17:10-17:30 Tracking down EBID broadening – Interaction of low energy electrons and cobalt tricarbonyl nitrosyl Sarah Engmann (University of Iceland, Iceland)

17:30-17:45 Final remarks

19:30 *Conference dinner*

**Friday 27<sup>th</sup> August**

Departure

# PHOTON AND LOW ENERGY ELECTRON PHYSICS WITH COMPLEX NANO- AND PICO-SIZED SYSTEMS

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Current research in Laboratory for Atomic Collision Processes at The Institute of Physics, University of Belgrade is done within the framework of the project entitled "Electron and laser spectrometry and collisional cross sections for atoms, ions, molecules, metastables and biomolecules" [1]. There have been four Universities in Serbia that participated in this five year project and total of 14 researchers have been involved: seven senior, three early stage researchers and four graduate students. Traditionally oriented toward investigations in atomic and molecular collisional processes, this group evolved toward interdisciplinary research with thematic that include still fundamental research but more oriented to possible applications. These are the following: a) Photon and low energy electron interactions with atomic and molecular particles with the aim to underpin the radiation damage in biologically relevant systems; b) electronic and atomic processes at the surfaces; c) photonic and atomic processes that are relevant for environmental studies and biological effects; and d) information and expert system development. The first thematic includes low energy electron interactions with metal atoms, molecules, ions, biomolecules and time resolved laser induced fluorescent measurements (TR-LIF). The second one is mainly oriented towards studies of nanocapillaries and atomic interferometry. The third one encompasses research of nanometric air ions, radon exhalation, UV light influence on gene expression and synchrotron light interactions with complex molecules. Finally, the logistic support for these studies is the comprehensive information and expert system that is designed to facilitate all stages of research process, from preparation of new studies, along the storage of current results and research notebook, till data base of bibliographic units and measured values of quantities defined in AMO physics.

The experimental methodology and techniques underlying the proposed investigations is based on the versatile electron spectrometers [2,3], OPO laser facility with streak camera [4,5], homemade detectors for air ions and commercial radon detectors [6]. New developments that are envisaged in the proposed project include device for production of nanoparticles, modern data acquisition modules and upgrade of current spectrometers.

New results and highlights of some above mentioned studies (electron scattering by metal atom vapours, TR-LIF measurements) will be presented and discussed in terms of agreement between experimental findings and calculation predictions.

## References

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- [2] A. R. Milosavljević, S. Madžunkov, D. Šević, I. Čadež and B. P. Marinković, *J. Phys. B: At. Mol. Opt. Phys.* **39**(3) 609-623 (2006).
- [3] R. Panajotović, D. Šević, V. Pejčev, D. M. Filipović and B. P. Marinković, *Int. J. Mass Spectrom.* **233** (2004) 253.
- [4] B. P. Marinković, A. R. Milosavljević, J. B. Maljković, D. Šević, B. A. Petruševski, D. Pavlović, D. M. Filipović, M. Terzić and V. Pejčev, *Acta Physica Polonica A* **112**(5) 1143-1148 (2007).
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- [6] P. M. Kolarž, D. M. Filipović, and B. P. Marinković, *Applied Radiation and Isotopes* **67**(11) 2062 – 2067 (2009).

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