Marie Curie Alumni Association

Proceedings

The MCAA Poster Session – ESOF2016

EuroScience Open Forum – ESOF2016
Manchester, United Kingdom, 24-27 July 2016

Snežana Krstić
Paul Cunningham
Editors

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e-ISBN: 978-2-9601724-2-3

Publisher:
Marie Curie Alumni Association – MCAA
Avenue des Artes, 24
B-1000 Brussels
Belgium

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Preface

Professor Dame Nancy Rothwell

ESOF 2016 Champion
President and Vice-Chancellor of The University of Manchester

I was delighted that Manchester, with its impressive legacy of scientific endeavour, was selected to host ESOF 2016 and that so many people from all over the world were able to attend. The conference itself attracted over 3,500 attendees from 83 countries with 700 speakers, over 150 sessions and over 400 science journalists and communicators. Those present included four Nobel Prize winning scientists, scores of eminent scientists from across the globe, the UK Minister for Universities, Science, Research and Innovation, the European Commissioner for Research, Science and Innovation, government chief scientific advisers from the UK and several other countries and other leading policymakers and, of course, a host of researchers from every major scientific discipline, the social sciences and the humanities.

However, ESOF is not just about those who have already made their mark in their scientific and science-related careers. It is an inclusive event which reaches out to all those with an interest in science, in its broadest sense. Manchester's ESOF Conference was accompanied by the week-long 'Science in the City' which featured numerous events, attended by over 20,000 people each day. Many of these were aimed at school children, who may not have yet decided whether to study science further or enter a career in science.

We were particularly keen to engage with those just starting out in a scientific career. Thus, in addition to attracting as many Early Career Researchers (ECRs) to participate in the main Programme, there were a number of targeted events. These included a Careers Programme, with sessions dealing with issues of concern to ECRs; Career Clinics providing advice and guidance, for example, on crafting a CV; the 'Pi with the Prof' event at which younger researchers could have an informal chat with an eminent professor or scientific professional over a delicious pie; and the Marie Curie Alumni Association's poster presentation session.

The latter offered a fantastic opportunity for ECRs to showcase their own research to the eminent audience present at ESOF and to discuss the research issues in which they were engaged. As even established researchers know, condensing key research into a single message which provides a clear picture to a broad audience is a skill that is hard to master. Yet some 40 ECRs from across Europe and further afield were able to deal with this challenge and handle some tough questioning in a remarkably professional manner. If the contents of this book of proceedings can be seen as a guide, the quality and diversity of the presentations indicate that some of the eminent participants in future ESOFs may already be on their way.

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Editorial

Tomorrow's Science Revolutionaries?

Snezana Krstic[1] and Paul Cunningham[2]

Although scientific research can sometimes lead to that 'Eureka!' moment, the general course of the scientific endeavour is one of painstaking research, punctuated by sporadic insights (most often from co-researchers – Newton's 'giants'), sometimes guided by serendipity but more often resulting from sheer determination and application. Frequently, the outcome of this research is not a great leap forward, but a slow journey which sees the incremental addition of further building blocks to the edifice of knowledge.

However, some scientific discoveries, individually or in combination with others, can be revolutionary – literally transforming the lives of many others and enabling us to improve society, the material and systemic world around us and our understanding of human and other life and the universe. The notion of 'Science as Revolution' was selected as the motto for the EuroScience Open Forum (ESOF) 2016, held in Manchester in July. The choice reflected Manchester's scientific heritage: once known as 'Cottonopolis' the city can claim to be the birthplace of the industrial revolution, with the opening of the world's first steam driven textile mill in 1781 and leading to its development into the world's first centre of mass production. The city's scientific credentials continued, with further ground breaking research from the likes of John Dalton, Ernest Rutherford and Alan Turing, and still do so with Manchester now being recognised as the 'home' of graphene – a material with further revolutionary potential.

At some point, individuals have to concede their role in the scientific journey to others with the enthusiasm to take on the next phase of the research process, possibly forging new paths of their own, with equal revolutionary zeal. With Manchester being home to over 85,000 students, the concerns of Early Career Researchers (ECRs) were guaranteed prominence at ESOF 2016, and a host of events were organised for these participants including a Careers Programme full of scientific sessions, careers clinics, student parliaments and awards. The development of human resources in science is also a longstanding aim of EuroScience, the parent body of the ESOF events, thus significant emphasis was placed on attracting active participation by ECRs. One of the opportunities available was the poster session organised by the Marie Curie Alumni Association.

Following the success of those bridges built with the ESOF team at the previous event in Copenhagen in 2014, held under the motto "Science Building Bridges", the MCAA invited early-

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stage researchers from Europe and the rest of the world to present their research ideas at ESOF 2016. The MCAA Poster Stand for Young Researchers was situated in the Exhibition Hall of the main ESOF event at Manchester Central, an impressive former Victorian railway station now converted into a state of the art conference venue and now witness to a group of travelers on a very different form of journey. The aim of the Poster Session was to showcase the work of young talented researchers to a wider audience, as well as to support their development to meet the needs of society.

As we can learn from history, every age faces its own societal challenges. The aspiration to meet the needs of humanity and a curiosity to explore our environment, be it natural, physical, social or cultural have always been among the major driving forces leading to scientific progress and new discoveries. Nowadays, society continues to face numerous challenges – some long-standing, some of our own creation. These range from natural and man-made disasters, food security, depletion of natural resources, pollution and new health concerns to security, demographic and migration issues. The complexity, diversity and global dimension of these challenges emphasize the need for better organized response measures, for reliable scientific and expert advice, for highly skilled human resources and for new approaches to scientific research, which go beyond traditional disciplinary limits and foster integrated, problem-driven approaches to science (Krstic 2015). Thus, the cooperation of scientists - international, regional, cross-disciplinary and cross-sector - has a vital role in meeting the host of societal problems we now face.

The European Commission's Marie Sklodowska Curie Actions (EC-MSCA), with a reputation in in the research community as one of the most prestigious programmes to support the training, mobility and cooperation of scientists across and outside Europe, have recognised the importance of developing human resources and their innovation skills to address European and international challenges (EC 2014). Following the strategic goals of its founding body, EC-MSCA, the Marie Curie Alumni Association (MCAA) continues to support the professional development of its members, encouraging cooperation across different countries, disciplines and sectors of the economy and establishing fruitful connections with the European and global research communities.

While the importance of international and cross-disciplinary cooperation is widely recognised, the opportunities for ECRs to exchange their research ideas with multidisciplinary communities is still relatively limited: in many cases access to such opportunities is only gained on the basis of an extensive track record in research, something not available at the early stages of a research career. In addition, the fruitful exchange of ideas requires additional skills – such as the ability to communicate complex scientific issues to non-professionals in the same field, to researchers working in other fields, to policy-makers, business professionals, journalists and society at large. These, perhaps, are the reasons why the ECRs whose contributions are represented in these Proceedings have appreciated the opportunity provided to present their work, particularly emphasizing the benefits of exchanging ideas and learning about different problems and others' research projects. It is indeed clear that the key benefits from their participation was, not only an increased awareness of the importance of being able to communicate science to others, but also of the significance of cooperation among both MCAA members and non-members, including with researchers from far parts of the world, together with an improved awareness of European and UK research programmes – all knowledge crucial to their future research career development.

In addition to thanking those ECRs who produced posters of such high quality, thanks are also due to the team of reviewers who generously gave their time to select the final set of posters and to provide feedback and advice to the ECRs. Their inputs made a significant contribution to the quality of the poster session and also assisted those present in improving their communication skills.

The professionalism demonstrated by our collection of ECRs, all young people, makes us optimistic about the next generation of researchers and their contribution to addressing the challenges faced by society now and in the future. With much enthusiasm, they presented their achievements - concerning new molecules, new materials, new technologies, new experimental techniques and approaches, new perspectives, new paradigms, across the entire range of themes that comprised the ESOF programme.

As such, it is possible they will be themselves the initiators and pillars of new cooperative endeavours, leading scientists in emerging fields, distinguished innovators, even laureates of the most prestigious awards. We hope that, in some way, they will be a force which encourages the development of a new generation of scientists.

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Photochemical tools for neural control

Petra Dunkel, Christine Tran, Hamid Dhimane, David Ogden, Peter I. Dalko

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The dynamic study of fast cellular events represents a considerable challenge in neurosciences and requires the development of dedicated tools. Light can be used not only for the read-out of cellular informations but also for triggering extra-, or, intracellular events with 4D resolution (time and space) at molecular level, with only limited unwanted perturbation of the system. 'Caged compounds' are light sensitive prodrugs allowing the release of biologically active ligands in a controlled manner [1]. The light source might be a flash-lamp (UV), or, a fs pulsed laser (two-photon irradiation). Although the latter offers distinguished advantages, such as better spatial control, decreased phototoxicity and increased tissue penetration, it necessitates the development of specifically optimised probes. Besides improved two-photon absorption and fast uncaging kinetics, an adequate physicochemical profil - compatible with biological applications - is required.

We are developing aminoquinoline (AQ) based photo-cleaveable probes [2-4]. AQ caging groups show fast fragmentation kinetics, good solubility and low fluorescence. They mask efficiently the biological activity of small carboxy-ended compounds, C-terminal amino acids, olygopeptides as well as phosphate and carbamate ligands. The one- and two-photon sensitivity and the physicochemical properties of the chromophore were extensively optimized leading to a small library of 'cages', with the first series of compounds having ?2.5 GM uncaging cross-section. The synthesis and study of monomeric, dimeric and trimeric 2-hydroxymethylene-dimethylaminoquinoline derived caged compounds were realized. The best performing derivatives were applied in neurophysiology for the controlled liberation of agonist and inhibitory neurotransmitters.

ESOF theme:

- Healthy populations
- Material dimensions
- Sustaining the environment
- Turing's legacy – data and the human brain
- Far frontiers
- Living in the Future
- Bio-revolution
- Science for policy and policy for science
- Science in our cultures

Fellowship from FP7 Marie Curie Actions (FP7-PEOPLE-2013-IEF: 629675) is gratefully acknowledged.

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[2] OL 2002, 4, 3419; JACS 2006, 128, 4267; JOC 2009, 74, 1721;
[3] OL 2012, 14, 6366; OBC 2014, 12, 9899; OL 2015, 17, 402;
[4] Opt. Mat. Expess, 2016, accepted.

Scientists Dating Forum - Educating/Debating/Engaging Scientists on the relation of Science with Politics/Economy/Society

Yoran Beldengrün

Spanish Research Council/Scientists Dating Forum, Spain

In this poster we want to present a new think tank we are creating in Barcelona: The "Scientists Dating Forum" (SDF)!

No, this is not a dating platform for desperate single scientist. Or let's say it like this: Not only…

The mission of the SDF is to bring out the scientist from their laboratories and show them how science influences politics, economy and the society and vice-versa. We aim at educating the scientists, promoting a debate and also activism within the scientific community.

Several actions to fulfil those aims are planned:

- Workshops for the SDF team given by experts
- Workshops in research institutes in collaboration between SDF team and experts (for 50-100 people)
- Forums/conferences (for 300-500 people) which will be a mix of speeches, workshops, roundtables, science shows and social activities
- Publishing background/advocacy papers
- Collaborate with other entities with similar aims as the SDF
- Organise social events

In November 2015, Yoran Beldengrün, PhD Student and Founder of the SDF, started to present the idea to many different institutions and

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important players of the scientific community of Barcelona. In January 2016 he started looking for a team to work with him on the project. Within 2 months 80 people (scientists, journalists, entrepreneurs project managers, teachers...) from over 50 different institutions contacted him. Currently around 50 people are actively involved. In March 16 the SDF entered the process of registration as an association in Spain.

This successful start of this project, shows that the scientific community is ready to act, but just had been waiting for such a platform to express, with a common voice, their concerns and contribute to a better dialogue to politics/economy/society.

We would like to share at the ESOF our story and exchange ideas with people of common interest.

Reference:

SDF webpage http://scientistsdatingforum.org

Further details and contact:

Facebook: https://www.facebook.com/Scientists-Dating-Forum-1562575100725994
Twitter: @SciDating
email: info [at] sci-df.org

Cross-linked Microgels, Produced by Water-in-water-emulsions, for Future Use as Delivery System for Enzymes

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75 % of the world population is suffering under some form of lactose intolerance. As a consequence they have to avoid milk products, consume lactase-free formulations or get supplements of the enzyme lactase, which they are missing. Latter drugs need appropriate protection from the acid stomach conditions, in order to remain active when reaching the intestine. We propose a novel delivery system which could be incorporated into food products: Microgels.

The use of microgels as drug delivery vehicles is of interest as they combine the useful aspects of colloidal dispersions with the ones of conventional macrogels (1). This means they are free-flowing liquids with a high surface to volume ratio, which facilitates mass transport to and from the microgels, but also display controlled swelling, which makes them responsive delivery vehicles. Furthermore microgels are generally biocompatible and hydrophilic and contain a lot of water, which allows proteins to be incorporated into the microgels with only moderate conformational changes and with limited aggregation.

Not only the final product, but also the preparation method used is biocompatible. Microgels were prepared based on water-in-water (W/W) emulsions. W/W emulsions form due to the thermodynamic incompatibility of two aqueous solutions, mostly one containing polysaccharides, the other one proteins (2).

Our research focusses on two types of systems: Gelatin-in-maltodextrin emulsions for the formation of gelatin microgels, crosslinked by

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genipin, and carboxymethylcellulose (CMC)-in-bovine serum albumin emulsions for the formation of CMC microgels, crosslinked by ions. Ionic crosslinking can be made reversible at pH<pKa (4.3), as the protonation of the carboxyl groups of CMC, leads to dissociation of the ions from the polymer: Microgels could remain thus both, in a neutral/basic solution ex-vivo (in food) and later in the acidic environment of the stomach unswollen, but might swell in the intestine, due to the loss of ionic crosslinks inside the stomach.

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Models for Societal Impact Evaluation of Science, Technology and Innovation policies. Theory and practice.

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The societal impact evaluation is currently experiencing rapid development, and new conceptual frameworks and innovative methods for evaluation are being developed and applied. This tendency is fuelled by growing demand of policy makers for accountability reasons and growing need from evaluators to posses an adequate method. However, there is no agreement on criteria and methods that can be applied to the evaluation of societal impact, as it is both, conceptually and methodologically problematic. The variety of conceptualizations and misuse of the word "impact" in the science (Gluckman, 2014) affects the actual practice of evaluation (Bornmann, 2013). Although, there is no consensus over what impact means, there is an agreement on its multidimensional nature. Therefore, the main objective is to explore models used to evaluate societal impact of STI policies by posing the following key questions: which dimensions of societal impact do they claim to measure and which ones already were captured in practice? The analysis carried out focused on six different models and eleven dimensions proposed by Godin&Doré (2005) were used as criteria in order to homogenize the different definitions and models heterogeneity. This comparative analysis of models made by contrasting societal dimensions coverage in theory and practice shows that they share a commonality, partial coverage of societal dimensions.

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Keep Calm and Go Social: Responsible Research and Innovation for Renewable Energy Research

Ruth Carbajo, Luisa F. Cabeza

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Reaching a social dimension of scientific research is a challenge that requires structural changes as well as a reformulation of the role of researchers. This pursuit is not new and is rooted in the application of social sciences to technical disciplines, but in recent times, this approach has been travelling towards the definition of the excellence in terms of social relevance and the participation of all stakeholders, including in a determinant role the citizens, underrepresented and minority groups, innovation agents and policy makers. Responsible Research and Innovation (RRI) approach has been emerged as useful tool for achieve this pursuit but has not been reported uses in renewable energy (RE) research. In order to establish the social dimension of RE research, redefine the social commitments of researchers and thereof undertake actions for foster the RRI dimensions, GREA advanced energy research group in University of Lleida, Spain, have been conducted a global survey based on the analysis of the elements that can be considered social dimensions and has been set up the bases of a RRI plan for advanced energy research. The survey was based on interviews and questionnaires and was executed by groups of researchers and academics from the field of (RE) and Thermal energy storage (TES) fields.

The remarkable results are an agreement regarding to the benefits of the insights of the social sciences in RE research with a bias towards economics over other social sciences. Drawing from across the society when setting up research questions was not consider as social dimension, neither the inclusion of social research topics such gender or ethics.

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Therapeutic Approaches in Mitochondrial Diseases

Manar Aoun

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"Neurodegeneration with brain iron accumulation" (NBIA) comprises a group of progressive neurodegenerative disorders characterized by high content of iron in the brain. Mutations in PANK2 gene, which encodes for the mitochondrial protein pantothenate kinase type 2, determine an autosomal recessive inborn error of CoA metabolism, called pantothenate kinase-associated neurodegeneration (PKAN). The pathogenesis of PKAN, the most frequent form of NBIA, is still poorly understood.

In our study, we are exploring a Pank2-KO mice model, which showed altered mitochondria membrane potential in neurons and defective respiration in the brain. Moreover, we have demonstrated that ketogenic diet, which stimulates lipid utilization by mitochondrial beta-oxidation, was able to reveal a clinical phenotype not present in Pank2-KO mice under standard diet. These mitochondrial bioenergetics failure due to the absence of PANK2 protein may result from defects in mitochondrial membrane integrity and consequently in supercomplexes stabilization. Our first results showed a deficiency in complex IV activity in supercomplexes in the brain from Pank2-KO mice. In fact, PANK2 by synthesizing CoA required for membrane phospholipids remodeling, indirectly contributes to the synthesis of cardiolipin implicated in supercomplexes stabilization. Thus, phospholipids metabolism could be an interesting target to better explore membrane homeostasis.

In parallel, we are conducting lipidomic analysis on PKAN patients red blood cells. The complexity of the blood lipids profile establishes it as a rich source of molecules that can provide clues about human

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physiology and disease. Our first results showed differences in phospholipids distribution in RBC membranes, mainly a decrease in phosphatidylcholine and sphingomyelin. Thus, lipidomic analysis in NBIA patients' RBC could provide a powerful biomarker in clinical medicine to understanding lipid biology in NBIA pathogenesis and monitoring therapeutic intervention.

Anthraquinone Derivatives from Salt Lake Sediments of Tibet, Novel Multi-Target Anti-Cancer Drug Candidates Targeting Cancer Stem Cells

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The isolation and structure elucidation of three new anthraquinone derivatives (**1**-**3**), been obtaining from extracts of fungus isolated from sediments from the salt lake of Tibet, together with four known metabolites (**4**-**7**) is reported. Compound **2** is a new tetrahydroanthraquinon with a rare epoxy ether bond, exhibiting a considerable cytotoxicity against human MCF-7/ADR breast cancer cells with an IC_{50} value of 18.48 μM and moderate inhibitory activity on α-glycosidase and **3** is the first macrosporin dimer with a C-5, 5' linkage. Compound **4** shows the most potent inhibitory activity on α-glucosidase and moderate activity against the cancer cells. Compound **2** and **4** have been finding out to be novel promising multitarget anti-cancer drug candidates to target Cancer Stem Cells and valuable tools as probes to investigate and discuss links between diabetes and cancer. Our research also provides novel insights into mechanisms and innovative means to address cancer and age-related diseases.

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What Can Machine Learning Infer about the Way You Walk?

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The University of Manchester's smart carpet [1] is a floor sensor prototype to monitor gait. The gait analysis applications capabilities of the smart carpet can range from security verification systems [2] to identification of markers of neurodegenerative diseases such as Alzheimer [3]. The system uses plastic optical fibres to record spatiotemporal information of footsteps for gait analysis.

The large volume of raw gait data that can be obtained obtained with the smart carpet can be used with machine learning techniques, such as neural networks with deep representations [4][5] for gait characterization. In this poster we present a spatio-temporal analysis of 13 gait activities [6] enacted on the smart carpet which includes cognitive demanding tasks. We conclude that the activities have a unique pattern of frequency, amplitude and type of spatio-temporal signal that can be identified with deep neural networks models.

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- Far frontiers
- Living in the Future
- Bio-revolution
- Science for policy and policy for science
- Science in our cultures

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Reliable and Cost Effective Offshore Operations for Farm Deployment and Operation

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Operation and Maintenance (O&M) of Marine Renewables has been highlighted as one of the major contributors to the final cost of energy. Therefore, lower the costs related to such aspect is vital in order to speed up the access to the market of these devices. In last years, several O&M decision-making tools have been developed, mostly for offshore wind farms [1,2].

In this work the authors propose a computational tool for assessing the optimal O&M procedures of marine renewables. This toolbox uses Monte Carlo simulation, which permits to establish probability of exceedance and confidence intervals on the results obtained, to calculate the most likely results through a probabilistic approach. The model is expressly orientated towards Marine Renewable Energy (MRE) devices, and aims to reduce the assumptions generally needed in Reliability, Availability and Maintainability (RAM) analysis. It offers different modelling possibilities depending on the accessible information to the farm owner/operator, and its main goal is the production of safe and cost-effective maintenance procedures to reduce O&M expenses in Marine Energy.

The poster will give an overview of current O&M practices and the advances obtainable with the implemented tool. Findings will be presented on energy yield and availability predictions of MRE devices, as well as suggested practices for the optimisation of the O&M procedures [3].

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Making Energy with Electrochemistry: The Challenge of powering a Fossil Fuel Free Society

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Hydrogen is considered as one of the most feasible energy carriers of the future[1,2]. Fuel cells, which can use Hydrogen as fuel, are expected to replace internal combustion engines in the following decades, as the oil reserves decrease, and global warming increases. But Hydrogen production at the scale needed by our modern society is a process that takes a lot of time to be carried out. Catalysts are substances that can speed up chemical reaction rates in order to achieve the production in a faster time than the one it would take to nature alone. They are also vital for the efficient operation of Fuel Cells. Hydrogen production can be carried out in several ways, such as the Steam Reforming, which uses Methane as the main reactant, or by electrochemical means[2]. Stem reforming is currently the main process used for obtaining hydrogen gas, but this reaction has the drawback of producing greenhouse effect gases as by products, as well as leaving traces of those gases in the hydrogen produced which in turn "poisons" the catalysts used in most fuel cells, reducing its performance. On the other hand electrochemistry provides a process doesn't rely on fossil fuels and is considered cleaner, since it only involves water as its main reactant. Our research group takes a multidisciplinary approach in order to reduce the infinite number of possible of catalyst to just a small number that can potentially speed up Hydrogen production in order to make it economically and practically feasible. Our approach allows using the theory as a predicting tool[3,4], which can help to discard several metal combinations easily, in a relatively short time, saving time of laboratory work and money on expensive reactants. The most promising combinations are then selected so that they can be further studied experimentally by electrochemical means.

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Optimizing for Happiness in Personal Finance

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Happiness is one of the most important aspects of human lives, yet the literature on emotional well-being indicates that people often fail to correctly anticipate the hedonic consequences of future events [1]. As a result, individuals end up being not as happy as they thought they would be. This phenomenon also applies to the domain of personal finance where people make bad decisions about purchases [2, 3]. We suggest that people can potentially benefit from a recommender system with abilities to improve their affective forecasts and to offer intelligent guidance about spending. Many psychological biases that disturb affective forecasts of individuals are known to behavioral scientists and documented in the literature [4, 5, 6, 7]. For this reason, we argue that design of such a recommender system should be feasible taking into account excellent progress in the area of recommender system. In this project we aim to see if technology can help people become happier with their purchasing decisions and improve subjective well-being (SWB) by recommending clever choices. The innovative aspect of this project is to use emerging methods for measuring affective emotions of a person to make predictions about ways to spend money and thereby increase SWB and happiness of a person. In short, we aim to enable people with average income to achieve the highest SWB given their budget restrictions. The research is rooted in human-computer interaction methodology and draw on literature from behavioral economics and SWB.

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Our Best Ideas in Our Hands: Adaptive Virtual Reality to Enhance Human Creativity

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In the age of complexity, virtual reality and increasing demand for new ideas any device that can enhance Human Creativity would create sustainable impact. Cognitive enhancement is now feasible with Pervasive Neurotechnology patents which are now inexpensive, digital and scalable such as neurosensor-based vehicle operator systems, real-time neuromonitoring, cognitive training videogames, mindful wearables, Virtual Reality in conjunction with EEG (Electroencephalogram) and/or tDCS (transcranial direct current stimulation) to name a few. Our research focuses on creative learning in the chaotic environment around us. New ideas and their evaluation utilising appropriate creativity techniques can lead to new interpretations or even non-obvious solutions. If there can be a device to facilitate and enhance individual and group creativity, function in the grey area between reality, augmented and virtual reality as well as the individual's personal space such device can be the 'sine qua non' of the 21st century world. In the age of global crisis good ideas can produce viable and sustainable solutions. Hence, our proposition is an Adaptive Virtual Reality Brain-Computer Interfaces enhanced with micro-sensors to capture and visualise human brain activity and furthermore, project the best possible environment for the user to take advantage for best ideas capturing and evaluation. Such device can trace brain activity on a synaptic level by real-time multimodal neuroimaging with immediate and automatic patterns interpretation. In our poster we present preliminary results from initial studies based upon the differences between the brain hemispheres and the related creativity and learning techniques. In these studies we target honing new ideas to sense the

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presence of a subthreshold between functioning and non-functioning solutions and the ways the brain learns to identify and transfer such differences. Then, we transfer such human ability in identifying solutions and learning new tasksfor educational purposes.

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An Emission Characterization Study on a Model Flame Fuelled with Natural Gas and Commercial Grade Propane

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Improving combustion efficiency and emission reduction are vital so modern combustors exploit new low temperature combustion concepts and alternative/renewable fuels. Maritime engines increasingly consider their carriers Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG) among others as fuels. Therefore, an investigation at a fundamental level is needed to recognise the effect of different fuel compositions and to understand the synergistic effects of fuel-engine interactions.

Swirling flows ensure effective fuel and air mixing and provide an aerodynamic flame stabilization means for controlling flame shape and size. As a result, engine inlet streams are mixed in such a way to exploit the aforementioned advantages.

The current work presents preliminary flame measurements on a laboratory-scale swirl stabilized burner for methane (LNG), propane and commercial propane (LPG) under a constant nominal thermal load. Symmetry axis measurements for all major combustion products and pollutants have been performed on a dry-basis with a continuous Gas Analyser (GA). Detailed speciation measurements have been acquired with a Gas Chromatographer (GC) equipped with a Flame Ionization Detector (FID), for hydrocarbons from C1 to C4.

Since Exhaust Gas Recirculation (EGR) and preheating are commonly met in inland heavy duty engines and maritime ones respectively, mixture dilution techniques, at two preheating levels (373 K and 573

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K), have been employed in the present work. In all cases, the simulated EGR was formed by Carbon Dioxide, Nitrogen and water in representative ratios.

The present work provides a benchmark for comparison and characterization of pollutant concentrations with respect to systematic changes in the fuel stream. The results are discussed towards exploiting the influence of commonly employed engine techniques in a controlled environment.

The research leading to these results has received funding from the People Programme (Marie Curie Actions) of the European Union's Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n° 607214.

Smart Polymeric Materials for Biomedical Applications

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Living organism have the ability to respond to stimuli in their environment. Scientists have been trying to mimic this behavior for the last few decades thus creating the so called "smart" polymers. These polymers are defined as materials that can change their physical or chemical properties in response to an external stimuli in a reversible way**.** Examples of external stimuli include changes in temperature, pH, ionic factors, light, magnetic or electric fields, biological molecules, etc. Smart polymeric materials have very promising applications in the biomedical field as delivery systems of therapeutic agents, sensors, tissue engineering scaffolds, cell culture supports, etc. From a biomedical point of view, the most important systems are those sensitive to pH, ionic factors and temperature [1]. This work is focused on developing a biosensing method for the detection of specific biomolecules (proteins) from a mixture of proteins having different size, shape, electric properties and playing different biological roles. This method is based on applying two polymers: poly(ethylene oxide) (PEO) and poly(acrylic acid) (PAA), covalently attached to the substrate (gold). PEO is a polymer that inhibits the adsorption of proteins while PAA is an anionic polyelectrolyte having variable densities of negative charges depending on pH [2,3]. Three proteins were chosen to study selective adsorption on the PEO/PAA brushes. Human Serum Albumin (molar mass of 66 kDa; iep close to 5) was chosen as a common model protein. Lysozyme (14.3 kDa; iep~11) and Fibrinogen (340 kDa; iep~6) were additionally chosen based on their electric and structural characteristics. By changing pH it is possible to vary the "electric" state

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of PAA and the proteins. It allows one to find conditions where the protein possesses an opposite charge than the PAA. In such a case the electrostatic attraction occurs and the selective adsorption of a given protein can be achieved. Furthermore, by desired changes in pH and/or ionic strength, in which repulsive forces between the PAA and the protein appear, the desorption process of the selected protein can be obtained. Additionally, to increase the effectiveness of this process the protein-repellant properties of PEO were also used. It was demonstrated that by controlling both the pH and ionic strength, it was possible to effectively adsorb and desorb one protein from a desired mixture of three proteins on the pH-responsive polymer materials.

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Drug Discovery for a Common Human Kidney Disease (ADPKD) Using Zebrafish and Cellular Models

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Autosomal-dominant polycystic kidney disease (ADPKD) is one of the most common monogenic diseases with an incidence of ca. 1/1000 worldwide[1]. Around 10% of all end-stage renal disease results from ADPKD[2], which translates into an annual cost of €1.5 billion across Europe. Recently tolvaptan has been licenced for slowing ADPKD progression, however this drug is associated with significant side-effects[3] resulting in the need to identify alternative treatments for ADPKD.

A *pkd2* zebrafish mutant strain was used as the primary model for chemical library screens. The Spectrum (2000 compounds) and PKIS (published kinase inhibitor set, 367 compounds) libraries were screened for their effects on tail curvature, the most penetrant ADPKD-related trait in *pkd2* mutants. The most promising compounds of the Spectrum library and strongest repressors of the PKIS library were then tested in two different three-dimensional cyst assays: canine MDCKII cells and human *PKD1*$^{-/-}$ Ox161c1 cells.

Of interest, most of the compounds enhancing the phenotype from the Spectrum library clustered into three distinct chemical classes, one of which has previously been implicated in ADPKD. Similarly, one of the repressors regulates the prostaglandin pathway, which has also been linked to ADPKD pathogenesis[4]. Finally, two hit compounds from the PKIS library screen share a similar chemical structure and are predicted

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to inhibit the same kinase in an ADPKD-linked pathway.

All of the compounds behaved consistently as enhancers or repressors for the cystic phenotype in both canine and human cell models, validating the zebrafish mutant as a relevant model to predict cystic behaviour.

This is the first report of a high-throughput chemical library screen using a zebrafish ADPKD model. Retesting in cellular assays has confirmed the compound hits and revealed unexpected links to known and unknown pathways involved in cyst formation and expansion. These leads will be further refined through *in vivo* testing in preclinical ADPKD models.

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Elucidating Novel Signalling Pathways in Peroxisome Proliferation in Mammals

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The ability of peroxisomes (PO) to respond dynamically to environmental changes and stresses, for example by increasing their number and/or enzymatic capacity, is essential for cellular and organismal function and health (1-3). Despite the importance of PO proliferation, the signalling pathways regulating this process are poorly understood, in particular in humans. In order to identify novel signalling pathways and associated factors involved in PO proliferation, we have developed a cell-based PO proliferation assay to investigate different stimuli and their capacity to induce PO proliferation. Using qPCR, differential expression patterns for human peroxins were revealed. Combining this assay with pharmacological and transcriptomic analyses resulted in the identification of novel regulatory signalling pathways. We applied bioinformatics approaches to screen promoter regions of PO genes for regulatory elements and performed network analyses. A map of regulatory motif sites across the human PO genes has been developed. Our analysis revealed differences in transcription factor binding sites between metabolic and biogenetic PO genes suggesting differential regulation. For the first time, we demonstrate a link between TGFβ signalling and Pex11-mediated PO proliferation. Our findings suggest an involvement of PO function in cell growth, differentiation and inflammatory processes.

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Aflatoxin Concerns with Selected Nigerian Staples

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Aflatoxins are poisonous chemical substances secreted on food by some *Aspergillus fungi* under favourable conditions. Globally, aflatoxins are of economic, food safety and public health importance because of their ability to suppress the immune system and also cause cancer among other health issues. Nigeria is in the forefront of global production and consumption of sorghum, millet and sesame. This study was carried out to investigate the frequency and levels of *Aspergillus* species and aflatoxin contamination in the staples together with their products and monitor changes in aflatoxin level with processing, also the influence of tannin a natural antifungal agent was studied and correlated with aflatoxin levels. To achieve these, samples of the staples (146) around Northern Nigeria were assayed. Frequency of occurrence of *Aspergillus* species decreased in the order *A. flavus* -L- strain, *A. flavus -S-* strain, *A. tamari, A. niger and A. parasiticus.* Aflatoxin analysis showed 28.6% sorghum (0.96 – 21.74 µg/Kg), 80% burukutu (1.27 – 8.82 µg/Kg), 20% pito (0.69 -2.00 µg/Kg), 29% millet grain (1.05 – 14.96 µg/Kg), 26.3% millet dough (0.81 – 3.78 µg/Kg) and 21.7% sesame (0.79 – 60.05 µg/Kg) contamination. Based on the EC and Nigerian permissible limit of 4µg/Kg, samples that were unsafe for human consumption include; sorghum (17.1%), burukutu (30.0%), pito (0.0%) millet grain (32.3%) millet dough (0.0%) and sesame (15.2%). Processing was observed to reduce the levels of aflatoxin from grain to beer, establishing a 47% and 25% carryover into burukutu and pito respectively. Higher tannin levels in the samples correlated with lower fungal loads and aflatoxin levels. Continuous efforts to minimize occurrence and mitigate the impact of aflatoxins in the region is not

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futile. However, Legislative and stakeholder involvement should be further strengthened in the region as climate change could present unpredictable trends.

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Carbon Nanostructure – Polymer Composites as Smart Materials for Energy Related and Biomedical Applications

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We exploit chemical functionalization with organic residues of carbon nanostructures (CNSs), such as single and multi-walled carbon nanotubes (SWCNTs, MWCNTs) and graphene-based materials (GBMs) to achieve improvements in their dispersion in organic media, like solvents and polymeric matrices. This last aspect is particularly appealing for the production of polymeric nanocomposites with potential uses as organic functional materials in several smart applications, ranging from optoelectronics to sensing and biomedicine.[1]

We recently mainly focused on the diazotization process,[2] commonly referred to as Tour reaction, to produce CNS derivatives which can be employed as nano-fillers for polymer phases, improving the homogeneity of the dispersion and the physical properties of the final nanocomposite. Specifically, we targeted photovoltaic applications, by combining functionalized CNSs with semiconducting polymers and tissue engineering by combining functionalized CNSs with bio-compatible polymers.[3] We will therefore report here on our most relevant results in the aforementioned fields.

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Understanding the Highly Efficient Light Harvesting Process in Plants: Good Vibrations in Photosynthesis

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Photosynthesis performed by plants, algae and photosynthetic bacteria is the biological process that transforms solar energy into chemical energy with high efficiency. A complete understanding of the mechanisms and factors that modulate the efficiency of this process is a challenge centered at the nexus of fundamental physics and biology[1,2], and obtaining that knowledge could pave the way for the design of future cheap and highly-efficient light-conversion devices[3].
In that sense, the direct investigation of molecular vibrational modes in the photosynthetic process could provide new clues for a complete understanding of the mechanisms involved in the early stages of the light harvesting processes and regulatory mechanisms[4].

To explore that possibility we used femtosecond stimulated Raman spectroscopy (fs-Raman[5]) to study the excited states of trimeric Light-Harvesting Complexes from higher plants. Herein we show the first time-resolved results of the vibrational modes of xanthophylls and chlorophylls in excited Light-Harvesting complexes. By selectively exciting the different pigments, we obtain the time evolution of their vibrational spectra and relate it to different processes in the light harvesting mechanism.

These preliminary results constitute a proof of concept of the application of fs-Raman to complex photosynthetic samples and pave the way for future research aiming for a complete model of the light harvesting mechanisms and its regulation at the molecular level. This

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valuable fundamental knowledge could pave the way for the design of sustainable highly efficient devices for energy harvesting.

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Transparent and Conductive Films From Liquid Phase Exfoliated Graphene

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The lab production of graphene has sparked huge scientific and commercial interest, especially since the discovery of methods to produce graphene in large quantities. Although many of those methods use costly sacrificial growth substrates, liquid phase exfoliation (LPE) with the aid of ultrasound has proven to be a facile, reliable, and economically satisfying solution to producing significant volumes of graphene colloid dispersions. Graphene can be extracted from dispersion to be used in various electronic devices and as a transparent flexible electrode in applications ranging from solar cells to wearable sensors.

We describe transparent and conductive films of LPE graphene deposited from soluation with the Langmuir–Blodgett (LB) method [1]. Graphene sheets (GS) were exfoliated from graphite by ultrasonic treatment in N-Methyl-2-pyrrolidone (NMP) and N, N-dimethylacetamide (DMA) solvents. For comparison, graphene sheets were also exfoliated in a water solution of surfactants. We confirm a higher exfoliation rate for surfactant-based processing compared to NMP and DMA. Furthermore, we demonstrate that our films exfoliated in NMP and DMA, deposited with LB and annealed have a higher optical transmittance and lower sheet resistance compared to films obtained with vacuum filtration, which is a necessary step for GS exfoliated in water solutions. High optical transmittance and low sheet resistance are desirable properties for transparent electrodes. The structural, optical and electrical properties of graphene layers were

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characterized with scanning electron microscopy, atomic force microscopy, UV/VIS spectrophotometry and sheet resistance measurements.

Our facile and reproducible method results in high-quality transparent conductive films with potential applications in flexible and printed electronics and coating technology.

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"Heal Me Up"- an Integrated Digital Learning Module That Features Skin Wound Healing by Linking Biology, Mathematics, History and Arts

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The development of knowledge society puts increasing emphasis on enabling people to become information literate. Technology enhanced learning considers the use of information and communication technology to support and improve learning experience and knowledge transfer. Egyptian high schools, like many other countries in the world, have declining numbers of students in Science, Technology, Engineering and Mathematics (STEM) particularly among girls. Women remain less likely to choose a career in STEM areas while they, and their parents, prefer disciplines that are more related to humanities and arts. Meanwhile, the country desperately needs more STEM graduates incorporated in its national innovation system to achieve social and economic welfare. Attention should be drawn to the possible integration of STEM and humanities in a multidisciplinary format through innovative learning modules that enable communication of science in a social context. The science of wound healing has had an existing journey over the ages especially in the Egyptian civilization which was renowned for its scientific and artistic achievements.

Therefore, we aim to demonstrate the process of skin wound healing as it involves highly complex coordinated interactions of many different cell types, tissues and biochemical mediators. By using current and emerging learning technologies, the process of normal and abnormal wound healing is explained in an interactive approach while combining biological processes with mathematical models (1) and relating them to the art of wound healing that is deeply rooted in the ancient Egyptian history (2).

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Order in Disorder: A New Paradigm of Partially Crystalline Nanofilms for Molecular Separations

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In response to the instability of the current energy market, both political and economic interest is being shown in understanding the potential of upgrading biogas to natural gas standards for delivery to national grids. In industrial separation of small gas molecules, such as carbon dioxide and methane, the main components of biogas, the assembly of thin, continuous and dense nanofilms is a prerequisite. It is also necessary for the films to retain mechanical stability, particularly when exposed to high gas pressures, under which many practical thin films implementations take place. Currently dominating the industrial market, amorphous glassy organic polymeric membranes are known to undergo severe plasticisation, when exposed to high-pressure highly soluble gases, such as CO_2.[1,2] Relaxational phenomena and swelling stresses on the polymer matrix occur, resulting in increased polymer segmental mobility, which with time lead to significant deterioration of the polymer properties, and reflect in selectivity loss. On the other end of the spectrum lay robust porous crystalline materials with highly ordered microscopic structures.[3,4] The open porous structure of crystalline materials allows for the accommodation and manipulation of any molecule trapped inside, a powerful tool for many important

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applications. However, the crystals' assembly into thin films that are continuous on a molecular level remains challenging due to defects such as transverse grain boundaries, pin-holes and cracks that are detrimental to the membrane performance.[5] Our work demonstrates that a feasible dip coating method allows for the synthesis of partially crystalline nanofilms (<200 nm), reminiscent of quasi-crystalline materials.[6] The films display previously unreported monoclinic nanocrystals embedded in a continuous amorphous phase, from which the film continuity and film densification stem. We demonstrate how the intrinsically distinct nature of the partially crystalline zinc-imidazole nanofilms allows for a high carbon dioxide uptake with CO_2/CH_4 sorption selectivities that are much greater than those reported for purely crystalline bulk material such as ZIF-8. When perturbed with high-pressure (>50 bar) plasticizing penetrants, our nanofilms maintain prolonged stability, outperforming state-of-the-art glassy polymeric thin films. By overcoming the limitations of both polymeric and purely crystalline thin films, the nanofilms presented herein have the potential to answer current challenges facing practical thin membrane films.

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Why do Research Aircrafts Chase Small Ice Crystals in Clouds?

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The University of Manchester, Manchester, UK and the CLOUD collaboration

Clouds play an important role in precipitation, solar radiation budget and electrification of our atmosphere. The presence of small ice crystals in clouds can complicate weather forecasts and climate change predictions, leading to a net cooling feedback on climate [1]. Additionally, detection and quantification of small ice particles continue to pose a challenge in aviation safety. In our study we measure the smallest ice particles in clouds and compare their microphysical features.

Satellite measurements of water and ice particles in clouds often require in-situ airborne measurements for complimentary analysis. It was shown in previous studies that it is possible to classify cloud particles by their unique light polarisation signature. In this study we combine single particle and cloud-bulk polarisation measurements from laboratory experiments [2, 3] to improve determination of particle specific polarisation response. We then apply this methodology in real airborne measurements.

Results from laboratory experiments showed good agreement between single particle and bulk polarisation measurements. However, contributions from larger particles can lead to discrepancies. Analysis of the aircraft data showed that ice fraction derived from the polarisation properties of the cloud particles agreed with image shape analysis of these particles. Our results will help to develop better instruments and improve the climate models.

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Nanotechnology for Exploring New Frontiers in Axonal Growth

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The leading edge of the axon, the growth cone, is traditionally considered responsible for axonal guidance and directional movement. However, despite two centuries of investigation, the puzzle has not yet been solved. How can neurons regulate neurite elongation and mass addition at sites other than at the growth cone? How is extension possible in large animal integrated axons with no growth cones during the increase of body mass? Recently, new perspectives have been opened by the discovery that axonal growth can be driven purely by mechanical forces. Axonal growth can be promoted by tension, independent of its origin, i.e., from the traction exerted by the growth cone, by the body mass growth or by external force application. According to recent findings, neurons and their axons possess the machinery to sense and transduce mechanical force in axon initiation/elongation/guidance. Our preliminary results suggest that this sensing mechanism is characterized by high sensitivity and high dynamic range as axons react to extreme and extremely low forces ranging in five orders of magnitude (from 0,1 pN to 10 nN).

Surprisingly, although recent knowledge suggests that this “stretch growth” is perhaps the most remarkable axon growth mechanism of all, little or nothing is known about the molecular pathways evoked by the tension. The main limitation is related to the lack of “biologically compliant” technological tools to explore this complex problem, whose solution could open novel biomedical applications. We propose the use of smart magnetic beads for controlled force application in the picoNewton range on models of axonal development/regeneration.

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Mobile Phone Problem Use in Europe: Comparative Study between Spanish and Belgian Young Adults

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Research into mobile phone and smartphone addiction has increased exponentially during last decade, with valid screening scales being developed to identify maladaptive behaviour with this mobile technology. This study adapts the short version of the Smartphone Addiction Scale [SAS-SV] into Spanish and into French. The aim is twofold: to (i) examine the scale's psychometric properties, and to (ii) estimate the prevalence of potential excessive smartphone users among Spanish and French Belgian adults. The data were collected via online surveys administered to 281 and 144 participants from both countries respectively. Results indicated that the reliability was excellent, because the SAS-SV achieved a Cronbach alpha coefficient [α] =.88 [95% confident interval [CI]: .84, .91] for Spain, and α = .90 [95% CI: .87, .93] for Belgium. The factorial and construct validity was very good; findings obtained through the exploratory factor analyses with the principal component analyses were almost equal in both countries (Spain: Kaiser-Mayer-Olkin[KMO]=.852; Bartlett's test: $\chi^2_{(45)}$=532.37; p<.001; Belgium: KMO=.868; Bartlett's test: $\chi^2_{(105)}$=445.96; p<.001) that yielded clearly unidimensionality: "smartphone excessive usage" explaining 49.3% of total variance in Spain and 54.3% in Belgium. Findings also showed that the prevalence of potential excessive smartphone users estimated with a proposed cut-off point was between 10 and 20% approximately according Kwon and colleagues' (2013b), who suggested cut-off points per genders to classify problem smartphone users, a mean between them (score of 32 out of 60) was selected as cut-off for both genders (Spain: $t_{(115)}$=.135, p=.89; Belgium: $t_{(77)}$=.365, p=.72). The Spaniards contained 15 (out of 117) "excessive users" (12.8%: 15.2% males and 10.2% females) and in

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the Belgian 17 (out of 79) (21.5%: 20% males and 22% females). Therefore, due to these large percentage that remain to be explored in detailed, the smartphone addiction construct is a phenomenon that seems to exist in our European countries, and still is under debate and applied to other cultures, due to the extension of mobile technology around the world, in order to study its potential negative effects related with an addictive usage.

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Meeting the Global Challenge of Antibiotic Resistance: Towards Broad Spectrum Metallo-β-lactamase Inhibitors

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The increasing problem of antibiotic resistance is a major global public health concern.[1] The β-lactam antibiotics (BLAs) are the most important antibiotics representing >50% of antibiotics in clinical use.[2] β-Lactam antibiotics contain a β-lactam ring which is critical for their mechanism of action which involves inhibition of penicillin-binding proteins (PBPs) that are essential for bacterial cell wall biosynthesis.[3] The development of successive β-lactam antibiotic generations (*e.g.* penicillins, cephalosporins, carbapenems) has promoted evolution of serine- and metallo- β-lactamases (MBLs) which catalyse the hydrolysis of the β-lactam ring rendering the antibiotics inactive.[4]

MBLs are a growing concern because they hydrolyse almost all β-lactam antibiotics (including carbapenems; "last resort" antibiotics) - with the only exception being Aztreonam[5] - rendering the development of MBL inhibitors (MBLIs) important. Due to the variations in MBL structures, a major challenge in MBL inhibition is the development of compounds with the breadth of selectivity necessary for clinical use.[5, 6]

Our work is aimed at the synthesis of broad-spectrum MBL inhibitors active against a panel of clinically representative MBLs, but inactive against human enzymes with related active sites, including those involved in DNA repair.[7]

Structural work has revealed 'transition state analogues', including boronic acids (some of which show activity in cells) can inhibit both serine- and metallo- β-lactamases.[8] Current work involves the synthesis of α-amino phosphonic and α-amino boronic acids as 'transition state analogue' based inhibitors and as support ligands for MBL-directed

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dynamic combinatorial chemistry (DCC)[9] (*i.e.* compounds which participate in Zn^{2+} chelation at the MBL active site and which enable modification by DC screens). Protein-directed dynamic combinatorial chemistry (DCC), which is related to the fragment-based drug discovery (FBDD) method, will involve the use of MBL protein templates to select structures from equilibrating mixtures of large numbers of potential inhibitors (*i.e. via* phosphonate or boronate derivatives via transesterification). The syntheses of boronic acids is being investigated *via* two routes involving: *(a)* Matteson's homologation wherein boronic esters containing the chiral pinanediol auxiliary which can undergo α-chloromethylene homologation to give α-chloroboronic esters which are further transformed to α-amino boronic esters,[10a] and *(b)* catalytic asymmetric hydroboration of aldimines.[10b] The latter route is aimed at giving access to α-amino phosphonic acids *via* 1,2-addition of phosphites to aldimines using *t*-butyl sulfinamide chiral auxiliaries.

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Decontamination of Water Containing the Herbicide Methyl Viologen Dichloride by Non-Thermal Air Plasma: Determination of the Reaction Mechanism

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Methyl viologen dichloride ($MVCl_2$) is a bipyridylium herbicide with a high acute toxicity, known to be the deadliest herbicide commercialized nowadays. Because of $MVCl_2$ high water solubility, a great concern also exists related to the possibility of its presence in water, particularly drinking water for instance, due to a deliberate contamination event[1]. For this reason, it is important to evaluate an efficient method for its degradation in aqueous media. In the literature, most studies report the use of advanced oxidation process, mostly referring to photocatalytic processes by the action of TiO_2 and/or Fenton's reagents[2]. However, none reports the use of any type of plasma treatment. In this work, a kinetic study was performed to evaluate $MVCl_2$ degradation by a non-thermal air plasma system. Kinetic parameters were obtained in order to determine the reaction mechanism. $MVCl_2$ degradation followed a pseudo-second order reaction kinetics, under all experimental conditions. The activation energy value (13.9 kJ mol^{-1}) indicated a diffusion-controlled reaction[3]. The largely negative value for the entropy of activation (–219.4 J K^{-1} mol^{-1}) and small values for both the enthalpy of activation (+11.4 kJ mol^{-1}) and the pre-exponential factor (58.2 M^{-1} min^{-1}) suggested an associative mechanism between ions with the same charge[3,4]. Based

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on these observations, a reaction mechanism is postulated, consisting in a bimolecular reaction in solution as occurring in two steps. In the first step, an encounter complex is formed, through diffusion of the reactants, $MV^{2+} + MV^{2+} \rightarrow [MV^{2+}\text{-}MV^{2+}]$, ($k_1$). Then, the encounter complex, $[MV^{2+}\text{-}MV^{2+}]$, reacts to form products (k_2) much faster than it reverts to reactants (k_{-1}), i.e., $k_2 \gg k_{-1}$. Therefore, from the experimental determined rate law, rate = $k_{obs}[MV^{2+}]^2$, and the mechanism steady state approximation, it was found that $k_{obs} = k_1$. In summary, the degradation rate is controlled by the rate of formation of the activated complex.

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Towards a Better Understanding and Control of Catalytic Reactions in the Conversion of Renewable Resources

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The exploitation of renewable resources is of key importance in the evolution to a more sustainable society [1]. These resources are characterized by an even more complex nature than conventional ones, among others due to the abundant presence of heteroatoms such as oxygen. Their catalytic transformation into fuels and chemicals can, hence, not adequately be captured by simple reaction networks [2]. A reaction network is a collection of all molecules and elementary steps between the species involved in a chemical reaction. It constitutes the corner stone to simulate the behavior of this reaction. The manual construction of such a network can be very tedious and error-prone. Assembling and analyzing complex networks is preferentially tackled via software to do this in an automated manner [3]. In this research project, a methodology is being developed to automatically construct reaction networks and analyze the kinetics in these networks, i.e., study the rate of each reaction in the network and identify the dominant pathways. The main challenge in the project is the heterogeneously catalyzed nature of the chemical transformations. Particular attention is devoted towards keeping the size of the reaction network within tractable limits. Adequate kinetic and thermodynamic data are essential to the methodology's success and will be determined by dedicated mathematical methods exploiting quantum chemical calculation or experimental results. The first stage of the project was the selection of the most appropriate representation of the chemical species, elementary reactions and programming language. Based on a survey it is decided that chemical species will be represented as mathematical graph structures and elementary steps are the manipulation of the graph structure based on a user defined recipe.

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Java is selected as the programming language for the network generator. In the next stage the network generator is constructed and a strategy is developed for the dynamic network size control. The progress made in the first stage of the project and the future objectives will be presented.

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The Polymer Journey: From Cyanobacteria to the Market

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Cyanobacteria are photosynthetic microorganisms that produce oxygen as byproduct of photosynthesis. Additionally, some strains can also fix atmospheric nitrogen. Their morphological diversity and metabolic complexity allow them to survive in a broad spectrum of environments, including extreme ones. Cyanobacteria are also recognized as a prolific source of compounds, from biological active secondary metabolites to extracellular polymeric substances (EPS). Cyanobacterial EPS are mainly composed by heteropolysaccharides that can remain attached to the cell surface (as sheaths, capsules or slimes), or be released into the medium (RPS). These polymers have particular features, such as the high number of different monosaccharides, which allows a wide range of structural rearrangements; the presence of two uronic acids and sulphate groups, conferring them a strong anionic nature and their content in deoxyhexoses and peptides, conferring high hydrophobicity (1, 2). These characteristics make these polymers suitable for biotechnological and industrial applications (3, 4, 5). The low nutritional requirements of cyanobacteria and the low-cost biomass production is also a competitive advantage for the production of these polymers compared to other microbial polymers already in the market. Moreover, some strains are highly efficient producers of RPS enabling

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an easy recovery and manipulation (6). In the Bioengineering and Synthetic Microbiology group (MicroBioSyn), CF and MS are working on the generation and characterization of cyanobacterial mutants on EPS-related genes; RM is characterizing cyanobacterial polymers and exploiting novel biotechnological applications, SP is investigating proteins involved in EPS biosynthetic pathways, their interactions and their influence on the production/composition of the polymer. PT is the group leader and contributes to design experiments, discuss results, writing publications and raising funds. In this work, we present what we have done to unveil cyanobacterial biosynthetic pathways leading to EPS production, to optimize the extraction and purification of the polymers, and to test these polymers for industrial applications.

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A Nuclear Analytical Method for Unravelling Elemental Profiles in Human Scalp Hair

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Trace elements play an essential role in the biochemical and physiological processes of the human body.[1] When elemental concentrations in tissues reach deficient or toxic levels, the risk for developing disease is increased.[2] To monitor the levels of minor, major, trace, and toxic elements in the body, hair has been cited as an interesting biological matrix for studies in disease pathology and clinical toxicology.[3] Hair concentrate elements at higher levels than blood and urine[4], is a more attractive biopsy material due to its ease of sampling and storage, and has the ability to provide an indirect historical screening of elemental status as a biomarker of disease[3]. Although numerous analytical techniques have been employed in hair elemental analysis[3], there are limited reports on in-air proton-induced X-ray emission (PIXE) analysis of elemental content in hair[5]. The advantage of measurements in air is negligible charging of the insulating targets and simple handling and changing of the samples. Here we report on setting the hair-measuring system at the Jožef Stefan Institute and on the first measurements of single scalp hairs for application in disease pathology and clinical toxicology. The present work involves construction of the hair holder, selection of optimal absorbers, and development of numerical methods for evaluation of elemental concentrations. In conclusion, an optimized in-air PIXE system will present an attractive method for analysis of minor, major, trace, and toxic elemental concentration in scalp hair of diseased

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patients to ultimately advance our knowledge on the important role elements play in disease.

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Electronic and Optical Properties of Nanographenic Compounds Functionalized by Molecular Switches

Valentin Diez, Akimitsu Narita, Xinliang Feng, David Beljonne, Jérôme Cornil

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Hexa-peri-benzocoronene (HBC) is a 2D carbon-based molecule considered as the smallest graphene fragment. During the last years, the interest dedicated to this molecule has grown substantially due to its unique properties such as its tendency to stack with other 2D molecules via strong π-electronic interactions or its low energy bandgap. When the HBC unit is repeated in one direction, it is possible to obtain well-defined graphene nanoribbons (GNR), such as the zig-zag 4- CNR, exhibiting a substantial decrease in the bandgap. For that reason, these compounds have been largely exploited for application in organic transistors and photovoltaics. Another attractive feature of interest would be to control its electronic and optical properties via an external stimulus. This can be achieved by the functionalization of the nanographene cores with photochromic molecular switches, such as the prototypical azobenzene and diarylethene (DAE) groups. In this context, we report here a theoretical study of the electronic and optical properties of functionalized nanographene compounds (HBC and 4-CNR) substituted by photochromic systems by means of (time-dependent) density functional theory (TD-DFT) calculations. We show the possibility of tuning the properties of the functionalized nanographenes via the state (ON-OFF) of the photochromic molecule, the number of functional groups, and the nature of the linker between the core and the substituents.

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Tackling Phosphorus Shortage and Eutrophication: Re-Use It or Lose It

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The level of phosphorus (P) in surface water has ecological significance. Concentrations of P as low as 20 µg P/L can lead to algal growth and eutrophication. This undesirable ecological status results in the release of algal toxins and formation of a physical barrier that prevents the penetration of sunlight to deeper parts of the water body, which causes plant death and hypoxia. The main inputs of P to the aquatic environment are run off from arable land and effluents from wastewater treatment works, both being processes that can severely damage the ecosystem.

The present research has aimed to modify biomass for effectively capturing P from water. Low cost biomass has been transformed into biochar with controlled structure and composition [1]. The factors controlling the removal of P from water by biochar have been investigated (effect of surface chemistry, porosity and the content of metals among them). The type and levels of metals in the biomass and surface charge have been found to be critical. The maximum levels of uptake of P by biochar, measured at 50 mg P/L, were found in the level of 1 mg P/g biochar at acidic pH. The low cost of the biochar produced and the flexibility to tailor its critical characteristics indicate that biochar has potential for becoming part of a technology for removing P. Further developments are underway to enhance its efficiency for removing P and make it viable as a solution to improve the health of aquatic ecosystems and contribute towards P sustainability.

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Graphene-Based Membranes for Water Purification, Gas Adsorption and Energy Applications

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In the past two decades, utilization of membranes for separation processes became an advanced technology that allows solving the enormous challenges faced by mankind. Graphene-based membranes can be engineered by combining multiple chemical components, each conferring to a well-defined function of formed ensemble.[1] Graphene is at the centre of an ever-growing research effort due to combination of its unique properties. By combining graphene with other components its chemical and physical properties can be tuned. Polyoxometalates (POMs) are representing a versatile family of polyanionic clusters, which comprise two main constituents: (a) transition metal ions that occur on the highest oxidation state, mostly Mo^{+6}, V^{+5}, W^{+6}, Nb^{+5}; (b) terminal oxygen atoms that simultaneously function as bridging species with respect to other metal ions or ligands. [2] Besides their highly defined morphology (size, shape and composition), high negative charge, significant molecular weights as well as good solubility in polar solvents, POMs exhibit interesting catalytic, photochemical and magnetic properties.[3] By combining the properties of the individual material, i.e. graphene and POMs encapsulated in the polymeric matrix, membranes with high permeability, transparency, flexibility electrical and thermal conductivity can be fabricated. Such multifunctional hybrid material can be used for water purification, gas storage and energy applications.

This project is at the initial stage of implementation, nevertheless we

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have successfully synthesized first representative membranes. The innovative issue of this project is the fact that preparation of membranes has been achieved with components hitherto uncombined, namely polyoxometalates and graphene, the latter of which was obtained by electrochemical exfoliation procedures. So far, we have managed to obtain a membrane based on polyoxometalate Mo132 ($(NH_4)_{42}[Mo_{72}^{VI}Mo_{60}^{VI}O_{372}(CH_3COO)_{30}(H_2O)_{72}]$ $10(NH_4)CH_3COO^-$ $\sim 300H_2O$) functionalized with long alkyl chains. Four different linkers were used so that adsorption on graphene surface occurs, depending on the chain length and their quantity e.g. decyltrimethylammonium bromide (DTAB), dimethyldioctadecylammonium (DODA). Preliminary studies show that such novel membranes would be of great potential in a wide range of applications.

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A Byte to Eat: Synergetic Homeostatic Environments

Lucy Mills, Gregory Oldham, James Atkinson

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By 2020 ICT demand in the UK is expected to treble, information is becoming increasingly virtualised; as a result the demand for secure facilities for data storage is predicted to grow rapidly in the next 4 years and beyond. At the same time our demand for food is also growing, food poverty levels in the UK are currently at an all-time high, and with food prices rising and self-sufficiency falling both consumers and producers are feeling the pinch.

But what connects these two vastly different issues of supply and demand? The answer is waste. Currently most data centres produce oceans of heat almost equivalent to the enormous amounts of electricity these energy intensive facilities consume, and currently this low-grade, potentially usable heat is expelled into the atmosphere.

What if we were to harness this heat and use it for to greater effect? Examples already exist which prove data centres are capable of heating entire botanical gardens1 and even swimming pools2, but what if we were to use this heat to address the food problem the UK faces by using it to grow tropical fruit and vegetables here in the UK, out of season, increasing self-sufficiency and cutting the carbon emissions associated with transportation.

Our project explores how these two homeostatic environments: data centres and urban farms, can be interconnected in a synergetic system which maximises waste resources and renewable energy technology to produce a closed loop, self-sufficient system of data and food production from renewable resources. We have built a numerical model which is capable of calculating the required input of racks and

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their densities and surface are of greenhouse, in order to give the approximate yield per harvest for non-native fruits and vegetables.

We chose Manchester as the flagship location to bring eco-tourism into the city centre and express the city's commitment to digital and sustainable industries ; creating an exciting architectural vision of what the City's future could look like and where better to showcase this than at ESOF!

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Public Engagement through Fisheries Visualization

Luz K. Molina

Manchester Metropolitan University, Manchester, United Kingdom

The amount of data in natural sciences is so massive, that sometimes, even researchers have a hard time grasping the key elements of it (Wong, 2012). To facilitate the understanding of these data, visualizations have been generated and presented to the public online. No research has looked into what happens to the viewer after they see or interact with a visualization (Lambert, 2016). The aim of this project, is to find out if visualizations invite the public to search more about a topic. The main hypothesis of this research is that interactive visualizations on fisheries are inviting the public to look deeper into fisheries issues. Furthermore, previous studies have determined a relationship between viewers and their attitudes before seeing a visualization (Vikram Pandey, *et al*. 2014). So this study will also analyze if viewers with higher involvement in fisheries will look deeper into fisheries issues, after interacting with a visualization. Visualizations will be created with D3.js, a JavaScript library for manipulating documents, based on data. The research will have three stages. One online that will be broadcast through social media, blogs and a website (Vande Moere *et al*. 2012). The purpose is to reach as many people as possible. The clicks of people interested in further information will be counted. This stage is directed to the public that do not like to respond surveys. The second stage will be a survey. This survey will be filled online using BOS. It will ask for demographic information of the responders and what interests them in fisheries. It will also ask them specifically, if they are interested in knowing more about a specific topic explored in one of the visualizations. The final stage will be a personal survey taken at aquariums, to get further feedback from the public.

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Targeting Influenza A: A New Class of Antivirals

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Influenza A is a contagious respiratory disease that results in increased morbidity on a global scale.[1] The pandemics of 1918 H1N1 (Spanish flu), 1957 H2N2 (Asian flu), 1968 H3N2 (Hong Kong flu), 2005 H5N1 (bird flu), and 2009 H1N1 (swine flu) involved the appearance of virus strains for which there was little resistance in the human population, causing high levels of illness. Besides pandemics, seasonal influenza has substantial economic costs in terms of hospitalizations and sick leave.

Influenza A virus is an RNA virus enclosed within a lipoprotein envelope. This envelope contains two types of integral membrane glycoproteins, the hemagglutinin and the neuraminidase. The hemagglutinin is a lectin which binds specifically to cell-surface receptors bearing terminal sialic acid residues; mediating the viral entry in the host cells before virus replication. The neuraminidase is an enzyme that cleaves the sialic acid receptors on host cells and is responsible for the mobility and spreading of the virus. The emergence of resistant influenza A neuraminidase strains underscores the growing demand for the development of new antiviral drugs with novel structural motifs and/or substitution patterns. The communication presents the design and of a new class of neuraminidase inhibitors, constrained oseltamivir analogues based on byciclic scaffold.[2] Functionalization with the aim of reaching an additional binding site, the neuraminidase 150-cavity[3] was also exploited. Inhibition assays

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demonstrated low micromolar inhibition against both group-1 (H5N1) and group-2 (H9N2) influenza neuraminidase subtypes. Although the novel inhibitors are not highly potent compared with existing drugs, we validated the design of a rigid bicyclic analogue and we will present critical points that need to be addressed in order to improve potency.

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Network Optimization for Wireless Communications

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Wireless communications have become an important part of modern life. The ubiquitous wireless networks and connections require exponentially increasing data traffic. In view of this, wireless network optimization, which aims at utilizing the limited resource, especially spectrum and energy, as efficiently as possible from a network perspective, is essential for performance improvement and sustainable development of wireless communications. We study one fundamental problem of wireless network optimization, link activation, with a novel extension incorporating new technologies of interference management. The results show that cooperative transmission and interference cancellation result in a synergy that significantly improves the number of concurrently active links. Since link activation is a key elements of access coordination in wireless communications, the study opens up new approaches that significantly improve network performance, and eventually benefit practical applications.

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Spatial Characterization of Inflammatory Responses in Human TB Granulomas

Mohlopheni J Marakalala, Kirti Sharma, Yanjia J Zhang, Ravikiran M Raju, Brendan Prideaux, Eliseo A Eugenin, Laura E Via, Clifton E Barry 3rd, Matthias Mann, Veronique Dartois, Eric J Rubin

University of Cape Town, South Africa

Tuberculosis (TB) remains a leading global health problem that is aggravated by emergence of resistant strains, which account for increasing number of treatment-refractory cases. In order to eradicate this disease, there is a need for development of better therapeutic strategies (1). Granulomas, which represent the pathological hallmark of TB, are comprised of impressive arrangement of immune cells that serve to contain the invading pathogen. However, granulomas can also undergo some changes, developing caseums and cavities that facilitate bacterial spread and disease progression (2). To characterize different stages of TB disease progression, we used granulomas from lung tissues of patients who had undergone surgery for severe lung damage. Using Laser Capture Micro-dissection, we isolated different granuloma types that represent disease progression namely, solid, caseous and cavitary granulomas. We analyzed the different granuloma types/regions by Mass Spec and proteomics. Our results show that caseums of the granulomas were enriched with pro-inflmmatory pathways, including inflammatory mediators in the arachidonic acid pathway, while cellular regions of granulomas were enriched with anti-inflammatory pathways. Expression profiles of candidate pro-inflammatory proteins, including LTA4H and TNF, were confirmed by immunohistochemistry staining and confocal microscopy (3). Our data indicate that overwhelming inflammatory responses may drive granuloma collapse and tissue destruction during disease progression. Such responses can be targeted for development of host-directed therapies.

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PRIDE: Drivers of Pontocaspian Biodiversity Rise and Demise

Sabrina van de Velde

Naturalis Biodiversity Center, Netherlands

The Pontocaspian region houses a unique anomalohaline lake system that evolved in the past two million years. Its biota became adapted to the dynamic and unusual salinity regimes resulting in the development of a species rich mostly endemic fauna (Kostianoy et al., 2005). Since the beginning of the 20th century anthropogenic activities such as habitat destruction, invasive species and pollution have resulted in a major decline of these so-called Pontocaspian biota. The Marie-Curie funded PRIDE project analyzes the evolution and demise of lakes and Pontocaspian biota in the Black Sea and Caspian Sea by combining climate-, geo- and biological approaches.

My research focuses on the evolution and biodiversity of mollusc faunas (gastropods and bivalves). Several introduced species, such as Mytilaster minimus and Abra segmentum among others, are now rapidly replacing endemic Caspian species. Despite efforts to examine the effect of introduces species by humans, incomplete research of historical fauna compositions are limiting the analysis of the magnitude of the biodiversity crisis (Grigorovich et al., 2003). The aim of my first project will be to establish a natural baseline to compare the biodiversity in natural and anthropogenic-influenced Caspian populations. An in-situ fauna sample of Selitrennoye (Russia) from the last interglacial provides a snapshot of a natural near shore Caspian assemblage c 120 kA ago. The fauna composition and diversity will provide a natural baseline for comparison of the biodiversity of modern Caspian coastal assemblages.

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Night Shifts in the Nocturnal City of the Future

Iulius-Cezar Macarie

Central European University, Budapest, Hungary

This poster explores the difficulties posed by past legacies, such as diurnal ethnography as the dominant point of reference in anthropological research. When testing and navigating in the darkness with the nocturnal participant observation to examine the complex subjectivities of migrants nightshifting at the market, nocturnal fieldwork puts great strain on the ethnographer's diurnal life. Both, the corporeality on the ethnographer's body and mind, and the methodological puzzles that awaits her/him are explored, addressing:

(a) At which point can s/he say that they get used to the night rhythms of life in-out of the research that s/he conducts? When should the researcher pull out of the field, conscious of the tiredness? How does tiredness affect the chances of gathering useful material?

(b) By turning native (Wacquant, 2014), i.e. living an antithetic way of life to diurnal creatures – just like my respondents I too have my boots and hands dirty while I load produce or drive the forklift around the market, six nights per week, on 10.5 hour shift, with 5 hours day sleep. Depth of participation and length in the field, and being up and working at night made me empathetic with the workers' precarity, which perhaps affected my power of observing the less-visible forms of solidarity or competition. Or their reactions sometimes helped or other times hindered my nocturnal investigation?

The poster highlights the aspects of such method (Wacquant, 2000/4) used to capture the workers of the nocturnal cities of future, invisible otherwise to the diurnal eye and mind.

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The MCAA Poster Stand, ESOF2016

Pictures and testimonials

Matt Wilkinson Photography for ESOF 2016

Participating in The MCAA Poster Stand for Young Researchers at ESOF 2016 was a wonderful experience. Next to the networking opportunities it brought to me, it also allowed me to learn how to communicate my research to a very broad audience. Showing information is just giving out, but communication is getting through (Sydney Harris, journalist 1917-1986). Thanks MCAA for this exciting event, I look forward to ESOF 2018 in Toulouse!

Brigitte Devocht, Belgium
Ghent University

It was great opportunity to meet with other scientists, exchange ideas and create long lasting collaborations. In addition it was inspiring to see and discuss other hot science topics provided both by young researchers and well known scientists.

Marios Markoulides, UK, *University of Oxford*

We were particularly glad to host brilliant young talents from far parts of the world!

Mohlopheni Jackson Marakalala, South Africa, *University of Cape Town and Harvard University*

(Photo credits: S. Krstic)

It was a great honor for me to attend the 7th EuroScience Open Forum (ESOF) as a EuroScience-Bosch grantee and present my poster at the MCAA Poster Stand. My sincere thank you to the organizers in affording me this unique opportunity to present and discuss my work with an international audience composed of researchers, academics, journalists, and business professionals. I was impressed by the range of ground-breaking projects presented that also provided me with a glimpse into the research landscape of early-career researchers in Europe.

I will carry fond memories from ESOF 2016, cherishing always the passionate and talented people I met and the valuable lessons I learned..

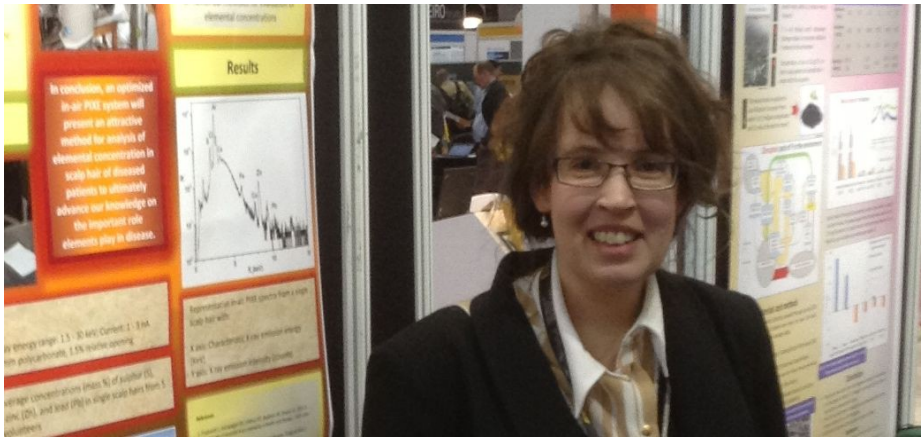
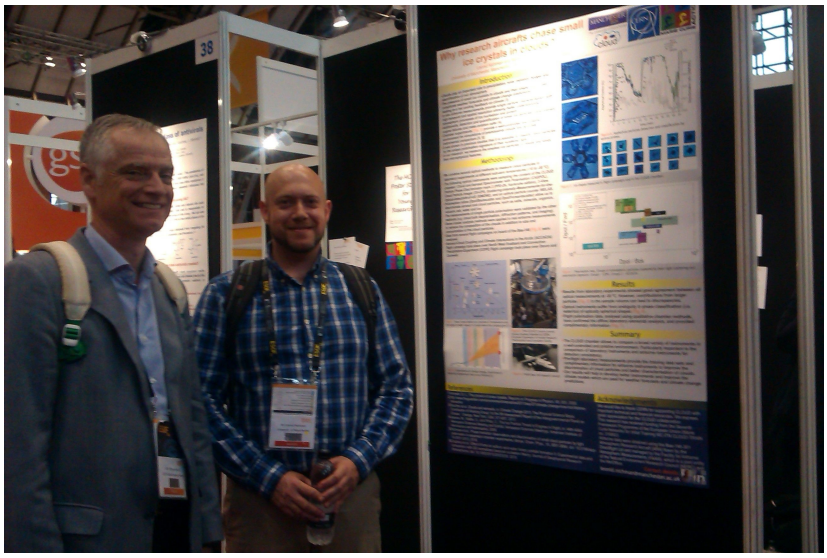


Photo credits: K. Cloete

Karen Cloete, South Africa
iThemba Laboratory for Accelerator Based Sciences
National Research Foundation

Given the great opportunity to participate at the MCAA poster stand at ESOF, I was able to communicate my research with diverse visitors that included scientists, journalists, business leaders, policy makers and politicians from different countries. Eventually, my network has been extended to include potential collaborators.

Zeinab El Maadawi, Egypt, *Cairo University*

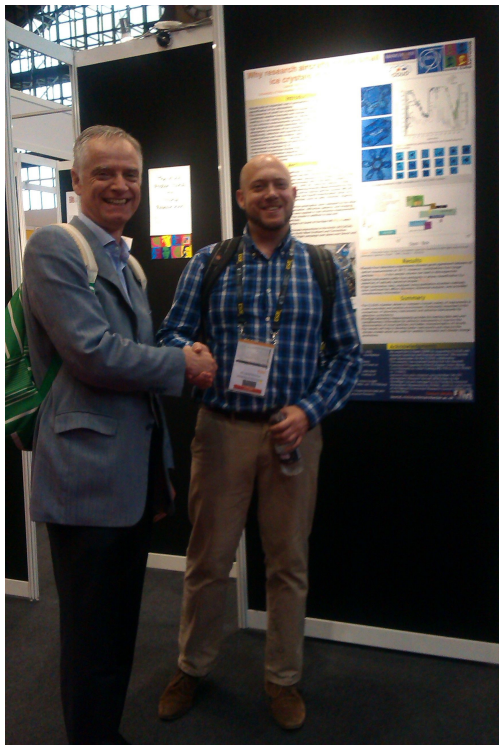


Communicating science to policy makers: **Leonid Nichman**, The University of Manchester and **Carthage Smith**, OECD

Photo credits: S. Krstic

It was a great opportunity that allowed me to share my research with the general public and key figures among European policy makers. I learned from my colleagues about other projects in the network but mostly I met new people and made new friends. Together, we shared our future career plans and experiences from our PhD life.

Leonid Nichman, UK
The University of Manchester



Matt Wilkinson Photography for ESOF 2016

Science and arts

Author: ***Iulius-Cezar Macarie, Hungary***
Central European University

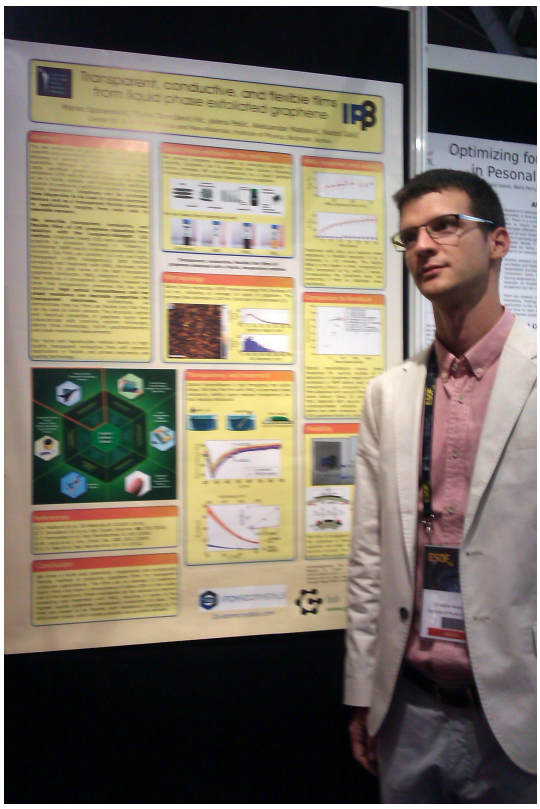


Photo credits: S. Krstic

Marko Spasenovic, Serbia
Institute of Physics

I liked very much the ESOF conference, and I would like to attend again in the future!

Jose Juan Rodriguez Henriquez, Germany
Brandenburg Technical University

It was a great opportunity for me to be able to present my work at the ESOF conference.

Eduardo Nicolas Schulz, UK
University of Birmingham

Excellent organization and great opportunity to expand knowledge in various areas of life.

Dawid Pakulski, Poland
Adam Mickiewicz University in Poznań

Photo credits: S.Krstic

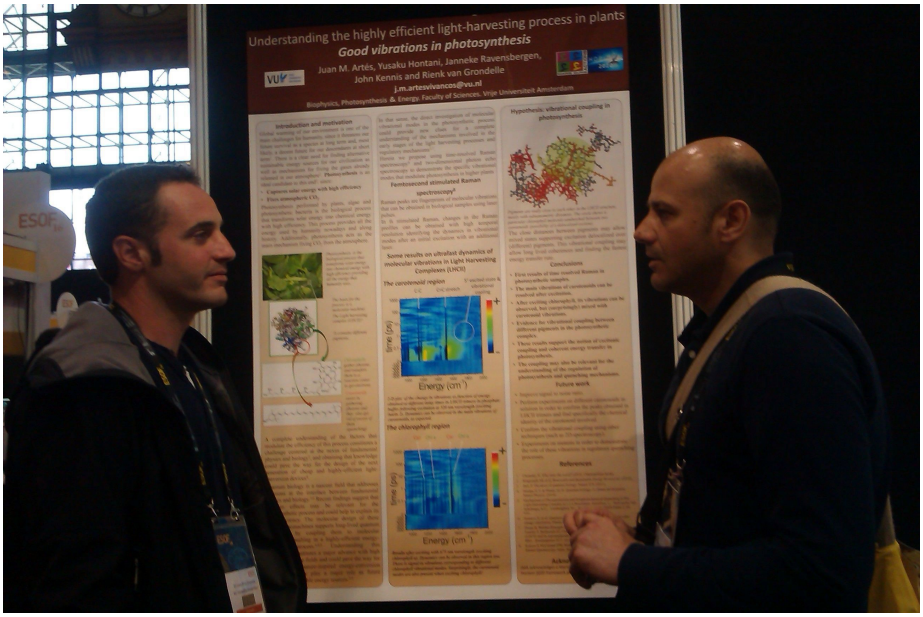


Photo credits: S. Krstic

Photo credits: A. Ibrahimi

I think that the MCAA poster Stand was a pretty good initiative in order to show the work of young researchers.

Carlos Eduardo Flores, Portugal
University of Porto

ESOF was a great opportunity to see what is going on beyond my field, what are the big challenges, how they could be addressed.

Petra Dunkel, France
Université Paris Descartes

Matt Wilkinson Photography for ESOF 2016

See you at the next ESOF event!

Matt Wilkinson Photography for ESOF 2016

About the Authors

1 ***Petra Dunkel***

Petra Dunkel was born in Budapest (Hungary). She obtained her Doctor of Pharmacy degree and her PhD in pharmaceutical sciences from Semmelweis University (Budapest, Hungary). She is currently carrying out research in organic chemistry as a Marie Curie postdoctoral fellow at Université Paris Descartes (France), under the supervision of Dr. Peter I. Dalko, on photoremovable protecting groups.

2,3 ***Yoran Beldengrün***

Yoran Beldengrün is a Swiss PhD Student in drug delivery, working in Barcelona at the Institute for Advanced Chemistry of Catalonia (CSIC). His research focuses on encapsulating enzymes into microgels for targeted delivery to the intestine, aiming at improving medication for lactose intolerant persons.

He is founder of the Scientists' Dating Forum, which is a young and independent think tank which aims to bring scientists together and support education, debates and activism regarding how science influences politics, economics, society and vice-versa.

Furthermore he participated in Famelab Spain 2016 and has been continuously involved with various NGOs. In 2014 he completed a work experience placement at UNESCO, in the field of Science Policy & Capacity Building.

Yoran holds a Master's in Biomedical Engineering and a Bachelor's in Pharmaceutical Sciences from the ETH Zürich.

4 ***Magdalena Bielawska***

Magdalena Bielawska is a Doctoral Researcher and Associate Professor of Economics at the University of Malaga (Spain) as well as Visiting Researcher at Manchester Institute of Innovation Research (UK). She specialised as an economist of innovation, having previously completed two separate Master's degrees focused on Innovation & Technology Management.

5 ***Ruth Carbajo***

Ruth Carbajo is a science graduate with a BA and MA in Chemistry, and is currently a PhD student at GREA Advanced Energy Research group in University of Lleida, Spain. With eight years' experience, she is a specialist in outreach and diffusion in museums, education

centres and institutions and is passionate about public engagement and e-learning. Her fields of research are responsible research and innovation methodologies applications and the social dimension of renewable energy research and policies.

6 ***Manar Aoun***

Carlo Besta Institute Milan, Italy

7 ***Qiong Shen***

Faculty of Engineering, University of Nottingham, United Kingdom;
School of Chemistry and Chemical Engineering, SUN Yat-Sen University, Guangzhou, P. R. China;
Guangdong Province Key Laboratory of Functional Molecules in Oceanic Microorganisms (Sun Yat-Sen University), Bureau of Education of Guangdong, Guangzhou, P. R. China

8 ***Omar Costilla Reyes***

Omar Costilla Reyes specialises in the fields of machine learning and sensors systems, perception for robotics and wireless sensors networks. Omar is currently a PhD student in Electrical and Electronics Engineering at the University of Manchester. His research lies in the fields of machine learning and sensors systems for healthcare applications where he currently has published papers in recognised conferences and journals in the field. Omar obtained his Master's degree in Electrical and Electronics Engineering at the University of North Texas, Texas, USA. During his Master's he published papers in the areas of wireless sensors networks, machine learning for bioinformatics and robotics.

9 ***Giovanni Rinaldi***

Giovanni Rinaldi received his B.Sc. and M.Sc. in Applied Physics from the University of Messina, respectively in 2009 and 2012. In 2014, he received his M.Sc. in Renewable Energy with specialization in Ocean Energy and Offshore Wind. Giovanni is currently working as an Early Stage Researcher at the University of Exeter within the European program OceaNET. His work focuses on developing a reliability-based tool to reduce the operational and maintenance costs of Marine Energy devices.

10 ***Eduardo Nicolas Schulz***

Eduardo Schulz's career objectives were always focused on renewable energy production and storage, mainly from the point of view of electrochemistry and electrocatalysis, but working on the boundary between chemistry and chemical engineering. The main goal of his research is to find renewable energy solutions that can easily be scaled up and implemented at an industrial scale, thus producing a positive impact in society.

His previous training as a chemical engineer gave him a broader view of the renewable energy problem, which has allowed him to tailor his research, targeting industry and

society's needs more effectively with a major emphasis on scale up for immediate application. He uses a theoretical-experimental approach to allow him to first explore potential systems from a theoretical/computational simulation point of view, then to focus his experimental research on the most promising systems, thus saving time and resources while achieving optimal results. An additional benefit of this approach is gaining theoretical insights on the studied system, which enables the prediction of the system's behavior under lab conditions and therefore more accurate design of future experiments.

11 ***Leonid Ivonin***

Dr. Leonid Ivonin is a researcher at the University of Bristol. He holds an individual Marie Curie fellowship and works on an 'Optimising for Happiness in Personal Finance' project that explores how technology could be developed to enable users track how money is spent and help them take control of their personal finance by balancing income and expenses, and achieving financial goals through leveraging mobile, wearable and quantified-self systems to perform effective forecasting. He obtained a PhD cum laude at the Designed Intelligence group at the Department of Industrial Design at Eindhoven University of Technology, in which he developed a method to measure a person's unconscious emotions – highly relevant to understanding the user experience and patterns of behavior around financial products and services.

12 ***Niki Lambropoulos***

Dr. Niki Lambropoulos is an author and researcher on creativity, innovation and human computer interaction in education. She is a visiting senior researcher at the Human Creativity Unit, University of Patras, Greece and Smart Internet Technologies (SuITE), Computer Science and Informatics, School of Engineering, London South Bank University, UK. She holds a degree and a diploma in education from the Academy of Tripolis and the University of Athens in Greece, Master's in ICT in Education from the Institute of Education, University College London (UCL), and a PhD from London South Bank University in the UK. She has published widely in her areas of interest.

13 ***Jose Juan Rodriguez Henriquez***

Jose Juan Rodriguez Henriquez was born in Gran Canaria, Canary Island, Spain. He is currently studying for a PhD at the Brandenburg University of Technology Cottbus-Senftenberg in the Department of Thermodynamics of Reactive Systems in Germany. He is part of the ECCO-MATE (Experimental and Computational tools for Combustion Optimization in Marine and Auto-moTive Engines) project founded by the FP7-Marie Curie Action (Grant Agreement 607214). During this project he has had two secondments at the National Technical University of Athens and the National University of Ireland.

14 ***Anna Bratek-Skicki***

Dr. Anna Bratek-Skicki obtained her doctorate in chemical science from the Institute of Catalysis and Surface Chemistry (ICSC) Poland. She was awarded a postdoctoral fellowship from the Irish Research Council for Science, Engineering and Technology and worked at the Centre for BioNano Interaction at University College Dublin. She returned to the ICSC and worked within a European Project (FUNANO) to develop functional nano-and microparticles for biotechnological applications. Currently she is working as a Marie Curie Fellow at the Université Catholique de Louvain, Belgium where her research involves the development of novel materials and structures for controlling protein adsorption.

15 ***Metzner Aylin***

Aylin Metzner is a PhD student in the field of biomedical sciences. During her Master's degree, she investigated the role of retinoic acid signaling in the developing zebrafish inner ear at the University of Konstanz, Germany. She then decided to move to Sheffield as part of a Marie Curie Early Stage Research Fellowship to investigate the kidney disease ADPKD. Presently, she is working cross-departmentally at the University of Sheffield (United Kingdom) under the mentorships of Albert Ong and Freek van Eeden. More specifically, Aylin uses a zebrafish model of polycystic kidney disease to infer disease-driving mechanisms and to discover new therapeutic targets.

16 ***Afsoon Sadeghi Azadi***

Afsoon Sadeghi Azadi's work concerns finding novel signaling pathways in peroxisome proliferation as a part of the Marie Curie Initial Training Network, PERFUME (PERoxisome formation, FUnction, Metabolism). This has involved testing the effects of different external stimuli in order to discover new signaling pathways involved in peroxisome proliferation in mammals.

Due to his interest in science management and communication he accepted the role as Postgraduate Researcher Liaison Forum Representative for three years. During this period he was responsible for relaying feedback from the PGR students in his Department to the Director of Postgraduate Research. He was also involved in establishing a society for PhD students in order to organize series of events for biosciences students at Exeter University. This was initiated with a conference on Jun 16th (ExeBioCon-2015) for which all the PGR students in Biosciences were invited to send an abstract and participate.

17 ***Daniel Ojochenemi Apeh***

Daniel Apeh is currently Biochemistry Lecturer in the Department of Biosciences, Salem University, Lokoja in Nigeria. He is also in the research phase of his PhD programme at the Federal University of Technology (FUT), Minna, where he is specialising in Mycotoxicology. Before this, he studied in Ahmadu Bello University Zaria and FUT Minna (both in Nigeria). His previous research work was primarily in food safety and mycotoxin surveillance and includes; sampling and analysis of aflatoxin B1 in rice, sorghum, millet, sesame, fish feed,

diary feed, poultry feed and feed ingredients, aflatoxin M1 in breast milk, cattle and goat liver, cow milk, nono, cheese and fura. He also carried out preliminary screening for antifungal potential in a selected plant. He has bench experience from the IITA Ibadan mycology/mycotoxin laboratory. Daniel Apeh has a keen interest in scientific proposal writing and has been involved in applications for an EU Horizon 2020 grant, a Tetfund National grant, and others. He has several articles in press, about 12 conference papers and is a reviewer to a journal. Daniel Apeh is a proud mentee of Professor Hussaini Anthony Makun of the Federal University of Technology (FUT), Minna, Nigeria.

18 ***Teresa Gatti***

Teresa Gatti is a chemist, with major specialisation in organic synthesis and organic molecules characterisation. She obtained her Master's degree in 2008 from the University of Bologna (Italy) and her PhD in Materials Engineering in 2014 from Politecnico di Milano (Italy). She is currently a post-doc at the Department of Chemical Sciences of the University of Padova (Italy). Her major research interests are in the field of carbon nanostructures functionalisation and preparation of functional polymer nanocomposites for use in different applications, ranging from optoelectronics to sensors and biomedicine.

19 ***Juan Manuel Artes Vivancos***

Juan Manuel Artés Vivancos graduated in biochemistry and biotechnology from the Autonomous University of Barcelona in 2007. He obtained a PhD in the Physical Chemistry department of the University of Barcelona. He joined the University of California Davis in 2013, as a postdoctoral researcher in the electrical engineering department and conducted research of molecular electronics of biomolecules such as DNA and RNA. In 2016 he was awarded a Marie Sklodowska Curie individual postdoctoral fellowship to join the department of physics in VU Amsterdam to perform research in the biophysics of photosynthesis using ultrafast spectroscopies.

20 ***Marko Spasenovic***

Born in Belgrade, Serbia, in the middle of high school he immigrated to Canada, where he stayed until obtaining his MSc degree (University of Toronto). He obtained his PhD from the University of Twente (NL), working at AMOLF on near-field optics (his first Marie-Curie). Marko then went for two postdocs at ICFO in Spain, working on plasmons in graphene and optomechanical cooling of levitated nanoparticles (2nd MSCA). Since September 2014 he has returned to Serbia and works as Assistant Professor at the Institute of Physics in Belgrade, where he studies thin films of graphene and other novel "2D" materials.

21 ***Zeinab El Maadawi***

Zeinab El Maadawi (MD) is an associate professor of histology and cell biology and head of technology enhanced learning at the faculty of Medicine, Cairo University, Egypt where she works as medical educator, biomedical researcher and e-learning expert with evident experience in international education management. She has special interest in the field of stem cell research and regenerative medicine and received relevant postdoctoral training at the Institute of Cardiovascular Sciences, faculty of Medical and Human Sciences, University of Manchester, UK. She is also passionate about using the added value of emerging technologies to promote public communication of science and technology.

22 ***Joanna Cookney***

Joanna Cookney obtained an MSc Eng. (honours) degree in Chemical and Process Engineering from Poznan Polytechnic. Afterwards, she received an MSc by Research from Cranfield University working in collaboration with several leading water authorities on the recovery of dissolved methane from anaerobic low temperature domestic wastewater effluents, which will ultimately lead to energy neutral wastewater treatment. Currently, Joanna is finalising her PhD on ultrathin nanofilms as platforms for molecular separations and sensing. During her PhD Joanna has discovered three new synthetic molecules utilising them as continuous nanofilms showing great potential in comparison with state-of-the-art industrial thin films.

23 ***Leonid Nichman***

Leonid Nichman is a multidisciplinary scientist with a broad range of experience and expertise in laboratory and field measurement techniques. He received his B.Sc in Chemistry from Tel Aviv University and then proceeded with a M.Sc in Materials Science. He spent five years in the industrial sector (R&D Materials Chemist, Landa Labs/ Landa Corporation) before returning to the academy for his Ph.D studies in Cloud Microphysics at the University of Manchester/CERN. He supports applied research and has won numerous awards in enterprise idea competitions.

24 ***Vittoria Raffa***

University of Dundee, United Kingdom

25 ***Olatz Lopez-Fernandez***

Olatz Lopez-Fernandez is a PhD in Pedagogy and Psychology with European mentions by the University of Barcelona, and was awarded the Queen Sophia prize for best PhD studying addictions and a Marie Curie Fellowship for her ‘Tech Use Disorders’ project. At present, she is Senior Lecturer in Psychology at Nottingham Trent University (United Kingdom).

26 ***Marios Markoulides***

Marios obtained his undergraduate degree in Chemistry (BSc Hons) at the University of Manchester where he also stayed to obtain his MPhil with Prof Jim Thomas (synthesis of M3-receptor antagonists), and his PhD with Dr Andrew C. Regan focusing on synthetic methodologies towards the synthesis of phosphinate analogues of anti-cancer phospholipids. In 2010 he moved for postdoctoral work with Prof Nikos E. Chronakis at the University of Cyprus where he was involved with the synthesis of fullerene derivatives. In 2012 he joined the Department of Pharmacy of the Frederick University of Cyprus as a Visiting Lecturer, and in 2014 he moved to CEMES-CNRS in Toulouse to work with Prof Andre Gourdon on the synthesis of polyaromatic hydrocarbons (PAMS; FP7). Following a period as a Special Scientist in the Department of Chemistry of the University of Cyprus, Marios was then awarded a Marie Skłodowska-Curie fellowship to join (July 2015) the group of Professor Chris Schofield (FRS) at the University of Oxford. In the Schofield group, Marios has been engaged in the field of Antimicrobial Resistance, with the main focus to develop new protein-directed DC libraries towards the generation, identification and development of novel broad spectrum metallo-β-lactamase inhibitors.

27 ***Péricles Khalaf***

Department of Chemistry, Federal Technological University of Parana, Brazil;
School of Chemical Engineering and Analytical Science, The University of Manchester, United Kingdom.

28 ***Brigitte R. Devocht***

Brigitte Devocht graduated from the Sint-Lodewijkscollege in Lokeren in 2010 and initiated her chemical engineering studies at Ghent University. After obtaining her master degree in 2015, she started her doctoral research in the Laboratory for Chemical Technology, funded by the Fund for Scientific Research Flanders (FWO). Brigitte focuses on the development of software for automatic network generation for the catalytic conversion of renewable resources, under the guidance of Prof. Dr. ir. J.W. Thybaut and Prof. Dr. ir. G.B. Marin. Brigitte attaches great value to science communication to a non-expert audience.

29 ***Carlos Flores***

Carlos Eduardo de Bento Flores is currently studying for his PhD in Molecular and Cell Biology at the University of Porto, Portugal. His work has been developed at i3S – Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Porto, Portugal, in the Bioengineering and Synthetic Microbiology group (MicroBioSyn), headed by Prof. Paula Tamagnini. The main focus of his research is to study the biosynthetic pathways involved in the production of cyanobacterial extracellular polymeric substances (EPS) and the application of these polymers as antitumoral agents.

30 ***Karen Cloete***

Karen is a the current co-chair of the South African Young Academy of Sciences and is employed as a postdoctoral researcher on the biological applications of ion beam techniques at the iThemba Laboratory for Accelerator Based Sciences, National Research Foundation, South Africa. She has authored multidisciplinary international journal publications. She has also convened/lectured a module on writing and publishing scientific papers for MSc (MedSci) in Clinical Epidemiology and workshops on research supervision/project management, academic writing, and publishing/presentation. Her research has been highlighted in popular media, she has been the recipient of scholarships/grants, and she has also served on committees, as a reviewer, and as a consultant.

31 ***Valentin Diez***

University of Mons, Belgium

32 ***Rosa Busquets***

Rosa Busquets is a senior lecturer at Kingston University London, Department of Chemistry, Kingston upon Thames, UK. Her current research is devoted to the remediation and analysis of pollutants in the environment, and also includes interdisciplinary studies in biomaterials, nanotoxicology and food science. Rosa has been Marie Curie Intra European Fellow at the Nanoscience and Nanotechnology group of the University of Brighton (2011-2013) and Industry Academia Partnership and Pathways Marie Curie fellow at MAST Carbon International Ltd. (2009-2011). Rosa had been Assistant Professor in the Analytical Chemistry Department of the University of Barcelona (2005-2011), following the completion of an MRes, Diploma of Advanced Studies and European PhD (2001-2009) in the areas of chromatography-mass spectrometry and the Maillard reaction.

33 ***Dawid Pakulski***

Dawid Pakulski is an early-career researcher (PhD student) at the Adam Mickiewicz University in Poznań, Department of Chemistry, Poznań, Poland.

34 ***Lucy Mills*** *(co-authors: Gregory Oldham, James Atkinson)*

Lucy, Gregory and James are Masters of Architecture graduates from the University of Liverpool, currently working in architectural practice in London and Manchester. In 2013 they commenced their thesis project as a final element for their Master's Degree. Each was keen to focus on sustainability, specifically to explore the parallels between the growth of Data Centres and the need for more sustainable food sources in the face of increases in population; specifically this involved developing the idea for a Urban Farm fueled by the waste heat from Data Centres. They also sought a city centre location to combine the two interests and to be able to deliver the services directly to those who

need them. To begin with, they visited live data centres and urban farms across the Northwest of England to understand the requirements of both industries and then began to explore several prototypes both in terms of structure and design. They also selected an underutilised but prominent site on the approach to Manchester city centre, Potato Wharf. During the process they gained the support of the University's Green Guild and later won the Green Start-Up Award for their proposal.

After a year of developing their scheme they produced a design which imagined how such a centre could look and operate together with a detailed report on their research. Their work was later displayed at the Architecture School Degree Show in 2014 and used by the University Green Guild as an exemplar project for future students in 2015. If you would like to find out more about their project and research, please see contact details below.

Contact Details
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Linked in: https://uk.linkedin.com/in/lucy-mills-691a7053 , https://www.linkedin.com/in/gregory-oldham-04853237 , https://www.linkedin.com/in/james-atkinson-22a0b39b

35 ***Luz K. Molina***

Luz Molina is a Colombian Scientist with a BSc. in Biology from Universidad de los Andes. While studying she felt an inclination for the study of water bodies. She did surveys of the Amazon and Orinoco Rivers. Later she completed an MSc. in Marine Science at The University of Southern Mississippi. Molina then gained experience doing field work and lab work analyzing phytoplankton strains. This work resulted in data that required analysis and synthesis, before later being presented to other scientists and the public. This need to communicate science to the masses pushed her to learn data visualisation. She is currently studying for a PhD is in Fisheries Visualisation.

36 ***Cinzia Colombo***

Cinzia Colombo is a post-doctoral fellow working on the design, synthesis and evaluation of potential neuraminidase inhibitors for the treatment of the influenza virus. She is funded by a Marie Curie International Outgoing Fellowship (MC-IOF-FP7). She worked on the project for two years at the Simon Fraser University (SFU, Canada) and she is now continuing it at the Università degli Studi di Milano (UNIMI). She is interested in all aspects of organic and medicinal chemistry, with a special focus in glycoscience, protein-protein interactions, small molecules-protein interactions of relevant biological targets present on cells and bacterial and viral surfaces.

37 ***Qing He***

Qing He is a PhD student in the division of Communications and Transport Systems, Department of Science and Technology, Linkoping University, Sweden. Her research area is Mobile Telecommunications, with the focus of network optimisation on wireless networks. She is also a researcher in EU project MESH-WISE, founded by FP7 Marie Curie action.

38 ***Mohlopheni Jackson Marakalala***

Mohlopheni is a Senior Lecturer at the University of Cape Town (UCT), and a Visiting Scientist at Harvard University. He obtained his PhD in Chemical Pathology (UCT) in 2008, receiving the Bronte Stewart most meritorious PhD award. He completed his postdoctoral fellowship in Infectious Diseases at Harvard School of Public Health, USA. Mohlopheni is a Next Einstein fellow, and was honoured as a Young Scientist at the 2015 World Economic Forum. His research is aimed at developing better therapies against TB, and has published in a number of leading journals, including Nature Medicine, PNAS, Plos Pathogens, and Cell Host Microbes.

39 ***Sabrina van de Velde***

Sabrina van de Velde is an Early Stage Researcher at the Naturalis Biodiversity Center (Leiden, the Netherlands). Her research career started in 2007 when she graduated from her BSc in Science Based Archaeology, with a focus on palaeontology. To extend her knowledge on ecology and biodiversity, she studied BSc Ecology and Conservation Biology (2008-2011) and wrote her thesis in the Rocky Mountains on pollination networks. After that she joined a research team to work one year on endemic plant-pollinator communities in the Seychelles. She decided to write her MSc thesis in Finland on biodiversity and after that realised she wanted to continue working in the field where archaeology and biology overlap: reconstructing environments. Right now she is part of the Marie Sklodowska-Curie funded PRIDE project where she reconstructs the Quaternary Pontocaspian mollusk fauna to make stratigraphic subdivisions and reconstruct palaeoenvironments.

40 ***Iulius-Cezar Macarie***

Iulius-Cezar Macarie is an INTEGRIM Marie Skłodowska-Curie Actions Fellow with the Centre for Policy Studies, and also a PhD Candidate in Socio-Anthropology at the Central European University, Budapest. As Nightlaboratory collaborator and filmmaker, he co-directed Invisible Lives with Tim Marrinan (UK, 2013).

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About the Reviewers – Scientific Committee

Aksam Merched, The University of Bordeaux, MCAA, France

Dr Aksam Merched earned a French PhD in Clinical Biochemistry in 1998. He then continued his career at Baylor College of Medicine in Houston studying molecular and cellular aspects and inflammation in cardiovascular diseases. In 2013, he accepted a full Professor position at the University of Bordeaux, France, leading the Pharmacy Laboratory of Cell Biology. In parallel, he is conducting research at the INSERM (Biotherapy of Genetic and Inflammatory Diseases and Cancer). His research projects aim at understanding the contribution of inflammation in cardiovascular diseases and liver cancer. He has published more than 35 research papers and book chapters.

Conor O'Caroll, Independent consultant, Ireland

Dr O'Carroll is currently an independent consultant on Research and Higher Education Policy and Funding and Chair of the European Steering Group on Human Resources and Mobility focusing on researcher career development as part of the European Research Area (ERA). He has led the development of the European Framework for Research Careers (EFRC) and the Principles for Innovative Doctoral Training (PIDT).

He is a physicist by training with a B.Sc. and M.Sc. in Mathematical Physics from University College Dublin. He was a Marie Curie PhD Fellow at the EC Joint Research Centre in Ispa, Italy. He has been internationally mobile having done his doctoral research in Italy and worked for both academia and industry in Ireland, Scotland and Germany.

Dr O'Carroll has wide experience of research funding programmes and peer review having been responsible for running evaluation panels in the European Commission (Marie Curie Programme) and for two funding agencies, Enterprise Ireland and Science Foundation Ireland. In 2014, he was Advisor to the Government of Montenegro on developing new programmes to retain researchers.

He has served as a panel Chair and reviewer on national and international programmes including the Health Research Board, Irish Research Council and the European Commission Horizon 2020 programme (Societal Challenge 6, European Research Council and Marie Sklodowska Curie). He was chair of the Marie Sklodowska Curie COFUND Doctoral Panel in 2014 and 2015.

Paul Cunningham, The University of Manchester, ESOF2016 Delivery Team, UK

Editor, details available on the Editors' page.

Lisa Dale-Clough, The University of Manchester, UK

Lisa Dale-Clough is an innovation studies scholar based at Manchester Institute of Innovation Research (University of Manchester) since 2014. Her research cover public sector innovation; innovation systems; innovation management, and science, technology and innovation policy. Before completing her Doctoral research at University of Birmingham Lisa worked in public policy and consultancy. Lisa was also Science Programme Officer of ESOF2016.

Alaa Ibrahim, The American University in Cairo, Egypt

Dr. Alaa Ibrahim studied and worked at NASA, MIT, George Washington University, University of Maryland, and has been associate professor and director of outreach and the astronomical observatory at the American University in Cairo then at Zewail City of Science and Technology. As a scientist, he utilises satellite and ground-based observations to study the physics of the Universe and Earth's atmosphere. His work includes the discovery of a new neutron star and first decadal survey of air pollution over Egypt. As a professor and educator, he is passionate about enriching education and building capacities in science through experiential, project-based and community-based learning. As a science communicator, he develops programs of outreach and lifelong learning to society. His awards include the best PhD thesis award by George Washington University, the Fulbright Scholar Fellowship, the American University in Cairo Dean and Provost Awards, and Cairo University Achievement Award. He is fellow of the Egyptian National Academy of Science. His advisory roles include Euro-Science Open Forum, Egyptian and U.S. National Academy of Sciences. As an avid lifelong learner, he enjoys scuba diving, amateur/ham radio, photography, and model aircraft aviation

Diana Malpede, UNESCO, France

Diana Malpede holds a post-graduate degree in science policy and transfer of technology. As specialist in science policy, Malpede's areas of expertise include the interconnections between science and policymaking; the politics and practice of scientific advice, particularly in relation to the parliaments; transdisciplinarity, participatory governance, multi-stakeholder dialogue in STI policy, including the media and the wider public, science diplomacy, public engagement in STI. Malpede also has also extensive experience in science and gender issues as well as in the involvement of young scientists in policy making.

Prior to joining UNESCO, Malpede has served as policy specialist to EU and OECD and has contributed to a wide range of projects relating to science policy and innovation.

Ms Malpede is author or co-author of numerous publications/ articles in the field of science policy and governance.

Snezana Krstic, Independent consultant, MCAA, Serbia

Editor, details available on the Editors' page.

About the Editors

Snežana Krstić (Ph.D., M.Sc., B.Sc.) is the Founding Chair of the Marie Curie Alumni Association, the international association based in Brussels, where she chaired the Board and Executive Committee in the period 2013-2016. Her main background is in chemical engineering and environmental management and her interests encompass a wide range of issues at the intersection of science, society, policy and innovation. She has actively participated in European research and higher education policies for many years and is an Ethics Expert in the H2020 Ethics Appraisal Scheme. As an independent expert, she has provided consultancy and expertise to numerous European organisations, institutes, agencies and departments. She has several years of experience in media and in national broadcasting. She has been an invited speaker at numerous European and international conferences and workshops, cooperating with the European Commission, UNESCO, World Science Forum, NISTEP (Japan), and many other distinguished organisations and teams. She was a member of the ESOF 2016 Careers Committee and holds several international and national awards for scientific achievements and excellence.

Paul Cunningham (Ph.D., B.Sc.) is a Senior Research Fellow and Director of the Manchester Institute of Innovation Research (MIOIR) at Alliance Manchester Business School, University of Manchester. With over 30 years in the field of STI Policy Studies, his research interests now encompass a wide range of science and innovation policy-related fields. He has undertaken numerous evaluations, reviews and studies for a wide range of bodies including UK Government departments, UK Research Councils, the British Council, the European Commission, the European Parliament, OECD, European Space Agency, and a range of foreign government departments and other agencies. His work has been influential in the development and formulation of STI policy at a variety of levels, within and outside of the UK. His recent activities include his secondment in the role of Programme Manager for ESOF 2016 in which he was chiefly responsible for the planning, development and delivery of the complete scientific programme and careers programme.

We look forward to seeing you at the next ESOF!

MARIE CURIE
ALUMNI
ASSOCIATION

The Marie Curie Alumni Association (MCAA) is an international organisation based in Brussels gathering together researchers who have benefited or are still benefiting from the European Commission's Marie Sklodowska Curie research programmes. The association promotes cooperation among members from different countries, disciplines and sectors, provides further opportunities for their professional development and establishes fruitful cooperation with other organisations and research community in Europe and throughout the world.

These proceedings are an outcome of a fruitful cooperation with the EuroScience Open Forum – ESOF2016 and its parent organisation EuroScience. It represents a contribution to European and global efforts to meet societal challenges by developing human resources at the early stages of their careers, by highlighting their remarkable ideas and accomplishments, and by promoting their mutual understanding and cooperation between different projects, disciplines, sectors of economy and across the world.

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MARIE CURIE ALUMNI