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## Busy times

It was there on the upper floor of the Opera house in Como where the Summer School took place this year. Apart from this major event, Mid Term Review, PCAM Meeting, Financial reporting and arrangements for secondments kept us busy in the past months.

For those of you that receive the Thinface Newsletter for the first time, have a look, it gives a glimpse on the Network with varying topics where we also try to include recent research results and some social activities.

Thinface is part of the PCAM Network and in this issue Gian Paolo Brivio explains a bit about the evolvement of the PCAM Network.

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**PHYSICS AND CHEMISTRY OF ADVANCED MATERIALS**  
EUROPEAN DOCTORATE

## European doctorate in Physics and Chemistry of Advanced Materials (PCAM)

The European doctorate in Physics and Chemistry of Advanced Materials (PCAM) got started at the University of Milano-Bicocca (Italy) in 2006 after Prof. Gian Paolo Brivio in 2006 had the idea of an international network to support and broaden scientifically the skills and knowledge of Ph.D. students in the field of Materials Science. He invited Prof. Rodolfo Miranda (Autonoma University of Madrid, Spain), and Prof. Christof Wöll (University of Bochum, Germany) to begin this project with him. Dr. Agnese Cofler, Head of the International Affair Office of the University of Milano-Bicocca, joined them. She wrote the network agreement and still supervises the preparation of PCAM official papers as the headquarters of PCAM are located at the University of Milano-Bicocca. Prof.

Brivio also organized the first PCAM summer school at the University of Milano-Bicocca that same year. In the last month board meeting in Como, Prof. Brivio has been confirmed Chairman of PCAM for the next four years and Prof. Horst-Günter Rubahn (University of Southern Denmark) nominated Vice-Chairman.

Since then much water has passed under the bridge, ten summer schools of very high scientific level have provided Ph.D. students with frontier knowledge in several topics in Materials and Nano Science. PCAM now includes fourteen Universities from nine different countries (see full list at <http://www.pcam-doctorate.eu/>). This network promotes internationalization through the exchange of both students and lecturers, facilitates participation of non-European students to its activities and stimulates joint requests of funding to the EU. In 2013 the Marie-Curie project, THINFACE, including six PCAM universities, was awarded fourteen Ph.D. grants. Interaction with industries is one of the aims of PCAM and a few of them are associated to the network board. The costs to run the PCAM network have been funded by Prof. Brivio's successful applications to CARIPLO Foundation calls for higher education.

To participate in the PCAM program a Ph.D. student has to register at his home University, spend a minimum of six months doing research at one partner University (not of his own country) at least, attend one PCAM summer school and pass one exam either in a topic of a summer school or in a course at a foreign University. The student thesis has to be reviewed positively by two European scientists not from his/her country while the defense commission must include at least one examiner from a PCAM University. Finally, the candidate is awarded the Ph.D. degree of his/her University plus the title of *Doctor Europaeus* and the PCAM Ph.D. diploma in Materials Science. Co-tutorship and double Ph.D. degrees are also possible.



This picture with Prof. Brivio and five students from four continents, taken at the PCAM summer school of 2009 at the University of Milano-Bicocca, well summarizes the motivations of this European doctoral network. To promote in the field of Materials Science the education of young keen Ph.D. students from any part of the world offering them research opportunities in selected European Universities, advanced courses in frontier topics, and the interaction with the industrial world. We also expect to help the students to achieve a personal maturity and an open mind capable to meet the future challenges of a rapidly changing society.

Gian Paolo Brivio



**Mina Mirsafaei**

My name is Mina Mirsafaei. I was born in 1987 and I grew up in Esfahan, Iran. When I was at high school, the beauty of the night sky in Esfahan encouraged me to study astronomy. Therefore, I joined the astronomy Centre of Esfahan for four years. When I finished my high school I decided to continue my education in the field of electronic engineering. B.Sc. in electronics engineering was certainly an experience, which gave me the strength to move forward as a curious researcher. In order to make the experience to study in two countries/cultures, I decided to study Master of Science at the University of Roma2 “Tor Vergata”. During my master I had a truly awesome experience and I learned lots of interesting things about Italian culture and language.

My master topic was about renewable energy. Working at the Centre for Hybrid and Organic Solar Energy helped me to improve my knowledge and become familiar with new and innovative ideas. It made me confident to work on challenging projects and in a scientific community.

After my master graduation and in order to pursue my education in the area of my interest, I joined the NanoSYD research center at the Mads Clausen Institute (MCI), where I was fortunate enough to join the European project ‘Thinface’ focusing on hybrid thin films for new energy devices in collaboration with several universities.

The main purpose of my PhD project is to develop novel organic solar cells with integrated plasmonic nanostructures in order to improve light absorption and thus the efficiency of the solar cell. The modelling and fabrication of the plasmonic structure is done in collaboration with the Autonomous University of Madrid and an industrial partner, Plasmore in Italy.

Besides doing science I like to do painting, swimming and reading.

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**Golnaz Sherafatipour**

*To myself I am only a child playing on the beach, while vast oceans of truth lie undiscovered before me.*

*-Isaac Newton*

I am Golnaz Sherafatipour, and I am originally from Tehran, Iran. I have a bachelor's degree in Physics from Alzahra University in Tehran, and a master's degree in "Engineering Nanoscience" from Lund University in Lund, Sweden. Currently I am part of the THINFACE project, and working at University of Southern Denmark (SDU) in Campus Sønderborg under the supervision of Dr. Morten Madsen. The main goal of my research is to investigate and optimize the stability and lifetime of organic solar cells and modules. Here in vicinity of the beautiful sea, we are exploring the physical processes taking place in our solar cell devices and trying to better understand the degradation mechanism, which is one of the major concerns toward industrialization of the organic solar cells. For this purpose, first we investigate the charge transfer and transport mechanism in the small-scale organic solar cells by various techniques, including Electroluminescence and sensitive external quantum efficiency (EQE) measurements. Then, we fabricate large-scale solar cells from Roll-2-Roll (R2R) process, and we adopt our knowledge and experience being gained from the first part to compare and optimize the performance of the R2R cells compared to the small-scale cells.

Apart from the scientific life, I have a passion for sport, art, nature and universe. I enjoy climbing, playing violin, painting, travelling and stargazing. Being in the THINFACE project is a great opportunity to fuel both my passion for science and life.

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## **Introductory film on how to prepare an organic solar cell in the labs at the University of Southern Denmark.**



## **Mid Term Review**

It was the first time for most of us to attend a Mid Term Review and the preparation process took long. After all it is clear that REA focuses on all deliverables but to proof all took quite some collection time. As always not all information is transmitted immediately to the coordinator and tends to be forgotten somewhere in a folder.

We did really good although not even all our achievements were mentioned. We had a nice reviewer and our PO helped us to get all documents in the right form.



For the ESRs it was a major thing to present their work over for the REA for the first time and being judged by all these supervisors. We heard about all our diverse projects starting from theoretical

modelling to analysis of chemical compositions and proceeding to experimental findings. Here is a summary in form of the Milestones that we have in Thinface:

- M3 Optimized organic thin-films: Formation of thin-films with controlled phase segregation of electron donating and accepting molecules for use in solar cells is investigated (ESR2), and conductive organic-inorganic films have been prepared via an enhanced doping technique (ESR3). In addition, self-assembled monolayers have been formed in porous silicon for controlling the interaction with target molecules in sensors (ESR4).
- M4: Modelling device characteristics: The interplay between injection into and transport within the organic semiconducting layer in organic thin-film transistors has been investigated from drift-diffusion simulations (ESR8).
- M5: Fabrication of thin-film solar cells with optimized interfacial layers: Reference solar cell devices have been developed and the integration of interfacial layers is currently being investigated (ESR7 and ESR12).
- M6: Fabrication of optimized surface plasmon resonance devices: Plasmonic Au cavity nanostructures were fabricated from alternating self-assembled silica colloidal monolayers and coupling of traditional Au cavity structures with distributed Bragg reflectors were fabricated with porous silicon (ESR10). In addition, a novel technique for integration of plasmonic Au nanoparticles in devices has been developed (ESR7).
- M7: Modelling thin-film hybrid interface properties and their influence on device performance: Modelling of organic/coinage metal interfaces from quantum-mechanical methods has been conducted, and the work is now extended to organic/metal oxide interfaces (ESR1). Also, the transport code tranSIESTA has been modified to allow for computation of charge-transfer times (ESR5). Furthermore, a model to study the ground state and the electronic excitations of pi-conjugated molecules adsorbed on graphene has been established (ESR6).
- Milestone 8: Fabrication of interface optimized OLEDs and OTFTs: Optimization of organic transport layers from molecular doping is currently being investigated (ESR9). Modelling of organic thin-film transistor devices is furthermore conducted (ESR8).
- Milestone 9: Determination of lifetime and stability of fabricated devices: Reference solar cell devices have been fabricated, and the stability of those, along with methods for improving the stability, is currently being investigated (ESR11, ESR12 and ESR14).

RAE appreciated the active participation of all our ESRs. Katharina expects

for the future:

- Organize a workshop every 6 months
- Thinface open Days, we need 10 more in the remaining 2 years
- E-newsletter, more active communication and keep your project coordinator informed
- Multimedia releases, submit them to Katharina
- Upload all publications onto the Sharepoint start with a date in the title in the form YearMonthDay (yymmdd...) in your project folder and drop Katharina a line and you will be able to find them again on webpage and sharepoint.

A nice dinner including our PO Thierry and our external referee Magdalena rounded off the meeting.

Morten Madsen and Katharina Rubahn



**Smart Materials and Structures**

5th International Workshop Marrakech

9. - 12. September 2015

## **Workshop Smart Materials and Structures**

An exciting and interesting THINFACE workshop on Organic Photovoltaics took place in beautiful surroundings in Marrakech on Sep. 11, 2015. The workshop was organized as part of the Smart Materials and Structures, 5th international conference: [workshop-smartmaterials.com](http://workshop-smartmaterials.com)

Amongst many other interesting talks, the workshop included an excellent plenary about hybrid and organic PV from Prof. Vladimir Dyakonov, University of Würzburg and an invited talk from Dr. Jost Adam about modelling light-trapping in OPV devices. The full programme can be found at the website. Peer-reviewed conference papers are soon available in Applied Physics A.  
Morten Madsen





Horst-Günter Rubahn and Morten Madsen with one of the posters in Marrakech.



## Summer School Como 2015

This year the THINFACE and PCAM Summer School was held in Como, a nice city lovely placed beside the namesake lake, and surrounded by a suggestive crown of the pre-alps. For the THINFACE ESRs was the third school, after the ones in Sønderborg and Madrid, and it came right after the short mid-term meeting in Bruxelles. Anyhow it was useful to discuss about the EU rules, and everything that came up during the previous meeting. The lectures were given in the magnificent main hall of the local Opera house (kindly given by the Centro Volta). They were really interesting and challenging, with a lot of different kind of talks: from introductory to specialist. This was also due to the great amount of different topics, from biology to fundamental physics, through organic chemistry, interface science, and devices preparation and characterization. This great variety led to the presence of many students with many different backgrounds, making the group really diverse and giving an enriching experience for all of them. Finally a great 'grazie' goes to the local students, who provided a warm welcome, even in the awful early autumn Italian

climate, and hope to see everyone soon, or at least at the next Summer School in France.

Mattia Farronato



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## International Poster Session at TU Graz

On August 7<sup>th</sup>, 2015, Graz University of Technology organized a poster session in the course of summer programs at Graz University of Technology, KTH Stockholm (Sweden), the City College New York (USA), Syracuse University (USA) and the University of Novi Sad (Serbia). The posters were presented by students at the Bachelor, Master and PhD level in various research fields such as analytical chemistry and food chemistry, physical and theoretical chemistry, chemistry and technology of materials, biomechanics, environmental biotechnology, biomedical engineering, chemical engineering, pharmaceutical engineering and chemistry, biotechnology, applied geosciences, biochemistry, organic chemistry, and inorganic chemistry and physics.

Using the opportunity to address such a diverse audience, the THINFACE team at TU Graz requested a special participation at the poster session. We presented three posters: one detailing the network, its participants and the objective. The other two detailed the scientific work being done by the two THINFACE ESRs of TU Graz: Antón Fernández Fernández and Shashank Shekhar Hariviyasi. Antón's work, presented by Dr. Karin Zojer (as Antón was on vacation at the time of the poster session), focused on "Architecture-specific contributions to short channel effects in organic transistors" while Shashank presented his work on "Strategies for tuning the electronic properties of layered inorganic semiconductors". Both posters received much interest and audience. Also, the idea of EU Initial Training Networks was new to a number of American

participants and aroused curiosity about the Marie Curie Funding programs.

A day before the poster session, on August 6<sup>th</sup>, a few delegates from the same universities were invited to visit the Institute of Solid State Physics. The delegation was received by Dr. Karin Zojer who walked them through the different laboratories of the institute and informed them about the research activities being undertaken. From the THINFACE network, Dr. K. Zojer, Dr. Roland Resel and Shashank S. Harivyasi were involved in this outreach activity.

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## **New Instrumentation open for general use Center for Micro Analysis of Materials**

The Centre for Micro Analysis of Materials (CMAM) is located at Universidad Autónoma de Madrid (UAM). Its main experimental tool is an electrostatic ion accelerator with a maximum terminal voltage of 5 MV, devoted to the analysis and modification of materials. The accelerator is of the Cockroft-Walton tandem type. It is equipped with two sources for accelerated ions: a plasma source for gaseous substances and a sputtering source for obtaining practically any element of the periodic table.

From the analytical point of view, the accelerator opens the opportunity to characterize in detail interfaces of different nature and properties. Rutherford Backscattering Spectroscopy (RBS) is a reliable technique for the in depth characterization of complex interfaces, such as thin film structures and multilayers, and allows obtaining accurate in depth concentration profiles. This technique can be measured in parallel with Elastic Recoil Detection Analysis (ERDA), which can provide further details, specially for light elements present in the samples. This is particularly attractive for the characterization of Hybrid interfaces. Other specially attractive techniques for characterization of organic matter are Particle induced X-ray emission (PIXE) and Particle induced Gamma Emission (PIGE), which can be extremely sensitive for the characterization of F, Cl and other elements within organic structures.

Apart from this, irradiation with accelerated ions allows a smart modification of interfaces properties at optical and electronic level. The use of lithographic techniques allows the preparation of selective modification and first prototypes. Have you any structural question referring to the thin-film interfaces with which you work? Do you want to promote any particular property on your thin hybrid interfaces? Accelerated ion beams could be the key solution for you!!!

For any further details on which kind of experiments can be planned in these facilities you may contact: [vicente.torres@uam.es](mailto:vicente.torres@uam.es) or [m.ynsa@uam.es](mailto:m.ynsa@uam.es). For all the information necessary to access beamtime please visit the webpage <http://www.cmam.uam.es/en/beamtime>.

Miguel Manso

## Events

### Thinface / PCAM:

April 21-22, 2016, Lifetime and stability of hybrid and organic devices, Workshop in Paris, Details will follow

July 4-8, 2016 PCAM / Thinface Summerschool in Paris, Details will follow

February 2016

[SPIE Photonics West](#), February 13-18, 2016 San Francisco, California, USA  
Deadline for abstracts: August 03, 2015

March 2016

[MRS Spring Meeting](#), March 28 - April 01, 2016, Phoenix, Arizona, USA  
Deadline for abstracts: October 15

April 2016

[SPIE Photonics Europe](#), Apr 4-7, Brussels, Belgium  
Deadline for abstracts: Oct. 19, 2015

May 2016

[E-MRS Spring Meeting](#), May 02-06, Lille, France  
Deadline for abstracts: January 15, 2016

June 2016

[ECCOMAS 2016](#) European Congress on Computational Methods in Applied Sciences and Engineering, June 5-10, 2016  
Crete, Greece  
Deadline for abstracts: November 29, 2015

July 2016

[SIAM Conference on Mathematical Aspects of Materials Science](#), May 08-12, 2016, Philadelphia, Pennsylvania, USA  
Deadline for abstracts: December 15, 2015

August 2016

[IEEE Nano](#), August 22-25, 2016, Sendai City, Miyagi, Japan  
Deadline for abstracts: March 07, 2014

[ICANM](#)- Int. Conf. on Advanced Nano Materials, August 08-10 , 2016,  
Montreal, Canada  
Deadline for abstracts: May 31, 2016

[SPIE Optics+Photonics](#): NanoScience+Engineering, August 28- September 1,  
2016, San Diego, USA  
Deadline for abstracts:: February 8, 2016

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