MARIE CURIE ALUMNI

GENERAL ASSEMBLY OF THE MARIE CURIE ALUMNI ASSOCIATION

BOOK OF ABSTRACTS

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FOREWORD

Dear Members,

This publication makes public abstracts presented at the General Assembly and Annual Conference of the Marie Curie Alumni Association (24 to 25 March 2017, Salamanca, Spain).

Browsing through the different abstracts underlines the huge diversity in our Members' areas of study (Life sciences, Engineering, Mathematics, Chemistry, Physics, Environmental Sciences, Economics, Social Sciences, Humanities and Arts). If you would like to know more about one of these research topics, feel free to contact the author directly via the MCAA web-portal.

Happy reading!
Yours,
The MCAA team

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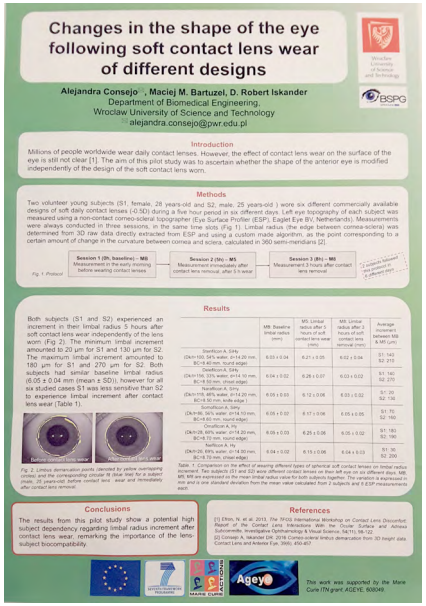
Changes in the Shape of the Eye Following Soft Contact Lens Wear of Different Designs

Millions of people worldwide wear daily contact lenses. However, the effect of contact lens wear on the surface of the eye is still not clear. The aim of this pilot study was to ascertain whether the shape of the anterior eye is modified independently of the design of the soft contact lens worn. Two volunteer young subjects (S1 and S2) wore six different commercially available designs of soft daily contact lenses during a five hour period in six different days. Left eye topography of each subject was measured using a non-contact corneo-scleral topographer (Eye Surface Profiler (ESP), Eaglet Eye BV, Netherlands). Measurements were always conducted in the same time slots. Before lens insertion, immediately after lens removal and finally 3 hours after lens removal. Limbal radius (the edge between cornea-sclera) was determined from 3D raw data directly extracted from ESP and using a custom made algorithm, as the point corresponding to a certain amount of change in the curvature between cornea and sclera, calculated in 360 semi-meridians. Both subjects experienced an increment in their limbal radius 5 hours after soft contact lens wear independently of the lens worn. The minimum limbal increment amounted to 20 µm for S1 and 130 µm for S2. The maximum limbal increment amounted to 180 µm for S1 and 270 µm for S2. Both subjects had similar baseline limbal radius (6.05 ± 0.04 mm (mean ± SD)), however for all six studied cases S1 was less sensitive than S2 to experience limbal increment after contact lens wear. The results from this pilot study show a potential high subject dependency regarding limbal radius increment after contact lens wear, remarking the importance of the lens-subject biocompatibility. (Note: this pilot study is a part of a major study entitled 'Corneo-scleral limbal changes following short-term soft contact lens wear')

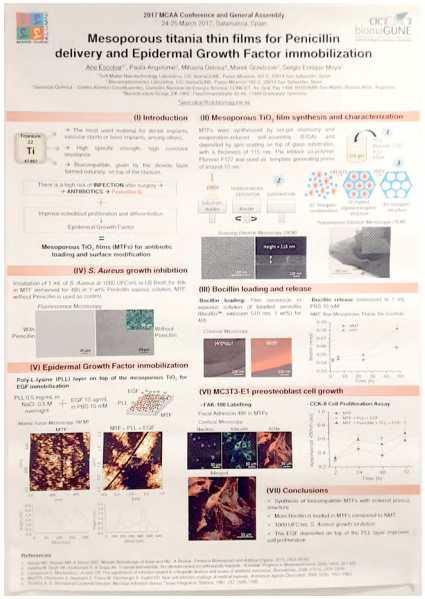


Author(s): Alejandra Consejo, Maciej M. Bartuzel, D. Robert Iskander

Organisation: Wroclaw University of Science and Technology

Mesoporous titania thin films for Penicillin delivery and Epidermal Growth Factor inmobilization

Successful delivery of antibiotics to the media after the surgery can significantly improve the antibacterial capacity of bone-anchoring implants. Spurred by excellent structural properties, that is, high surface area and accessible free volume, mesostructured films have shown great potential in drug delivery for orthopedic application. This work deals with the synthesis of mesoporous titania films (MTF) through sol-gel chemistry and evaporation-induced self-assembly (EISA) process to show the inhibition of bacterial colonisation and promotion of cell proliferation. Structural characterization of the films revealed that the pore size and the film thickness were 12 nm and 100 nm, respectively, as confirmed by Electron Microscopy characterization - Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM) -. To study the antibiotic loading and release, we used Penicillin G and Bocillin™ (Labelled penicillin) as model antibiotic, the Staphilococcus aureus strand was used to evaluate the effectiveness of the penicillin loaded films toward inhibiting bacterial colonization. Moreover, images taken by Confocal Fluorescence Microscopy using labeled vinculin, showed good adhesion of the MC3T3-E1 cells to the MTFs, as well as complex actin filaments arrangement. In order to improve cell proliferation a Polylysine (PLL) layer was adsorbed on top of the mesorpous film, to deposit Epidermal Growth Factor. The adsorption of the protein was proved by Atomic Force Microscopy (AFM), showing a roughness of 2nm, which is higher when compared to the bare MTF, proved to be of 0.6nm. In summary, this study shows that controlled surface modifications of MTFs improves both, antibacterial effect and cell growth.

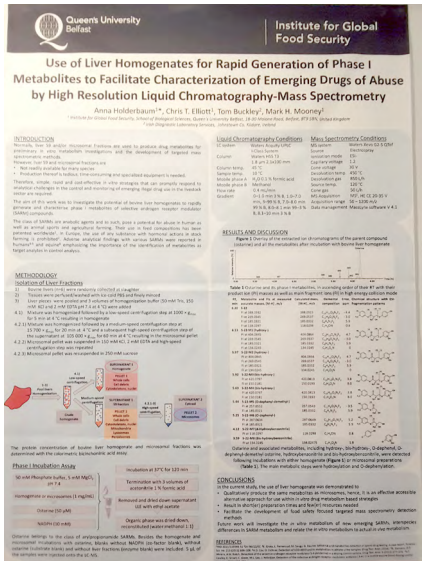


Author(s): Ane Escobar, Sergio Moya, Marek Grzelczak, Paula Angelomé, Mihaela Delcea

Organisation: CIC BiomaGUNE

Utilisation of In Vitro Strategies to Rapidly Predict the Metabolism of Emerging Anabolic Drugs in Food and Sports Animals

A plethora of cases of drug abuse to promote growth in livestock species and to enhance performance in racehorses are well documented within the scientific literature. An ever new and expanding range of drugs of potential abuse, such as selective androgen receptor modulators (SARMs) and related compounds, have emerged on the black market that can be used to circumvent current legislation regulatory controls and analytical detection procedures. Therefore, improving control analyses to meet these new challenges is essential, with the accurate prediction and detection of residues and metabolites a prerequisite to confirm that a drug has been administered. Simple, reliable, rapid and cost-effective in vitro strategies that can promptly respond to analytical challenges in the control and monitoring of emerging illegal drug use are therefore required. This project has set out to develop procedures for the preparation of various tissue and subcellular preparations from different species, and to establish methodology for the in vitro investigation of drug metabolism that can facilitate mass spectrometry identification and prediction of SARM metabolism profiles. Isolated liver fractions were characterized (e.g. protein concentration, enzyme activities) and protocols for required experimental procedures (incubations, sample preparation and LC-MS analysis) established and optimized. After incubation of liver preparations with representative SARM compounds in the presence of required co-factors, drug metabolites were concentrated by selected protein precipitation and liquid-liquid extraction procedures. Metabolites and analytes generated through in vitro incubations were separated by ultra-high performance liquid chromatography (UHPLC) and structurally characterised by quadrupole time-of-flight mass spectrometry (QToF-MS) and triple-quadrupole mass spectrometry (QqQ-MS). The completed work has demonstrated the potential of in vitro tools in identifying metabolites of SARMs for control purposes in food and sports animals. Future work will relate the in vitro metabolism of SARMs to actual in vivo metabolism.



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FcγR-mediated phagocytosis by broadly protective influenza A virus IgGs

Worldwide influenza epidemics result in substantial morbidity and the deaths of 250,000–500,000 people annually, with the young and elderly representing the majority of this mortality. Vaccination is the most effective method to prevent infection, but influenza vaccines must be reformulated annually because of antigenic drift in HA, the immunogenic glycoprotein to which the majority of the humoral anti-influenza immune response is directed. Neutralizing antibodies against influenza viruses have traditionally been thought to provide protection by interfering with virus entry and/or fusion with host cells, events that can rely solely on antibody variable region binding to viral spike proteins. The in vivo mechanism of antibody-based inhibition of virus replication is more complex and involves not only Fab recognition of viral epitopes but also Fc interactions with the FcγR system. We have previously developed a flu vaccine candidate that is based on the conserved ectodomain of matrix protein 2 (M2e) of influenza A virus (IAV). We have demonstrated that influenza M2e-specific IgGs require activating FcgRs for protection. In order to understand FcγR-mediated phagocytosis by broadly protective IAV non neutralizing IgGs, we have developed an in vitro assay in which IAV infected cells or M2-expressing epithelial cells can be phagocytosed by immortalized macrophages in the presence of M2e specific IgG2a mAbs or M2e convalescent immune sera from mice. FACS and confocal analysis revealed that phagocytosis of IAV infected or M2-expressing HEK-293T by macrophages is significantly enhanced in the presence of M2e specific IgG2a mAb. Anti M2e antibodies can initiate antibody mediated phagocytosis of target cells that are infected with different IAV subtypes by immortalized macrophages. In conclusion, our results show that M2e-specific antibodies confer heterologous protection and act through antibody-dependent cell-mediated phagocytosis.

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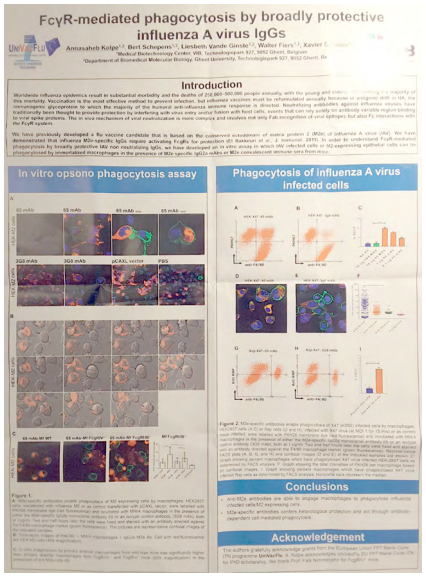

Rapid Bio-Process Development Strategies

The biological medicine market contributes to 23% of all global pharmaceutical sales and these medicines have helped transform the lives of nearly 800 million patients. 70% of the top ten selling products of the world comprise of biological drugs and the forecast for 2020 indicate a shift toward biologics owing to increasing profits and lower attrition rates when compared to small molecule drugs. Biologic drugs, however are far more complex structurally and are very difficult to characterise and produce than small molecules thus costing 1.5-2 times small molecule drugs. With nearly 80% of drugs failing in clinical development mainly due to lack of efficacy and safety there arises an urgent need for smarter preclinical development using quality by design based approaches as identified by ICH Q8(R2) guidelines on Pharmaceutical development. BIORAPID aims at facilitating rapid development of novel bioactive molecules by uniquely bringing studies on efficacy, toxicity, immunogenicity and hypersensitivity into the process development by using new predictive modelling tools (as PAT tools). The main focus of the research is on oncology related proteins and recombinant proteins to be used in diabetes treatment, although the resulting monitoring and modelling methods can be applied and validated to other bioactive molecule process development. The four pillars of BIORAPID are rapid screening, modelling tools in bioprocess development, consistent development and scale-up and real-time monitoring of bioprocesses, involving equal number of partners from industry as well as academia. The final BIORAPID framework could indeed revolutionise the way biopharma industries operate by cutting down their attrition rates and this could drastically change their business model enabling them to save time, money and resources. This could lead to reduction of prices for biologic drugs as well as more focus on medicines for rare diseases thus proving beneficial to society. The key impact of this research is on lowering of attrition rates, faster development of potential drug candidates as well as facilitate continued positive pipeline development for rapid bioprocesses. In the long term it would also help to reduce prices of potentially lifesaving biopharmaceutical products. Furthermore the applicability of the BIORAPID framework extends to food, biotech and other areas which rely heavily on bioprocesses.

Acknowledgement

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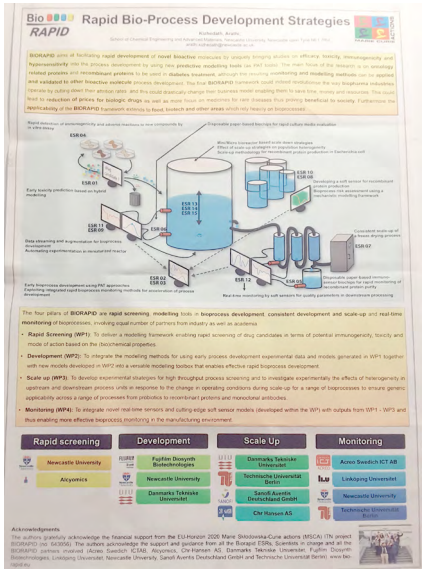

Author(s): Arathi Kizhedath

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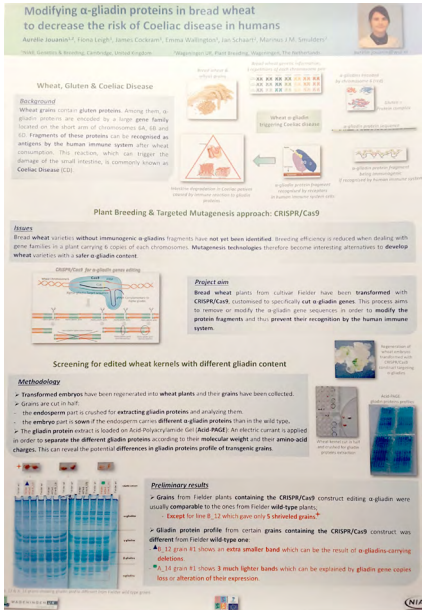
Modifying α-gliadin proteins in bread wheat to decrease the risk of Coeliac disease in humans

Hexaploid bread wheat (Triticum aestivum) is a staple crop in many parts of the world. A significant component of the wheat grain is gluten, a polymer of glutenin and gliadin proteins encoded by large gene families. These proteins harbour immunogenic epitopes which can trigger Coeliac disease in genetically predisposed humans (approximately 2% of the populations) The immunogenic properties of gliadins may be reduced by modification at specific positions or by their deletion. Therefore, mutagenesis technologies can be deployed to obtain hexaploid wheat plants producing grains containing fewer immunogenic gliadin epitopes, thereby increasing safety for Coeliac patients. CRISPR/Cas9 technology is a site directed mutagenesis technique aiming at cutting DNA in a gene of interest. This system triggers the DNA repair mechanism, which is a highly error prone process in plant cells, often resulting in mutations of the gene of interest. We have designed different CRISPR/Cas9 constructs transformed hexaploid bread wheat to edit or to remove alpha-gliadin genes. In subsequent wheat grains, alpha-gliadin proteins should be altered or less abundant, which would avoid or decrease their recognition by the human immune system. Alpha-gliadins mutant lines are screened using Acid-PAGE protein separation methods. Further quantitative (ddPCR) and qualitative (amplicon sequencing) analyses will be performed on promising edited lines These results will enable conclusions to be drawn on the applicability of CRISPR/Cas9 as a targeted mutagenesis method for large gene families in polyploid plants. It should also provide valuable information about the relevance of using such an approach to create safer wheat varieties for Coeliac patients. Our novel lines will require further investigation including immunological tests using monoclonal antibodies to determine their immunogenicity level and rheological studies to evaluate the bread dough quality obtained using these generated “CD-safer wheat lines”.



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PrinTendon - Development of a tendon substitute through bioprinting

Tendon/ligament (T/L) injury is a common clinical problem that can dramatically affect a patient's quality of life. The native structure of T/L makes them have limited ability to self-repair. Current approaches for T/L substitutes include autografts, allografts and artificial prostheses although their mechanical limitations and/or the induced adverse immune responses have restricted their use, which have accelerated the development of tissue engineering strategies. However, to the date, no clinical long-standing acceptable T/L substitute is available. For this reason, the project's overall objective is developing an innovative T/L replacement that results in a fully regenerated living tissue, mimicking the natural structure and function and with long-term viability. The unexplored approach that we want take advantage of is through 3D bioprinting and mechano- magnetic stimulation. The use of bioprinting technologies will allow to replicate the tissue structure and together with mechano-magnetic stimulation will induce cell and fibre alignment, that have been shown to induce tenogenic differentiation. Hybrid collagen-silk fibroin scaffolds will be designed and bioprinted to satisfy the mechanical and biological properties needed for T/L substitutes. Mechanical stimulation will be achieved by the inclusion of magnetic nanoparticles in the scaffolds and the use of magnetic forces. Tissue-like constructs will be tested for its mechanical properties and its capacity to induce tenogenic differentiation of human adipose derived stem cells (hASCs), prior to an in vivo assay. This proposal combines the use of bioprinting and magnetic nanoparticles in a bright and new option to create T/L substitutes. Taking into account that hASCs can be easily harvested and expanded from autologous source and that 3D printers have high reproducibility and automation, this approach will assure an easy and fast translation to clinics to improve people's live.

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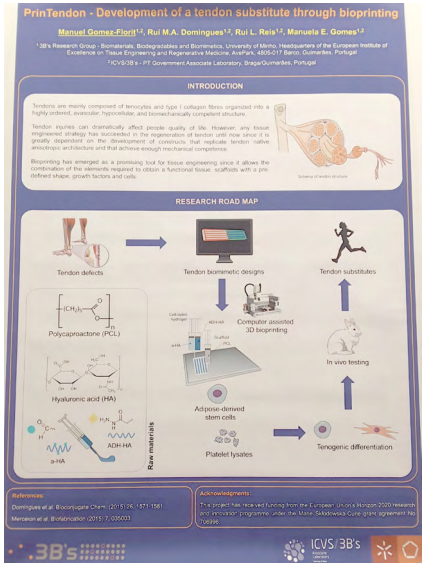

Structure-function studies of organellar proteins with FAST and RAP domains

We study the structure of two putative non-canonical RNA-binding domains, FAST and RAP, found in the mitochondrial FASTKD (Fas-activated serine/threonine kinase domain) and the chloroplast OPR (octotricopeptide repeat) protein families. We propose that FAST is a helical-repeat domain which overlaps with two conserved sequence motifs, FAST-1 and FAST-2. RAP (RNA-binding domain abundant in Apicomplexans) is a globular domain of ~60 residues which is found at the C-terminus of a subset of RNA-binding OPR and FASTKD proteins. The remarkably small size of RAP makes it an attractive target for protein engineering, and we present our efforts at expression, purification and structural characterisation of the RAP domains. We analyse also the phylogenetic distribution of RAP throughout the kingdoms of life and its association with predicted physicochemical properties.

Author(s): Matthew Merski, Jan Kutner, Jakub Skrzeczkowski, Aleksandra Jurska, Stanislaw Dunin-Horkawics, Maria Gorna

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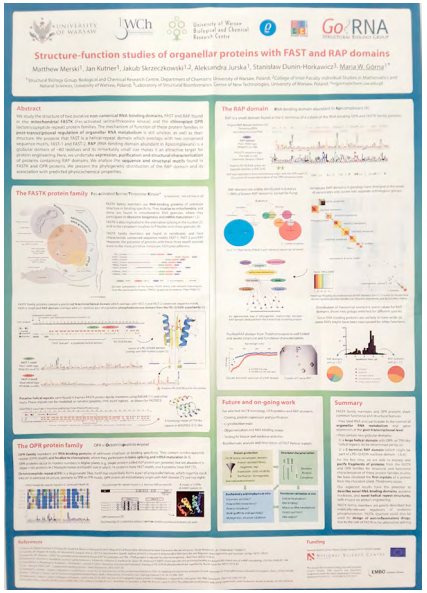
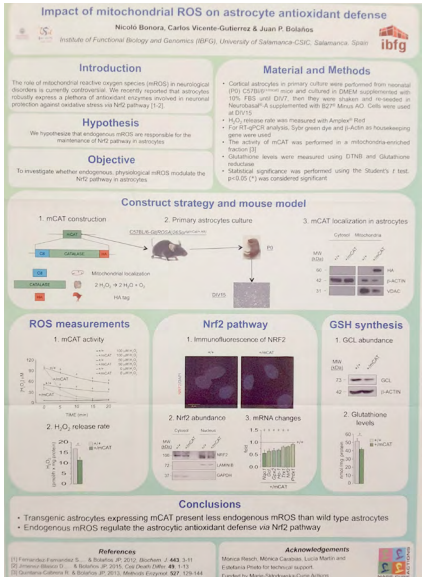


Impact of mitochondrial ROS on astrocyte antioxidant defence

A substantial body of evidence suggests that mitochondrial reactive oxygen species (mROS) generation is a hallmark of certain neural diseases. However, the underlying molecular mechanisms involved are not fully understood, and whether they play physiological roles is still controversial. Results obtained by our group revealed that astrocytes robustly express a plethora of antioxidant enzymes that may be involved in neuronal protection against oxidative stress. However, the molecular mechanism responsible for the up-regulation of the antioxidant defense in astrocytes is unknown. Here, we hypothesized that astrocyte mROS would play an important role in neuronal antioxidant protection. To explore this end, we have generated an inducible, floxed knock-in mouse model that expresses a version of catalase fused to a canonical mitochondrial localization signal (mCat). We believe that the adequate use of mCat mice would allow us to probe the astrocyte-specific functions of mROS at regulating the antioxidant defense in vivo. Here, we present data showing the efficacy of mCat at reducing mROS levels in an astrocyte-specific manner. We also found that the master transcriptional regulator of the antioxidant response, nuclear factor (erythroid-derived 2)-like 2 (Nrf2), is more active in astrocytes than in neurons. Furthermore, by means of down-modulating mROS in astrocytes, we found data compatible with a neuroprotective role of astrocytic mROS through maintaining active the Nrf2 pathway. We think that these data reveal the functional physiological relevance of mROS in astrocytes at contributing to the brain defense against oxidative stress.

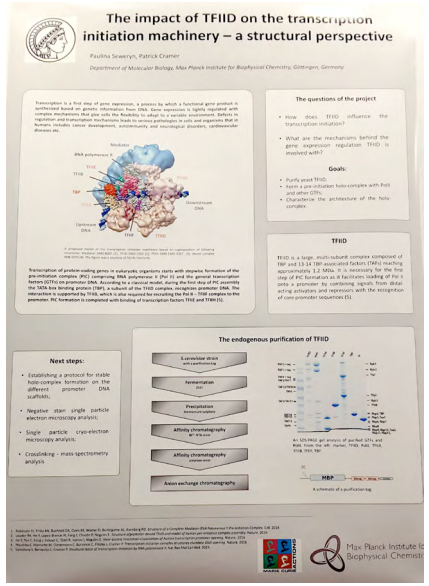


Author(s): Nicoló Bonora, Carlos Vicente-Gutierrez, Juan Pedro Bolaños

Organisation: Institute of Functional Biology and Genomics

The impact of TFIID on the transcription initiation machinery – a structural perspective

Transcription is a first step of gene expression, a process by which a functional gene product is synthetized based on genetic information from DNA. Gene expression is tightly regulated with complex mechanisms which give cells the flexibility to adapt to a variable environment. Defects in regulation and transcription mechanisms leads to serious pathologies in cells and organisms, which in humans include cancer development, autoimmunity and neurological disorders, cardiovascular diseases etc. Transcription of protein-coding genes in eukaryotic organisms starts with stepwise formation of the pre-initiation complex (PIC) comprising RNA polymerase II (Pol II) and the general transcription factors (GTFs) on promoter DNA. According to a classical model, during the first step of PIC assembly the TATA-box binding protein (TBP), a subunit of the TFIID complex, recognizes promoter DNA. TFIID is a large, multi-subunit complex composed of TBP and 13-14 TBP-associated factors (TAFs) reaching approximately 1.2 MDa. It is necessary for the first step of PIC formation as it facilitates loading of Pol II onto a promoter by combining signals from distal-acting activators and repressors with the recognition of core promoter sequences. The interaction with the promoter DNA is supported by TFIIB, which is also required for recruiting the Pol II – TFIIF complex to the promoter. PIC formation is completed with binding of transcription factors TFIIE and TFIIH. We have established the purification protocol for TFIID complex, which allows us initial structure studies of the transcription initiation machinery using a single particle electron microscopy.

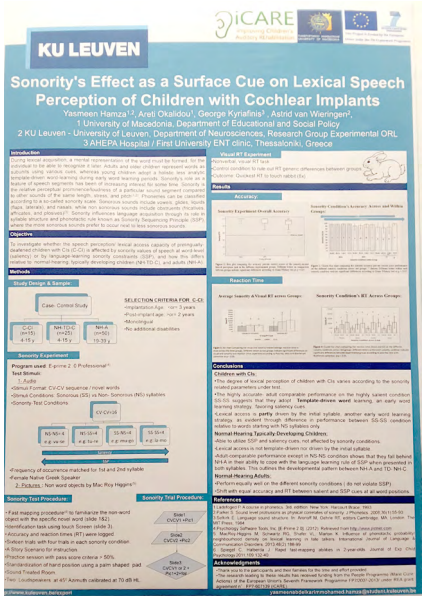


Author(s): Paulina Seweryn, Patrick Cramer

Organisation: Max Planck Institute for Biophysical Chemistry

Sonority's Effect as a Surface Cue on Lexical Speech Perception of Children with Cochlear Implants

During lexical acquisition, a mental representation of the word must be formed, for the individual to be able to recognize it later. Adults represent words as subunits using various cues. Infants utilize acoustic-phonetic mechanisms to store stressed and word-initial syllables only. Children adopt a holistic template-driven word-learning. Sonority is the relative perceptual prominence/loudness of a sound segment compared to other sounds of the same length, stress, and pitch (Ladefoged,1993;Parker, 2008). Sonority influences language acquisition through its role in syllable structure and phonotactic rule known as Sonority Sequencing Principle (SSP), where the more sonorous sounds prefer to occur next to less sonorous sounds. The study's purpose is to investigate whether the lexical access capacity of prelingually-deafened children with CIs is affected by sonority values of speech at word-level or by language-learning sonority constraints (SSP), and how this differs relative to 25 normal-hearing children, and 50 normal-hearing adults. Sixteen novel CV-CV words assigned to 16 funny pictures in four sonority conditions with combinations of sonorous/ less optimal SSP (SS) and non-sonorous/ optimal SSP (NS) syllables, i.e. SS-SS (e.g lamo), SS-NS (e.g mugo), NS-SS (e.g ture) and NS-NS (e.g vuse) were used in a computer-based lexical identification task via fast mapping procedures. Outcome measures were percent correct scores and reaction times. Children with CIs performed better on conditions relying on saliency cues rather than SSP. They adopt a template–driven (SS-SS) word learning strategy, an early stage strategy. Lexical access was partly driven by the initial syllable, another early word learner's strategy. Children with CIs exhibited longer overall and SS-SS condition reaction times relative to the normal-hearing children. Normal-hearing children performed equally well across all conditions and performed adult-comparable on all conditions apart from NS-NS condition, a condition relying highly on SSP. Adults performed equally well across all conditions.



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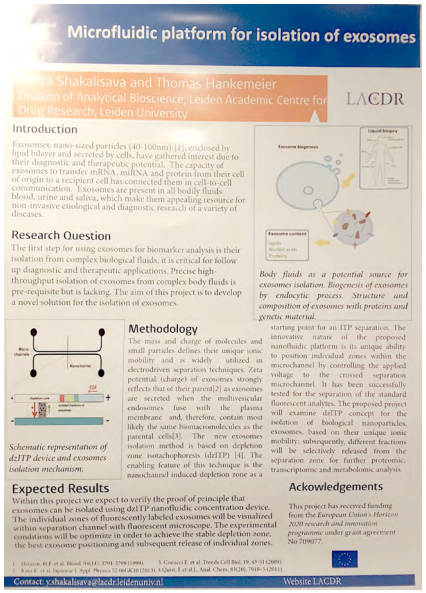
Organisation: University of Macedonia

Microfluidic platform for isolation of exosomes

Modern biomedical research is faced with enormous technical challenges when searching for biomarkers of a disease or studying a disease mechanism. The analytes, biomarkers or metabolites, are often present in very small concentrations and available biological samples are limited. The development of advanced analytical tools for biomedical research is motivated by these challenges. It aims to analyse ultra-small samples, analyse more analytes, increase sample throughput, and to maximize the power of different analytical methods in a single platform. Here we propose a microfluidic platform based on a novel electrodriven separation method, deplition zone isotachophoresis (dzITP), for extremely sensitive and highly controllable isolation and manipulation of analytes in biological fluids. The method is based on the principles of the classical isotachophoresis (ITP) and electric field gradient focusing techniques for simultaneous separation and efficient focusing. The enabling feature of this technique is the nanochannel (or nanopore) induced depletion zone as a starting point for an ITP separation. The technological novelty of the proposed nanofluidic platform is in its unique ability to position individual zones of analytes within the microchannel by controlling the applied voltage to the crossed separation microchannel. This concept allows to isolate analyte fractions separated by their unique ionic mobility. Subsequently, different fractions can be selectively released from the separation zone for detection and/or further analysis. The method showed a promising potential for the isolation of biomolecules (proteins, lipids and other metabolites) and nanoparticles (exosomes) in plasma. Exosomes especially represent a significant challenge and enormous opportunity for biomedical research. They are secreted by cells and carry nucleic acid and protein, metabolite and lipid information of the cells of origin and can be used in the biomarker discovery and disease investigation.

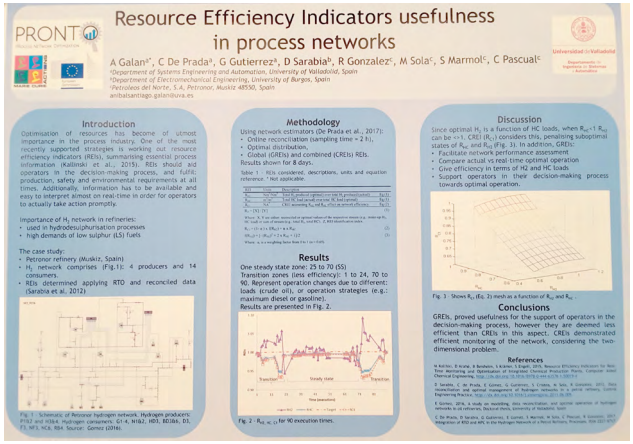


Author(s): Yuliya Shakalisava, Thomas Hankemeier

Organisation: Leiden University

Resource efficiency indicators usefulness in process networks

Process industries worldwide are constantly challenged by competitiveness, being forced to produce goods that meet specifications with the least possible costs. Therefore, optimisation of consumed resources has become of utmost importance in the process industry. However, is not crystal clear how to better approach resources minimisation without affecting production outputs. One of the most recently supported strategies is working out resource efficiency indicators (REIs), summarising key process information. REIs should aid operators in the decision-making process, while fulfilling production and safety requirements at all times. Moreover, data has to be available and easy to interpret almost on real-time in order for operators to actually take action promptly. Based on a case study of a refinery hydrogen network, comprising 4 producers and 14 consumers, REIs are defined and monitored. In brief, the more hydrocarbons processed with the least hydrogen production, the better overall efficiency. Mainly, analysing data from real-time reconciliation and optimisation tools, convenient REIs have been determined, aimed at bringing added value to operators in daily complex decisions on processes, facilitating production goals achievements even under contingencies. Thus, REIs should condense key information about process status, and operators should aim for optimum hydrogen distribution across the network while maximising overall production. Hence, process unit specific (PUS) and global REIs have been suggested and discussed. Furthermore, a discussion is conducted on how figures are calculated and their potential usefulness for process efficiency and assessment. In particular, focus is made on combining basic REIs to formulate new figures that appropriately integrate distribution and production data, aiding operators' judgment. These are called combined REIs. In overall, actual REIs for a refinery hydrogen network, sorted in PUS and global, are presented and explained. Attention is given to REIs combination as means of wisely condensate in a single figure hydrogen distribution, and production performances.



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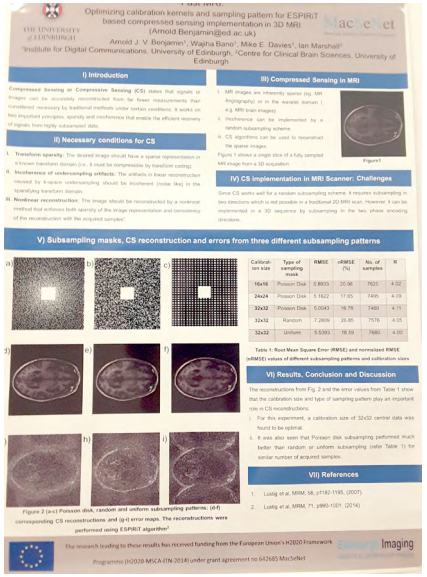
Organisation: University of Valladolid

Optimizing calibration kernels and sampling pattern for ESPIRiT based compressed sensing implementation in 3D MRI

Compressed Sensing (CS) in Magnetic Resonance Imaging (MRI) has immensely pushed the barriers of accelerated MRI data acquisition. This work analyzes the impact of calibration size and undersampling pattern on CS reconstructions in 3D MRI. The scanning was performed on a 1.5T GE Signa Horizon HDX scanner with an 8 channel head coil. A full resolution 3D scan was performed on a volunteer using EFGRE3D sequence. The slice thickness was 1.3 mm and the Field of View (FOV) was 25.6 cm. K-space raw data of size (192x192x160) were acquired for each coil. Several subsampling patterns (each with approximately similar number of samples and acceleration factor, R=4) were applied retrospectively on the full resolution data to simulate undersampling after which reconstruction was done using ℓ1-ESPIRiT algorithm. The results showed that it was essential to choose an optimum calibration size failing which the error in the reconstruction greatly increases. In addition, it was shown that the reconstructed image quality depended significantly on the type of sampling pattern. In conclusion, an implementation of an undersampling scheme for CS on a clinical MRI scanner was developed which also showed that calibration size and type of sampling are important parameters for CS reconstructions.

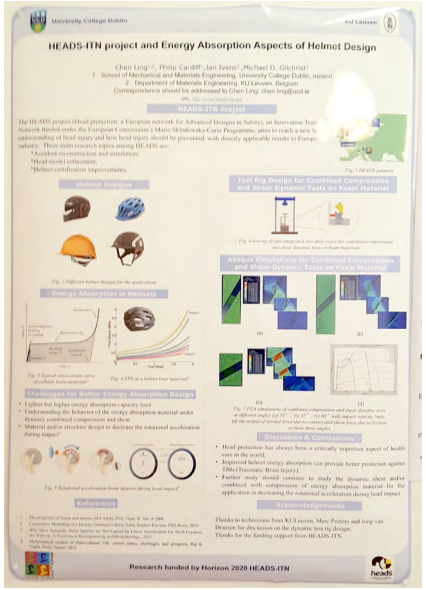


Author(s): Arnold J. V. Benjamin, Wajiha Bano, Ian Marshall, Mike E. Davies

Organisation: University of Edinburgh

HEADS-ITN project and Energy absorption aspects of helmets design

The HEADS project (Head protection: a European network for Advanced Designs in Safety, http://www.heads-itn.eu/), an Innovation Training Network funded under the European Commission's Marie Sklodowska-Curie Programme, aims to reach a new level of understanding of head injury and how head injury should be prevented, with directly applicable results to European industry. Three main research topics among HEADS are: Accident reconstruction and simulation; Head model refinement; Helmet certification improvements. Energy absorption ability is one of the most important quality for helmet design. In the market nowadays, different helmets adopt different materials and structures to realize this purpose during impact, however, among them uniform EPS foam is widely used as the energy absorption component. But two biggest problems with this design is the protection provided by the liner is not impact variation and does not help at all to decrease rotational acceleration during impact, which being proved by recent study more responsible for traumatic brain injuries (TBI). In this project, we are expecting to raise new materials and structures designs to improve the protection that helmets could provide, achieving less TBI and concussions during head impact.

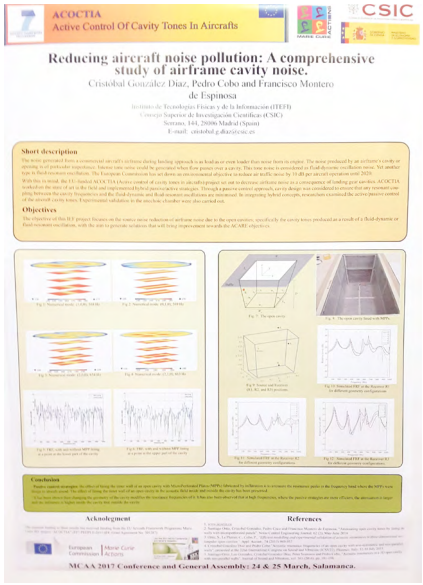


Author(s): Chen Ling, Philip Cardiff, Jan Ivens, Michael D. Gilchrist

Organisation: UCD

Reducing aircraft noise pollution: A comprehensive study of airframe cavity noise.

The noise generated from a commercial aircraft's airframe during landing approach is as loud as or even louder than noise from its engine. The noise produced by an airframe's cavity or opening is of particular importance. Intense tone noise could be generated when flow passes over a cavity. This tone noise is considered as fluid-dynamic oscillation noise. Yet another type is fluid-resonant oscillation. The European Commission has set down an environmental objective to reduce air traffic noise by 10 dB per aircraft operation until 2020. With this in mind, the EU-funded ACOCTIA (Active control of cavity tones in aircrafts) project set out to decrease airframe noise as a consequence of landing gear cavities. ACOCTIA worked on the state of art in the field and implemented hybrid passive/active strategies. Through a passive control approach, cavity design was considered to ensure that any resonant coupling between the cavity frequencies and the fluid-dynamic and fluid-resonant oscillations are minimised. In integrating hybrid concepts, researchers examined the active/passive control of the aircraft cavity tones. Experimental validation in the anechoic chamber were also carried out.

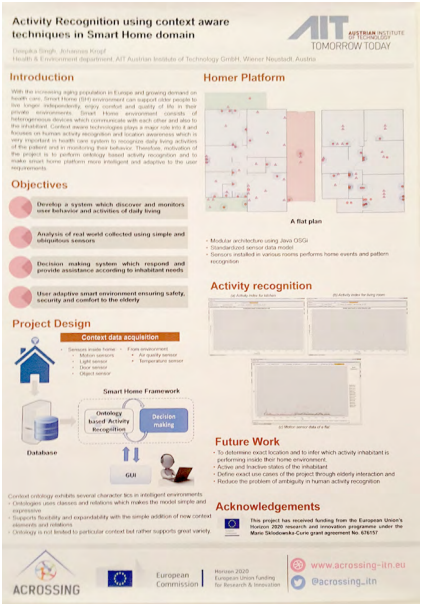


Author(s): Cristobal Gonzalez Diaz, Pedro Cobo, Francisco Montero de Espinosa

Organisation: The Spanish National Research Council (CSIC)

Activity recognition using context aware techniques in smart home domain

With the increasing aging population in Europe and growing demand on health care, Smart Home (SH) environment can support older people to live longer independently, enjoy comfort and quality of life in their private environments. Context awareness plays a big role in developing and maintaining a smart home. It refers to the idea that the computer can both sense, and react based on their environment. Context aware systems deal with the acquisition of context, and the application behavior based on the recognized context. As the user's activity and location are crucial for many applications, context awareness has been focused more deeply in the research fields of activity recognition and location awareness. Smart homes connect all the devices and appliances in home so that they can communicate with each other and with the user. Therefore, the motivation for the current project is to make the smart home platforms more intelligent beyond the ability to provide home automation.

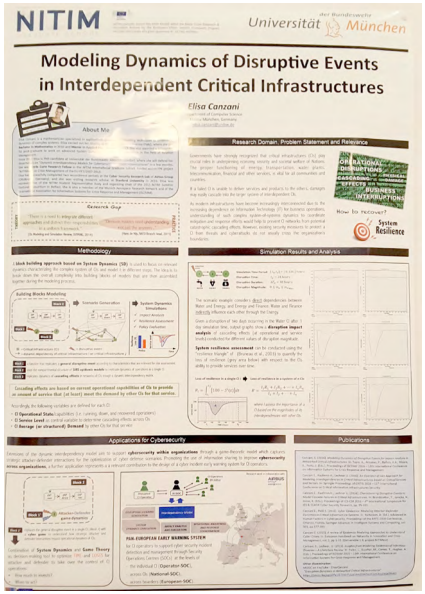


Author(s): Deepika Singh, Johannes Kropf

Organisation: Austrian Institute of Technology

Modeling dynamics of disruptive events in interdependent critical infrastructures

Governments have increasingly recognized that the proper functioning of critical infrastructures (CIs) is essential to the societal welfare. If a failed infrastructure is unable to deliver services and products to the others, disruptive effects may easily cascade into the larger system of interdependent CIs. In order to develop effective crisis response plans, CI operators need to understand the dynamics of direct and indirect dependencies between CIs. This research proposes a novel block building modeling approach based on System Dynamics (SD) to understand complex dynamics of disruptions in CI networks. Three building blocks of models are developed to capture relevant dynamics of: the disruptive event, operations within a single CI and interdependencies across CIs. Then, building blocks are iteratively expanded and combined together to generate hypothetical scenarios of disruption. With a special emphasis on time-dependent factors, we demonstrate how to apply this method for dynamic resilience assessment in networked CIs. Our approach is a potential instrument to support crisis managers in evaluating scenarios of disruption, forecasting their impacts and improving strategic planning in Critical Infrastructure Protection (CIP).



Author(s): Elisa Canzani

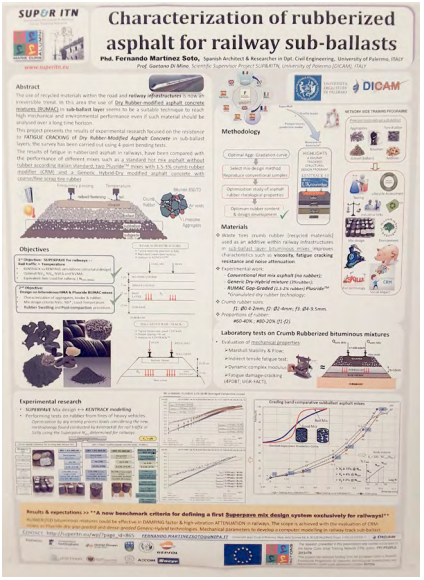
Organisation: Universität der Bundeswehr München

Characterization of rubberized asphalt for railway sub-ballasts

The use of recycled materials within the road and railway infrastructures is now an irreversible trend. In this area the use of Dry Rubber-modified asphalt concrete mixtures (RUMAC) in sub-ballast layer seems to be a suitable technique to reach high mechanical and environmental performance even if such material should be analysed over a long time horizon. This project presents the results of experimental research focused on the resistance to FATIGUE CRACKING of Dry Rubber-Modified Asphalt Concrete in sub-ballast layers; the survey has been carried out using 4-point bending tests.The results of fatigue in rubberized asphalt in railways, have been compared with the performance of different mixes such as a standard hot mix asphalt without rubber according Italian standard, two PlusrideTM mixes with 1.5-3% crumb rubber modifier (CRM) and a Generic Hybrid-Dry modified asphalt concrete with coarse/fine scrap tire rubber.

Objectives: Use of sustainable methodology to apply ASPHALT RUBBER by dry process (Rubber-modified asphalt concrete mixture) in sub-ballast layer in RAILWAYS to decrease the ground-borne vibrations produced by railway. Laboratory evaluation on the performance of hot mix asphalt (HMA) using recycled crumb rubber as an additive. Investigate optimal mechanical parameters of “aggregate-rubber” hot asphalt mixes with computer model development (KENTRACK). Searching on cost-effective materials with lower environmental impact and high preservation of the mechanical characteristics and performance.

Results & Future expectations: A new benchmark criteria for defining a first Superpave mix design system for railways. The scope is achieved with the evaluation of CRM-mixes as Plusride dry-gap-graded and dense-graded Generic-Hybrid technologies. Mechanical parameters to develop a computer modelling in railway track sub-ballast.



Author(s): Fernando Martinez Soto

Organisation: University of Palermo (Italy)

An Overview of Carrier Aggregation with Multi-band Scheduling in LTE-A Networks

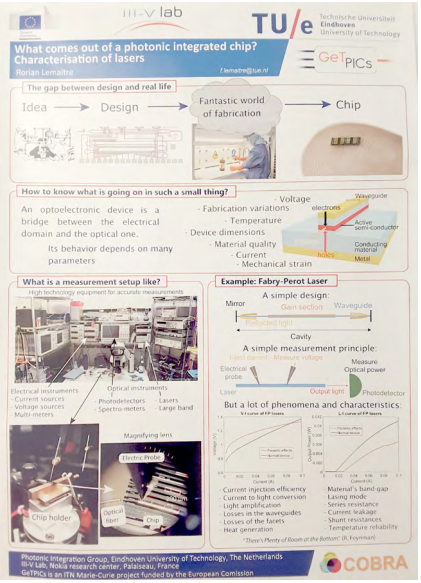
This work discusses the basic concepts, definitions, deployment scenarios and aspects of spectrum management optimization considering inter-band carrier aggregation (CA) and its applications to homogeneous and heterogeneous networks. In CA, normally a lower and a upper frequency band are considered. While the lower frequency band can provide coverage guarantees, even close to the cell edge, the upper frequency band ensures capacity, be means of supporting users closer to the cell centre. In macro-cellular networks, among different multi-band scheduling algorithms, the proposed enhanced multi-band scheduling (EMBS) algorithm is compared to the one from the summed capacity of considering two separate bands in the system, i.e., without CA. Unlike other multi-band schedulers that only support one CC per UE, EMBS involves reduced optimization scheduling complexity and allows the allocation of UEs to one or both CCs simultaneously. Simulations results have shown that, for 5 MHz CCs and cell radius equal to 1,500 m, with EMBS, the 3GPP and ITU-T's 1% packet loss ratio (PLR) threshold is only exceeded above 56 UEs (goodput of 7.48 Mbps), while, without CA, the minimum obtained PLR is approximately 2%. For CCs with bandwidth of 20 MHz, only EMBS has been considered. The PLR threshold is not exceeded up to 40 users and the value of QoE raises from 2.86 (for 5-MHz bandwidth) to 3.96, while a gain of 9.83 occurs in supported goodput, increasing from 7.24 to 71.18 Mbps. In HetNets, CA allows for adding/removing a second carrier component at the small cell (SC) layer while maintaining the primary carrier component at the macro cellular layer. Densification through the deployment of high number of such SCs will enable to answer to the traffic requirements from hotspots.

Author(s): Daniel Robalo, Fernando J. Velez

Organisation: Instituto de Telecomunicações and Universidade da Beira Interior

What comes out of a photonic integrated chips? Characterisation of lasers

An industrial photonic product is always the result of many development steps from the exploratory research up to the finished product, each time validated through chip measurements. What do we want to know when measuring photonics chips? What kind of data can we extract from these microscopic devices? Which tools do we need in order to perform such tests? What are the key features which determine if a device is performing well or not? What are the challenges implied by the use of integrated technology? Whether we want to extract the physical parameters of the materials inside the chip, validate new innovative circuit designs or verify which devices are faulty before selling them to customers, different setups are used, at different moments of the chip fabrication. Each method presenting different interests and challenges. An overview of the key aspects of chip characterization will be presented, in order to better understand what we are interested in with a photonic chip. A concrete example will be shown with the measurement of lasers carried on in the GeTPICs project, a Marie-Curie applied research program half way between fundamental research and industrial applications. Such a research has to find a trade-off between flexibility of the measurement setup, in order to measure different types of devices, and standardization of the methods, in order to obtain meaningful results and compare them with other works made in the photonics world. The different measurements during this kind of project already tackles the question of the balance between the time spent on measurements and the amount of data to extract in order to make the right conclusions.



Author(s): Florian Lemaître

Organisation: Eindhoven Technical University

Small Structures, Big Disagreements: The Difficulty of a Fair Comparison of Micro-computed Tomography Results

Micro-computed tomography (μ-CT) is a non-destructive method to study 3D micro-structure of small samples, and has been used in a variety of fields including tissue engineering where the characterization of scaffolds hold great importance. The acquisition can be performed using different parameters such as different pixel sizes and rotation steps, and the obtained results may not be the same or even similar. In this study, using a wide range of acquisition parameters, tissue engineering scaffolds were characterized in a repeated-measures manner, and the effect of the acquisition parameters on the results of the analysis was shown in a systematic way. This study provides a critical assessment of the practice of the μ-CT analysis, and highlights that a fair comparison of results obtained by different acquisitions remains a challenge.

Acknowledgements:
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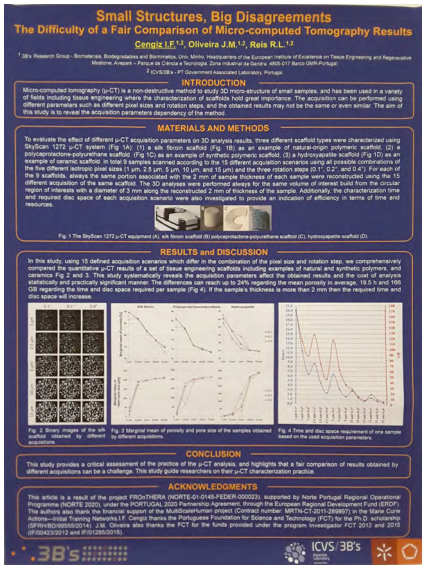
-ICVS/3B's - PT Government Associated Laboratory, Portugal.

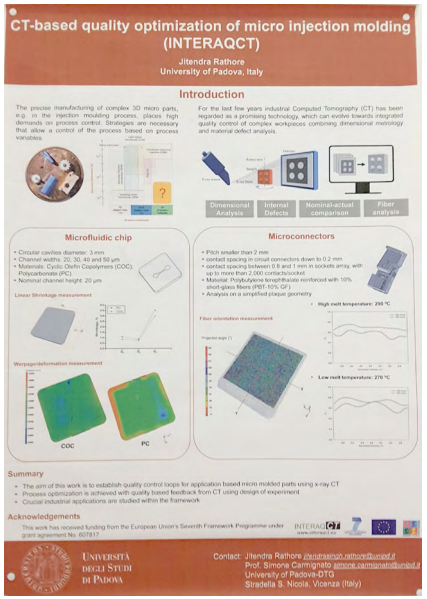


Author(s): Cengiz I.F., Oliveira J.M., Reis R.L.

Organisation: 3B's Research Group - University of Minho

CT-based quality optimization of micro injections molding (INTERAQCT)

For the last few years, industrial x-ray Computed Tomography (CT) has been emerged as a promising technology, which can evolve towards integrated quality control of complex workpieces combining dimensional metrology and material defect analysis. It led many academic and industrial organizations come together and form a consortium named “INTERAQCT” which stands for International Network for the Training of Early stage Researchers on Advanced Quality control by Computed Tomography. The project targets quantification and improvement of the reliability of CT measurement results, by determining the probability of detection of material defects as well as by achieving metrological traceability. In addition, CT based quality improvement loops are targeted for key emerging manufacturing technologies especially additive manufacturing and micro injection molding. Within the framework of INTERAQCT, this particular part is focused on the development of methods for control and optimization of micro manufacturing processes (particularly micro injection moulding) based on CT measurements of micro parts. The precise manufacturing of complex 3D micro parts places high demands on process control. Therefore, strategies are necessary that allow a control of the process based on process variables which are measured inside the mould cavity e.g. melt pressure.



Author(s): Jitendra Rathore

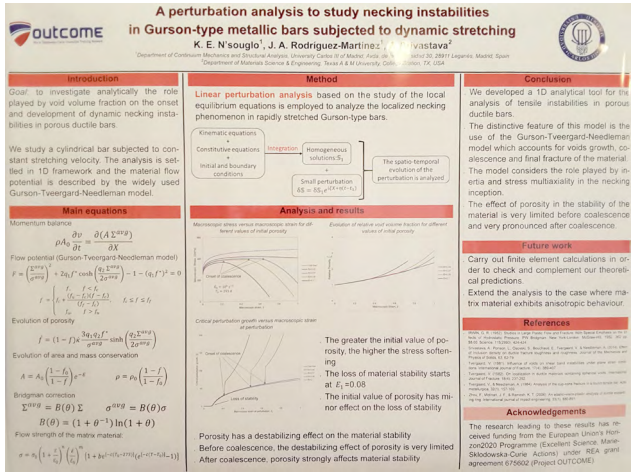
Organisation: University of Paodva

A perturbation analysis to study necking instabilities in Gurson-type metallic bars subjected to dynamic stretching

In this work, we study the localized necking phenomenon in rapidly stretched Gurson-type metallic bars by means of perturbation technique [Clifton et al. 1984; Shawki et Clifton 1989; Fressengas et Molinari 1987; Dudzinski et Molinari 1991; Zhou et al. 20106]. In doing so, the role played by void volume fraction on the onset and development of dynamic necking instabilities has been investigated. The perturbation model includes inertia and stress multiaxiality effects upon localization [Bridgman 1952]. The original feature of this model is the use of the Gurson-Tveegard-Model [Gurson 1977; Tvergaard 1981; Tvergaard 1982; Tvergaard and Needleman 1984] which considers the evolution and coalescence of micro-voids that in turn yield to damage and failure of the material. It has been found that the effect of porosity in the stability of the material is very limited before coalescence and very pronounced after coalescence. Furthermore, the initial value of porosity has minor effect on the loss of stability. In a forthcoming work, the predictions of the analytical model are going to be checked and complemented by finite element calculations results.

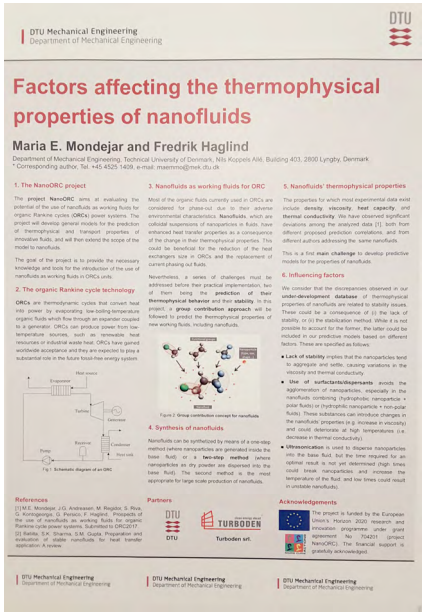
Author(s): K. E. N'souglo, J. A. Rodríguez-Martínez, A. Srivastava

Organisation: University Carlos III



Factors affecting the thermophysical properties of nanofluids

Nanofluids are colloidal suspensions of nanoparticles in industrial fluids, such as refrigerants or working fluids, which exhibit enhanced thermal properties. In the last few years, the potential use of nanofluids in refrigeration processes and organic Rankine cycle units has attracted great attention as a way to improve their performance. However, the research on nanofluids is still at its earliest stage and a number of challenges must be addressed prior to their practical use in industry. One of these challenges concerns the prediction of their thermophysical behavior, which is highly dependent on a number of parameters, such as the nanoparticle concentration, and their type, size, or shape. Moreover, based on the study of currently available experimental data of thermophysical properties of nanofluids, it has been observed that the preparation method of the nanofluid could significantly affect the measured properties. In this work we present the project NanoORC, which aims to study the potential of nanofluids as working fluids for organic Rankine cycles. The nanofluids preparation methods, including use of surfactants, and stabilizing and homogenization methods, are briefly described, and their effect on the nanofluid stability and thermophysical properties is discussed.


DTU Mechanical Engineering
Department of Mechanical Engineering

Factors affecting the thermophysical properties of nanofluids

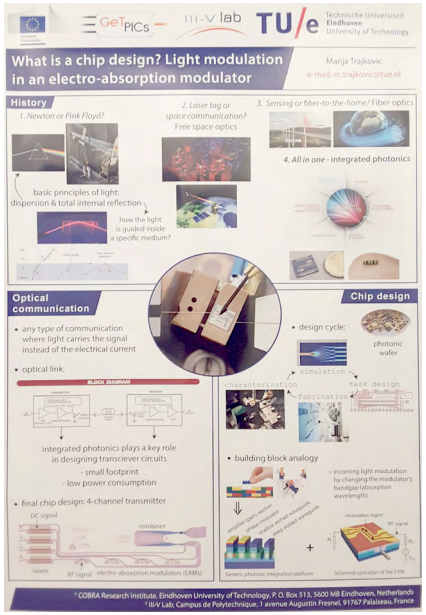
Maria E. Mondejar and Fredrik Haglind

Author(s): Maria E. Mondejar, Fredrik Haglind

Organisation: Technical University of Denmark

What is a chip design? Light modulation in an electro-absorption modulator

Photonic integrated chips play a key role in our daily lives, without our awareness of its significance. Sending a message through a chat programme, watching an online movie, having a video call – all of this would look much more different if it was not for photonics. Specific materials, from III-V group of elements, allow us to make the most out of the light interaction inside these materials. Starting from basic functionalities such as light generation on chip from a laser structure, modulation in modulator sections and combination of multiple light paths on a single chip, we are able to make very complex circuits. These circuits can be used in telecommunications, environmental sensing, medicine, and many more fields. All of the functionalities are implemented on a single chip, typically what we make is 4 × 4.5 mm2 area. This area is sufficient to make a transmitter or receiver circuit in optical communications, with at least 10 different channels if properly designed. Therefore, it is very important to make the initial calculations and simulate the behaviour of such a chip, to make sure we obtain the right performance. In a transmitter circuit for optical telecommunication, one of the most important components is the modulator structure. Depending on its design, its characteristics are determined and the characteristics of the whole chip as well. An electro-absorption modulator is preferred in such circuits, as it has a small footprint, low bias voltage and high extinction ratio. Our work focuses on improvement of the design and fabrication of this component in the platform we use. These ameliorations will lead to a demonstration of a fully integrated 10-channel WDM transmitter.

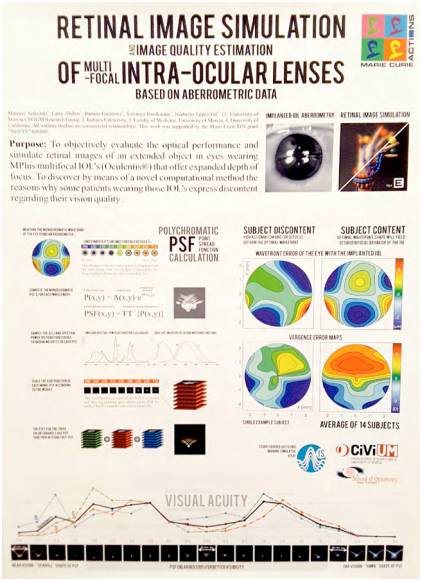


Author(s): Marija Trajkovic

Organisation: 3-5 Lab

Retinal Image Simulation and image quality estimation of the Multi-Focal Intra-Ocular Lenses based on aberrometric data

To objectively evaluate the optical performance and simulate retinal images of an extended object in eyes wearing MPlus multifocal IOL's (Oculentis®) that offer an expanded depth of focus. To discover the reasons why some patients wearing those IOL's express discontent regarding their vision quality by using a novel computational method. A custom simulator program has been developed using MATLAB®, that allows the computation of polychromatic smulated retinal images from experimental aberrometric data. The software uses a novel implementation of Fourier and geometrical optics and the Indiana Eye Model to calculate polychromatic PSF's (point-spread functions). Through-focus analysis performed using the software confirmed that most of the subjects have two zones of distances with better image quality. The dioptric distance between these two zones were 2.2 ± 0.3D which is in good agreement with the nominal addition of the IOL at the spectacle plane. The simulations have revealed two possible causes of discontent: lack of bi-focality or double "ghost" images yielded by secondary nuclei of the PSF's. It is possible to find the required change of Zernike coefficients in order to optimize the IQ for each particular eye.



Author(s): Mateusz Jaskulski, Sowmya Ravikumar, Ramon Gutierrez, Norberto López-Gil, Larry Thibos

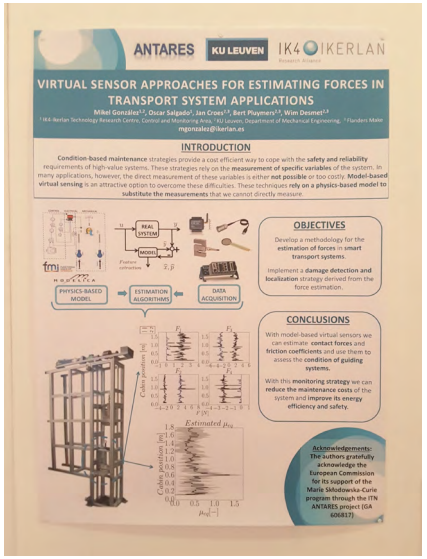
Organisation: University of Murcia

Virtual sensor approaches for estimating forces in transport system applications

Maintenance services account for a significant part of the operating cost of high-value systems, especially when possible failures result in large down times. Condition based maintenance strategies provide a cost efficient way to cope with the safety and reliability requirements of these systems. With these strategies the maintenance of the system is done when need arises, based on the actual condition of the system. Condition monitoring schemes rely on the measurement of specific variables of the system. In many applications, however, the required variables are either too costly or impossible to measure. Model-based virtual sensors are an attractive option to overcome these difficulties. These approaches combine physics-based models with measurements of the system by means of estimation algorithms. The model provides knowledge of the dynamics of the system, which in combination with off-the-shelf sensors can be used to estimate variables of interest otherwise difficult to measure. In this project model-based virtual sensors are used to monitor the forces in a guiding system. The estimated forces are used to assess the condition of the guiding system, allowing us to efficiently maintain the system. With this strategy we can reduce the maintenance costs of the system and improve its energy efficiency and safety.

Author(s): Mikel González, Oscar Salgado, Jan Croes, Bert Pluymers, Wim Desmet

Organisation: IK4-Ikerlan



Auditory interface for automated driving - with focus on highly automated driving

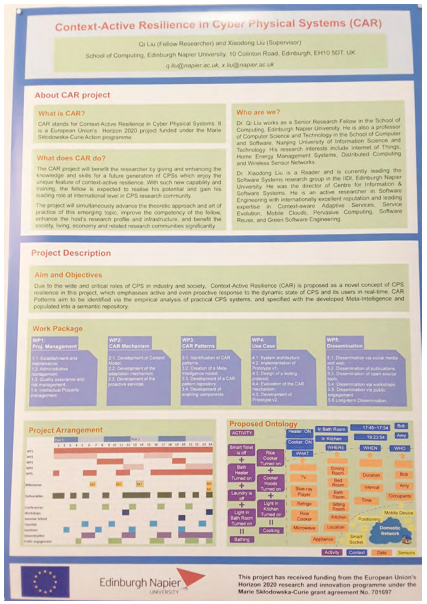
Highly automated driving (HAD) is likely to be introduced on public roads in the next one or two decades and could fundamentally change the role of man in society. HAD takes over both longitudinal and lateral control, and the driver is no longer required to permanently monitor the machine. In HAD the driver is permitted to take hands and feet off the steering wheel and pedals, and may engage in non-driving tasks such as checking the phone, reading a book, or resting. When the automation reaches its operational limit in a given traffic situation, the automation issues a so-called take-over request (TOR), asking the driver to take back control of the vehicle. Auditory modality offers a way to communicate to the driver. Auditory displays have the advantage of being “gaze-free”, meaning that the stimulus does not have to be in the field of view of the driver in order to be detected. Sound is transient and auditory displays do not require directional search. The distinctive meaning of multiple auditory warnings can be easily acquired. Auditory feedback may be used with other modalities in multimodal interfaces. Auditory displays have been widely used by the automotive industry in various forms, ranging from voice-based satellite navigation to beeps and earcons that warn the driver about the operational limits of automation or about hazards in the outside environment. WP2 of HFAuto project works on a multimodal interfaces for HAD. Within the project we investigate the use of both synthesised sounds and voice during highly and fully automated driving.

Author(s): Pavlo Bazilinskyy

Organisation: Delft University of Technology

Context-Active Resilience in Cyber Physical Systems (CAR)

Context-active resilience is a novel concept of CPS resilience proposed in this action, which emphasises active and even proactive response to the dynamic state of CPS and its users in real-time. CAR Patterns will be identified via the empirical analysis of practical CPS systems, and specified with the developed Meta-Intelligence and populated into a semantic repository. Due to the wide and critical roles of CPS in industry and society and the novelty of context-active resilience, the proposal is both timely and significant. Acting as a bridge, the project will simultaneously advance the theoretic approach and art of practice of this emerging topic, improve the competency and career of the fellow, enhance and complement the host's research profile and infrastructure, and benefit the society, living, economy and related research communities significantly.



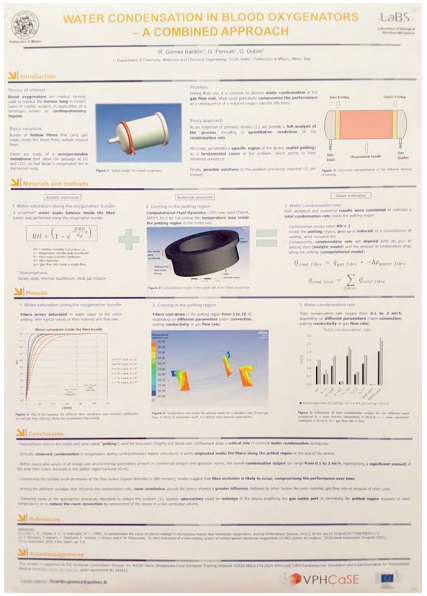
Author(s): Qi Liu, Xiaodong Liu

Organisation: Edinburgh Napier University

Water condensation in blood oxygenators – A combined approach

Blood oxygenators are medical devices used to replace the human lung in certain types of cardiac surgery, in application of a technique known as cardiopulmonary bypass. During their use, it is a recurrent event to observe water condensation at the gas flow exit of these devices, what could potentially compromise their performance as a consequence of diminished oxygen transfer efficiency. Although this phenomenon has been described in a few studies, a full analysis of the process including a prediction of the condensation rate has not yet been carried out. Moreover, despite possible ways of somewhat reducing this effect have been reported, one of the fundamental causes of condensation inside the oxygenator seems to have remained unnoticed. In this study, a specific component towards the outlet of the device, known as “potting”, was identified as critical for condensation, and Computational Fluid Dynamics were used to represent the temperature distribution along this region, with a sensitivity analysis for key parameters of the system. In addition, water saturation of gas throughout the device was computed be means of a simplified analytical approach, and both results (temperature distribution and water saturation) were combined to predict a total condensation rate. Finally, alternative approaches for minimizing this effect were described, aiming to improve those previously reported. Despite the simplifications of this model and the complex nature of the device, the proposed methodology can be of great benefit for future designs, as well as a guidance for best practice during clinical use.

This project is supported by the European Commission through the H2020 Marie Sklodowska-Curie European Training Network H2020-MSCA-ITN-2014 VPH-CaSE, grant agreement No 642612.

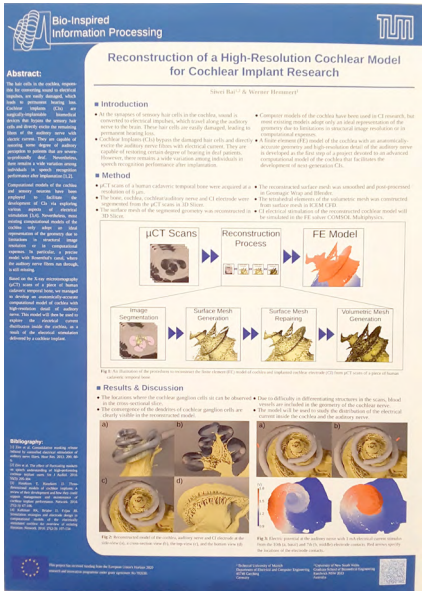


Author(s): Ricardo Gómez Bardón, Giancarlo Pennati, Gabriele Dubini

Organisation: Politecnico di Milano

Reconstruction of a High-Resolution Cochlea Model for Cochlear Implant Research

The cochlea in the inner ear is a complex three-dimensional structure, where sound is coded by the sensory hair cells into electrical impulses travelling along the auditory nerve to the brain. These hair cells are easily damaged, which leads to permanent hearing loss. Cochlear implants (CIs) are surgically-implantable biomedical devices that bypass the sensory hair cells and directly excite the remaining fibres of the auditory nerve with electric current. They are capable of restoring some degree of auditory perception to patients that are severe-to-profoundly deaf. Computational models of the cochlea and sensory neurons have been employed to facilitate the development of CIs via exploring various aspects of electrical stimulation. Nevertheless, most existing computational models of the cochlea only adopt an ideal representation of the geometry due to limitations in structural image resolution or in computational expenses. In particular, a precise model with Rosenthal's canals, where the auditory nerve fibres run through, is still missing. Based on the X-ray microtomography (μ-CT) scans of a piece of human cadaveric temporal bone, we managed to develop an anatomically-accurate computational model of cochlea with high-resolution details of auditory nerve. This model will then be used to explore the electrical current distribution inside the cochlea, as a result of the electrical stimulation delivered by a cochlear implant.

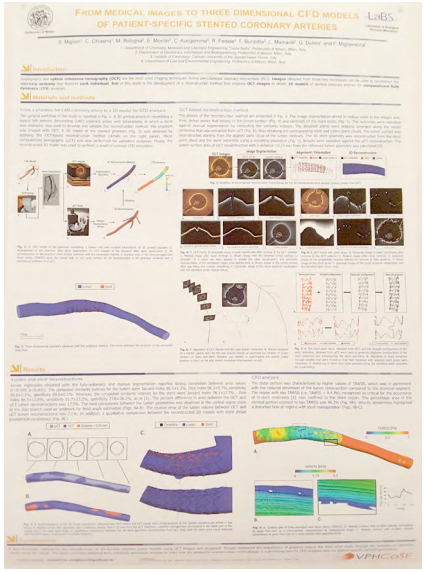


Author(s): Siwei Bai, Werner Hemmert

Organisation: Technical University of Munich

From medical images to three dimensional CFD models of patient-specific stented coronary arteries

Coronary heart diseases (CHD) are the major causes of death in the Western Countries. The principal origin of CHD is the occlusion of the blood vessel lumen due to plaque development and thickening of the arterial wall. Consequently, the physiological perfusion of myocardial tissue is severely compromised with consequences that include myocardial infarction. CHD is commonly treated with percutaneous coronary intervention (PCI) because of the reduced hospitalization, recovery time and costs. Success rate of PCI is strongly related to the coronary anatomy that features each individual. In this context, medical imaging techniques that are commonly executed during PCI, as optical coherence tomography (OCT), provide knowledge about the actual configuration of the treated vessel with the implanted stent. A method to achieve a three dimensional model for the treated coronary artery with a stent is presented. This method was applied on a rigid phantom that resembled a typical left anterior descending coronary artery with bifurcations. This phantom underwent a stenting procedure, then was imaged with OCT and micro computerized tomography. This latter was driven by the necessity of 3D centrelines for the vessel phantom and stent, with the availability of a reference for validation purposes. The workflow comprised the segmentation of OCT images in order to detect lumen contour and stent that were properly arranged along the vessel centreline, thus the relative point clouds were created. Finally, these components were used to achieve a high fidelity 3D model for the phantom with the stent that was used to perform a proof-of-concept computational fluid dynamics (CFD) simulation. Results from the validation procedure and CFD simulation demonstrated the reliability of the proposed reconstruction method. The study was supported by the European Commission through the H2020 Marie Skłodowska-Curie European Training Network H2020-MSCA-ITN-2014 VPH-CaSE, www.vph-case.eu, GA No. 642612.



Author(s): S Migliori, C Chiastra, M Bologna, E Montin, G Dubini, C Aurigemma, R Fedele, F Burzotta, L Mainardi, F Migliavacca

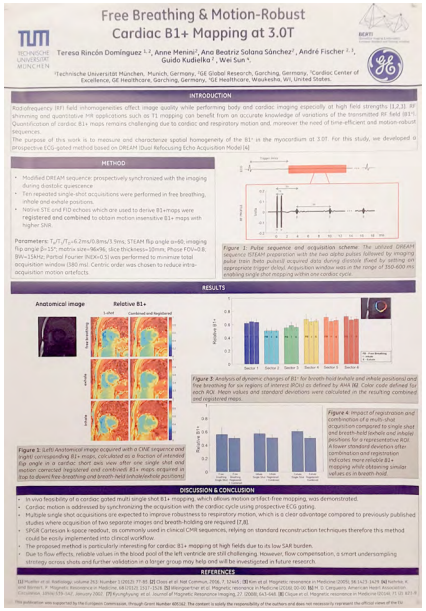
Organisation: Politecnico di Milano

Free Breathing & Motion-Robust Cardiac B1+ Mapping at 3.0T

Clinically relevant applications of cardiac MRI like quantitative tissue characterization of the myocardium require an accurate knowledge of the uniformity of the transmitted Radiofrequency field (B1+), especially at high field strengths. Several studies have reported that B1+ inhomogeneities can lead to image artifacts and thereby compromise diagnosis. However, quantification of cardiac B1+ maps remains challenging due to cardiac and respiratory motion and, moreover the need of time-efficient and motion-robust sequences. The purpose of this work is to investigate spatial homogeneity of the B1+ in the myocardium at 3.0T. For this study, we developed a prospective ECG-gated method based on DREAM (Dual Refocusing Echo Acquisition Mode). The presented approach allows free breathing multi-shot acquisition B1+ mapping and its feasibility is shown in vivo.

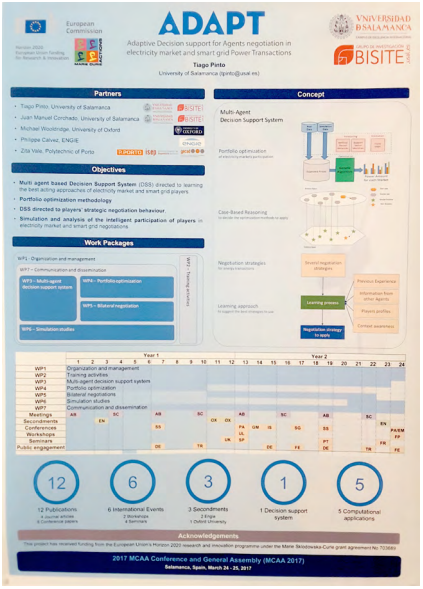
Author(s): Teresa Rincón, Anne Menini, Ana Beatriz Solana, André Fischer, Guido Kudielka, Wei Sun

Organisation: TUM Technical University Munich



ADAPT: Adaptive Decision support for Agents negotiation in electricity market and smart grid Power Transactions

ADAPT explores the theme of decision support for agents negotiations in the complementary environments of electricity markets and smart grids. The EU priority of increasing the penetration of renewable energy sources in the power system has led to the wide acceptance of the smart grid paradigm as the solution for several emerging challenges. Another EU priority is the creation of a Pan-European Energy Market. A relevant step was taken in 2015 with the coupling of several regional European markets. Despite the significant investments in the fields of smart grids and electricity markets, the two fronts are evolving quite independently from each other, evidencing the sector difficulties in profiting from the strong relationships among them. A relevant drawback is the lack of decision support solutions to enable involved players improving their outcomes from energy transactions. ADAPT tackles this gap by proposing a multi-agent decision support system to assist the negotiation process of smart grid and electricity market players. ADAPT is composed by: (i) a portfolio optimization that identifies the most gainful negotiation opportunities, considering the available markets, including negotiations at a smart grid level; and (ii) a decision support method for actual negotiations using novel machine learning approaches to choose the most suitable strategies for each context, considering opponents' negotiation profiles. ADAPT's quality and industry-driven nature is assured by the experience and complementary expertise of the candidate and host in the targeted fields, and is further enhanced by the participation of experts in the fields of artificial intelligence and power systems. Besides advancing in the multidisciplinary research fields, ADAPT is expected to impact the EU power sector, the industry and society as a whole, by contributing to the effective integration of smart grids in a market environment, and to the decrease of electricity prices through competitiveness.



Author(s): Tiago Pinto

Organisation: University of Salamanca

A Unified Framework for Smoothing, Tracking, and Forecasting via Continuous-Time Target Trajectory Fitting

This poster will present a unified framework for target inference including smoothing, tracking, and forecasting (STF), where the target is subject to a smooth evolving process in the space-time domain, e.g., the target moves with (nearly) constant velocity, or affected by negligible noises. The framework is applicable to a broad range of real world targets of significance such as passenger aircraft and ships, where little or no prior information is available about the target dynamics or the sensor observation statistics except the context information that “the trajectory is smooth” or “the target is descending”. Fundamentally different from the conventional Markov-Bayes formulation, the state process is characterized by a function in continuous time domain and the STF problem is formulated as an optimization problem with the goal of finding the target trajectory function that best fits the sensor data. As a result, the movement of the target at any time, whether the past (namely, smoothing), the current (filtering) or the future (forecasting), can be inferred from the trajectory function. Few assumptions are made on the statistical properties of either the target or the sensor, ensuring high flexibility and robustness of our approach. In addition, the proposed fitting-based STF framework has the advantages of incorporating arbitrary sensor revisit time and dealing with target maneuvering and missed detection. We compare the proposed method with the classical solutions using a variety of scenarios for both maneuvering and non-maneuvering target.

Author(s): Tiancheng Li

Organisation: University of Salamanca

How to fabricate a laser? A look into the microfabrication world

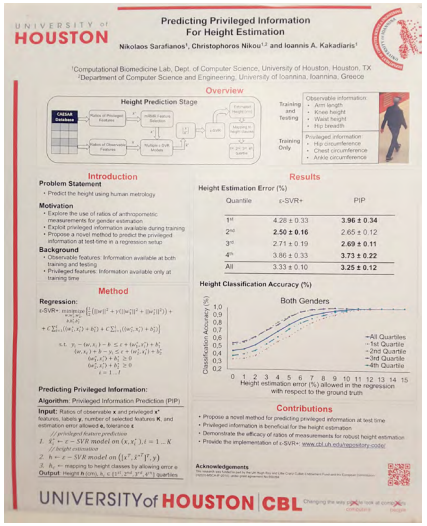
A photonic chip is a device that integrates many optical components (lasers, amplifier, waveguides…) with different functions. The dimensions of these components are in the micrometer scale. Thinking that the diameter of a human hair is just a few tens of microns gives a clear idea that the technology necessary to fabricate a chip involves many interesting challenges. For example, the fabrication needs to be performed in a clean environment where dust is not present. In the microfabrication word, indeed, a grain of dust is very large if compared to the manufactured components and its presence on a chip can make it unusable. That is why we need to do all the processes in a particular laboratory, called cleanroom. In a cleanroom the air is continuously filtered and temperature, pressure and humidity are kept constant. Extra care needs to be taken also by its users that are obliged to wear a special suit. This is necessary to avoid the contamination of the environment and at the same time to protect the skin from accidentally spilled chemicals. A clean environment is not the only challenge: how can we fabricated devices that are so small? What are the instruments that are used and how do they function? The purpose of this work is to give a panoramic picture of what microfabrication is, using a practical example: the fabrication of a laser. A laser is the main component of a photonic chip and its fabrication requires many different steps. We will therefore present the main fabrication tools used and explain their functioning. In particular, we will show the fabrication of a buried heterostructre laser, known for its good performances in terms of power consumption and thermal behavior.

Author(s): Valeria Rustichelli

Organisation: Eindhoven University of Technology (TU/e)

Predicting privileged information for height estimation

In this work, we investigate the problem of predicting gender from still images using human metrology. Since the values of the anthropometric measurements are difficult to be estimated accurately from state-of-the-art computer vision algorithms, ratios of anthropometric measurements were used as features. Additionally, since several measurements will not be available at test time in a real-life scenario, we opted for the Learning Using Privileged Information (LUPI) paradigm. During training, we used as features, ratios from all the available anthropometric measurements, whereas at test time only ratios of measurable (\ie, observable) quantities were used. We show that by using the LUPI framework, the estimation of soft biometric characteristics such as gender is possible. Gender classification from human metrology is also tested on real images with promising results.

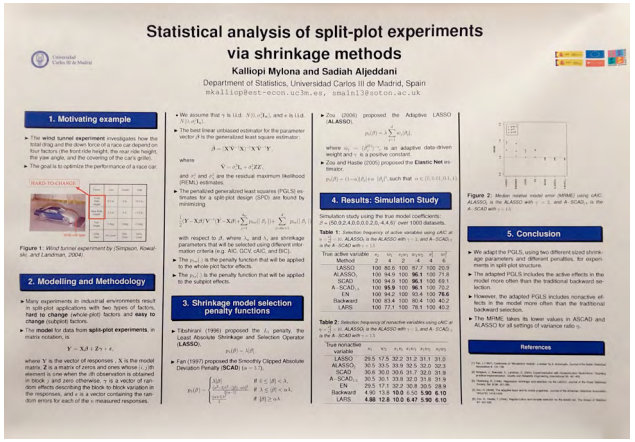


Author(s): Ioannis Kakadiaris, Nikolaos Sarafianos, Christophoros Nikou

Organisation: University of Ioannina

Statistical analysis of split-plot experiments via shrinkage methods

Designs with restricted randomisation are often more cost-effective than completely randomised designs. They are popular in industry both for developing new products and processes and for quality improvement experiments. Model selection for such experiments is an important problem that has not been well-studied to date. We extend available shrinkage methods, that perform model selection and estimation simultaneously, for application to experiments with restricted randomisation. We compare the performance of these extended shrinkage methods using data from a wind tunnel experiment and a freeze dried-coffee experiment, which were conducted under restricted randomisation.



Author(s): Kalliopi Mylona, Sadiah Al-Jeddani

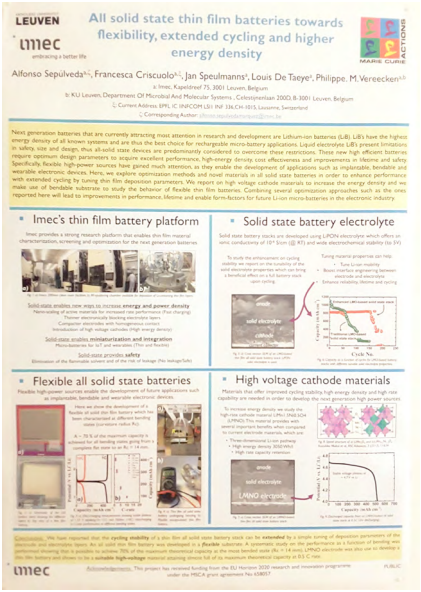
Organisation: Universidad Carlos III de Madrid

All solid state thin film batteries towards flexible, extended cycling and higher energy density

Next generation batteries that are currently attracting most attention in research and development are Lithium-ion batteries (LIB). LIB's have the highest energy density of all known systems and are thus the best choice for rechargeable micro-battery applications. Liquid electrolyte based batteries present limitations in safety, size and design, thus all-solid state devices are predominantly considered to overcome these restrictions. These new high efficient batteries require optimum design parameters to acquire excellent performance, high-energy density, cost effectiveness and improvements in lifetime and safety. Specifically, flexible high-power sources have gained much attention, as they enable the development of applications such as implantable, bendable and wearable electronic devices. Here, we explore optimization methods and novel materials in all solid state battery stacks in order to enhance battery performance with extended cycling by tuning thin film deposition parameters. We report on high voltage cathode materials to increase the energy density of the battery cell and we make use of several substrate materials to study the behavior of flexible thin film batteries. Combining several optimization approaches such as the ones reported here will lead to a huge improvement in performance, lifetime and facilitate the form-factor for future Li-ion micro-batteries in the electronic industry.

Author(s): Alfonso Sepúlveda, Francesca Criscuolo, Jan Speulmanns, Louis de Taeye, Philippe. M. Vereecken

Organisation: imec



Theoretical Study of Glutathione Analogues

Glutathione (gamma-L-glutamyl-L-cysteinyl-glycine, GSH) is essential in a number of biochemical processes in living organisms such as cell differentiation, proliferation, apoptosis, signal transduction, and gene expression [1,2]. Besides many of its other features, it is one of the most important antioxidants [1,2]. It is accumulated in several cellular compartments such as the cytosol, nucleus, and mitochondria [1,2]. There are many GSH analogues exist in different organisms which can work similarly as glutathione [3]. Different GSH analogues were compared using computational chemical methods. X-H bond dissociation energies were calculated and the antioxidant capacities were measured and compared. The structural features of the analogues were also compared.

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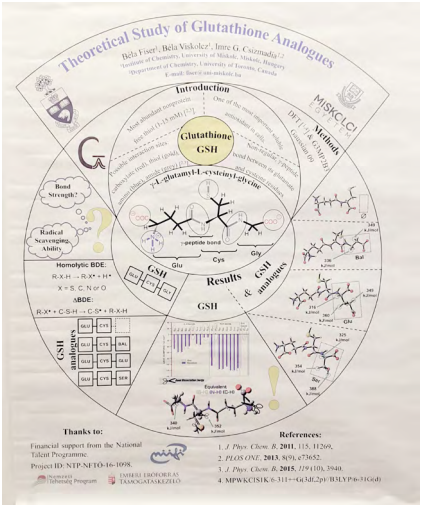
Acknowledgements:

BF thanks the financial support from the National Talent Programme (Project ID: NTP-NFTÖ-16-1098). Furthermore, the generous support from the University of Miskolc is gratefully acknowledged.



Author(s): Béla Fiser, Imre G. Csizmadia, Béla Viskolcz

Organisation: University of Miskolc

Growth of sustainable, rare-earth and noble-metal-free metallic coatings via electrodeposition

The paucity of raw materials and the devastating environmental implications of the widespread use of toxic elements in high-tech industry has brought the urgent need for sustainable, environmentally-friendly alternatives to the forefront. Electrodeposition is a simple and low-cost process which allows us to grow continuous or patterned metallic films at fast rates. Additionally, given the current trend towards miniaturization, electrodeposition can be used to produce small components in diverse and fairly complex architectures. The objective of our research within the scope of the SELECTA ITN is the fabrication of sustainable continuous and porous bimetallic coatings for applications in micro- and nanoelectromechanical systems (MEMS/NEMS) by means of electrodeposition while employing minimally invasive electrolytic baths. Film properties are systematically investigated using various materials characterization and analysis techniques such as scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM/EDX), X-ray Powder Diffraction (XRD) and Vibrating Sample Magnetometry (VSM).

Acknowledgements

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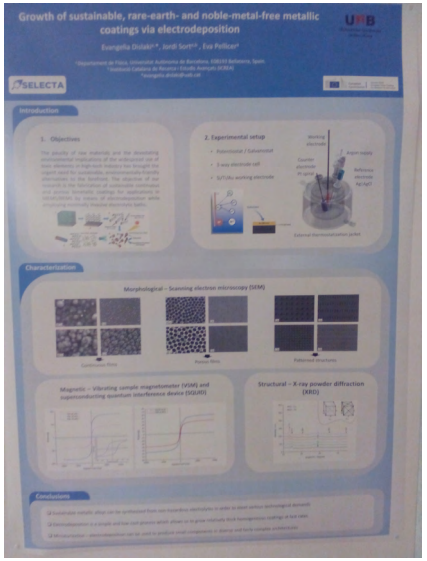
Author(s): Evangelia Dislaki, Jordi Sort, Eva Pellicer

Organisation: Universitat Autònoma de Barcelona (UAB)

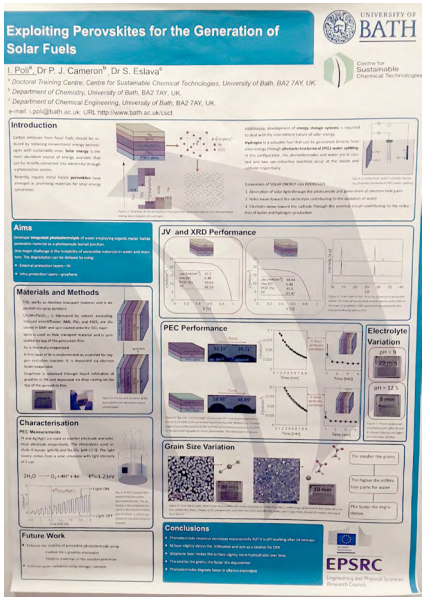


Exploiting Perovskites for the Generation of Solar Fuels

By 2050 it is expected that the world energy demand will double, due to the growth in human population and the development in densely populated countries such as China and India. In parallel, fossil resources are dwindling, becoming more expensive, and contributing to an increase in carbon dioxide (CO2) emissions which exacerbate global warming. Very recently, a new generation of mixed organic-inorganic halide perovskites have been initiated, offering an opportunity to avoid using fossil fuels and exploiting solar energy to generate electricity or fuels.These materials are inexpensive, they can be easily processed at low temperature and they promise to reach the highest efficiency. ‘Perovskite’ refers to structure ABX3, where A and B are cations and X is a halide anion (e.g. CH3NH3PbI3, typically called MAPI). These perovskite solar cells have made a tremendous progress over the last few years. Very promising efficiencies, that already far exceeded those for other 3rd generation photovoltaics, have been achieved. One of remaining issues with perovskite solar cells is lack of stability; in particular the cells are very moisture sensitive. This issue limits their lifetime and their use in a range of application such as photoelectrodes for water splitting. This PhD project focuses on investigating protecting layers and hydrophobic binders to further increase the long term stability of the material.

Author(s): Isabella Poli, Petra Cameron, S. Eslava

Organisation: Univeristy of Bath



Mitochondrial membrane protein misfolding studied in S. cerevisiae as model system

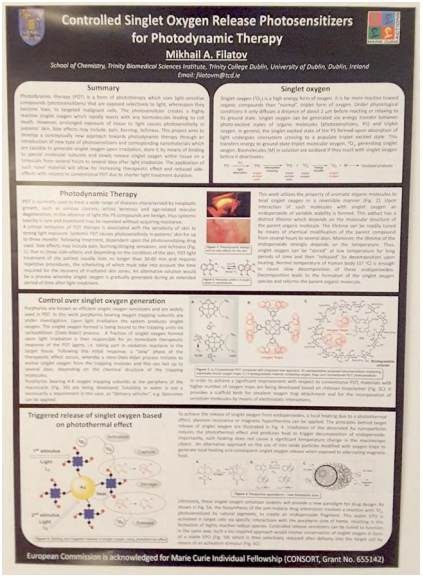
The amyloid hypothesis is regarded as one of the most promising causative theories of Alzheimer's disease. This hypothesis is based on the observation that protein aggregation into amyloid fibrils represents a general phenomenon. In this context, we have recently demonstrated that also α-helical membrane proteins exhibit an aggregation behaviour similar to that of cytosolic proteins. In parallel, by carrying out transcriptome-wide studies we have recently identified a set of proteins that are aggregation prone and that are downregulated in Alzheimer's disease. A substantial fraction of these proteins are membrane proteins. They are closely involved in certain biochemical pathways, including most prominently the oxidative phosphorylation (OP). To investigate the aggregation behaviour and the role in neurodegenerative disorders of these OP proteins, which are all mitochondrial membrane proteins, we exploit the S. cerevisiae model system. We use import mutants and overexpressing strains to investigate the structural properties of aggregates of OP proteins, and determine the cellular responses to their aggregation at the transcriptome and proteome levels. We anticipate that the results of these experiments will give further insights in the potential role of OP protein aggregation and regulation in neurodegeneration, and Alzheimer's disease in particular.

Author(s): Karen Stroobants

Organisation: University of Cambridge

Controlled Singlet Oxygen Release Photosensitizers in Photodynamic Therapy

Photodynamic therapy is a form of phototherapy which uses light-sensitive compounds (photosensitizers) that are exposed selectively to light, whereupon they become toxic to targeted malignant and other diseased cells. The photosensitizer creates a highly reactive singlet oxygen species which rapidly reacts with any nearby biomolecules leading to destructive reactions resulting in cell death through apoptosis or necrosis. However, prolonged exposure of tissue to light irradiation causes photosensitivity in patients' skin. Side effects may include, pain, burning/stinging sensation, itchiness. This work aims to develop a conceptually new approach towards photodynamic therapy through an introduction of new type of photosensitizers and corresponding nanomaterials which are capable to generate singlet oxygen upon irradiation, store it by means of binding to special molecular subunits and slowly release singlet oxygen within tissue on a timescale from several hours to several days after light irradiation treatment. The application of such novel material is expected to increase therapeutic effect and reduce side-effects with respect to conventional PDT due to shorter light treatment duration.



Author(s): Mikhail A. Filatov

Organisation: Trinity College Dublin

Electrodeposition of manganese layers from aqueous electrolytes

The research interest in electrodeposition of manganese (Mn) has recently increased due to the wide range of applications as single metal or alloy constituent. The present work shows that Mn coatings of good quality can be electrodeposited on polycrystalline Au substrates sputtered on glass from a sulfate electrolyte containing MnSO4, (NH4)2SO4 and H3BO3 with a constant pH value of 3. Cyclic voltammetry (CV) curves and Electrochemical Quartz Crystal Microbalance (EQMC) measurements were recorded to investigate the behavior of the electrochemical system. Scanning Electron Microscopy (SEM) coupled with Energy dispersive X-ray spectroscopy (EDX), Glow Discharge Optical Emission Spectrometry (GD-OES) and X-ray Photoelectron Spectroscopy (XPS) were applied to investigate the effect of the applied potential and the concentration of ammonium sulfate on the properties of the Mn deposits. Previous studies have reported that (NH4)2SO4 is essential to grow Mn coatings, providing good coverage, decreasing the precipitation of manganese hydroxides and improving the conductivity of the electrolyte. Morphology of the Mn deposits was found to change with the different concentrations of (NH4)2SO4, but no effect of the applied potential was detected. However, GD-OES measurements revealed an impact of the value of the applied potential in the chemical composition and thickness of the coatings. Electrodeposition of Mn is only possible at very negative potentials and long deposition times. This causes water decomposition, resulting in a high hydrogen evolution rate which leads to a significant increase of the pH value in the electrolyte. This is the reason why manganese hydroxides are formed. Therefore, control of the pH value of the electrolyte during the deposition is essential for avoiding the precipitation of manganese hydroxides, as confirmed by XPS analysis.

Funding of this work by the European Commission within the H2020-MSCA-ITN-2014 SELECTA, grant agreement no. 642642 is gratefully acknowledged.

Author(s): Mónica Fernández-Barcia, Volker Hoffmann, Steffen Oswald, Margitta Uhlemann, Annett Gebert

Organisation: Institute for Complex Materials

Liquid-Assisted Pulsed Laser Ablation: A Novel Route to Produce Multifunctional Contrast Agents for Multimodal Imaging Diagnosis

Multimodal diagnosis by combining mammography, MRI and X-ray CT techniques, such as play a leading role in the diagnosis of breast cancer. [1] However clinical application of this multimodal approach is problematic due the lack of commercial contrast agents showing capabilities to distinguish between malignant tumours and benign abnormal masses. Hybrid nanoparticles, which contain both magnetic and radiopaque elements are a promising alternative for the generation of these multimodal contrast agents Unfortunately, conventional chemical procedures to synthesize multimodal nanoparticles in liquid media suffer from serious drawbacks for large-scale production. [2] Liquid-Assisted Pulsed Laser Ablation of massive plates has proved as an efficient synthesis method for a wide range of stable nanoparticles in a variety of liquids. [2] Therefore, a new synthesis method to prepare multimodal nanoparticles is presented here. This method consists in the laser ablation of custom-made ceramic plates submerged in different liquids, which contain both a magnetic (iron) and a radiopaque element, showing the same composition of the projected multimodal nanoparticles. Water stable colloidal dispersions of Fe2WO6, FeSrO3, FeBiO3, FeLaO3, FeTaO4, FeYbO3 nanoparticles have been synthesized as proof of concept of this method. X-ray absorption properties showed a dependence on the radiopaque element. A systematic investigation has been conducted to explore the influence of the quality of the ceramic plates, the solvent nature and the laser parameters on the productivity and characteristics of the as-synthesized nanoparticles. Results showed that the solvent nature and the width of the laser pulse played a significant role on the control of the composition and structure of the as-synthesized nanoparticles; whereas the laser fluence and pulse accumulation strong affects the size, nanoparticle polydispersity and productivity.

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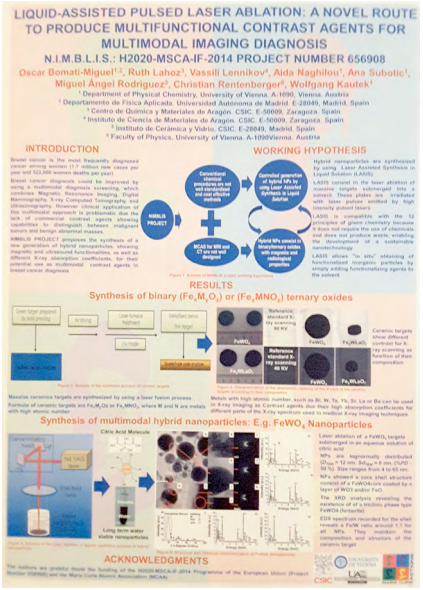
Author(s): Bomati-Miguel, R. Lahoz, V. Lennikov, A. Naghilou, A. Subotic, M.A. Rodríguez, C. Rentenberger, W. Kautek

Organisation: Department of Physical Chemistry, University of Vienna



Metal-organic Frameworks as good candidates for the development of more effective therapies

In general, although a wide variety of therapeutic agents are used, in many cases the effectiveness of the treatment is limited by their rapid biodegradation and elimination from the body. A great effort is currently being made to develop methods that achieve the administration of bioactive molecules, specifically, during a long timeframe and at a controlled rate. In this context, metal-organic frameworks (MOFs) –a new class of synthetic porous crystalline materials based on metal ions connected through spacing ligands– can be considered as good candidates for the transport and release of drugs [1,2]. In order to shared some light on rationalizing the drug adsorption/delivery process and further emphasizing the most relevant chemical and structural features that significantly impact on MOFs´ drug encapsulation capacity and subsequent delivery, we have studied the application of the porous matrices MIL-100 [Fe3F(H2O)2O(btc)2] nH2O (n ~ 14.5) (btc: 1,3,5-benzene tricarboxylic acid), UiO-66 [Zr6O4(OH)4(bdc)6] nH2O (bdc: terephtalic acid) and MIL-127 [Fe3O(abtc)1.5(H2O)3](H2O)(OH)] (abtc: 3,3',5,5'-azobenzenetetracarboxylic acid) in the controlled delivery of two model drugs: aspirin and ibuprofen. The results showed that all these materials can successfully incorporate and deliver both drugs following different kinetics depending on the host and guest nature.

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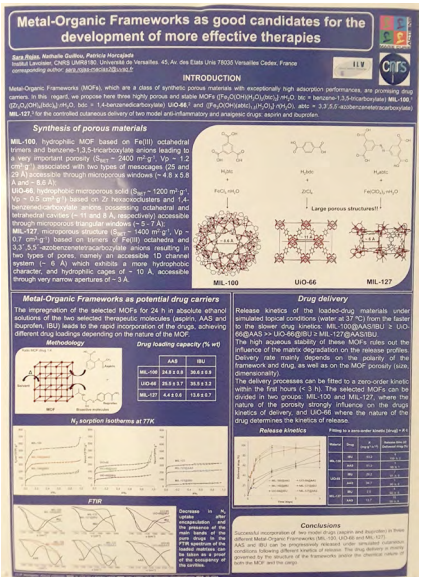


Author(s): S. Rojas, N. Guillou, P. Horcajada

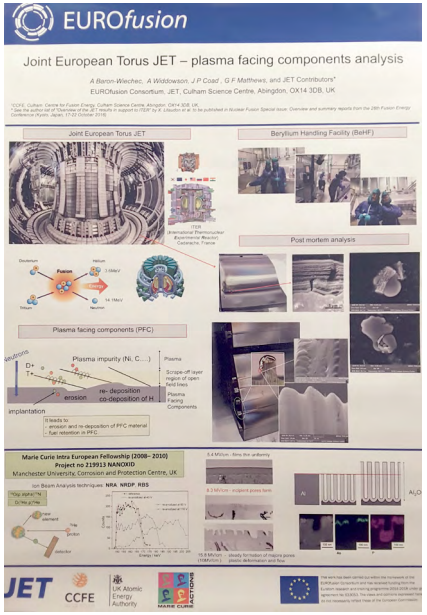
Organisation: Institut Lavoisier Versailles

Join Europeans Torus JET - plasma facing components analysis

I joined the University of Manchester in 2008 as a Marie Curie Fellow (IEF). During that time I was also a frequent user of the van de Graaff accelerator at the Université Pierre et Marie Curie in Paris. Carrying out nuclear experiments at the Université Pierre et Marie Curie, so close to a museum dedicated to Madam Curie and just few hundred meters from her tomb in Pantheon, I almost felt her presence… she might have been an alpha particle dancing inside a working chamber in a laboratory room. For me - Polish woman scientist – the experience had an additional mystical dimension. The poster presents my research focused predominantly on understanding the growth mechanisms of self-ordering nano-porous anodic oxides on light metals, which have a wide range of applications in nanotechnology and in the aerospace and transportation industry.

The research methodology of the MC project was based on tracer studies of initiation of film growth and later pore development, using tracers incorporated into the anodic oxide from the electrolyte. The idea of using a tracer presented in the poster is very simple and elegant. The tracer species include electrolyte anion species (W, As, Se) and isotopes such as 18O. I will present how I have optimized tracer method in order to study ionic transport in the oxides by means of Ion Beam Analysis.

Combined comprehensive hands-on experience obtained during my MC fellowship and more importantly transferable skills gave me an important confidence for moving to UK Atomic Energy Authority and join group of scientist and engineers working on nuclear fusion. I am proud to be part of truly international team working on ultimate clean energy goal – fusion power. I will also present how I transferred my knowledge to my new role as a nuclear fusion scientist.



Author(s): A Widdowson, J P Coad , G F Matthews, A Baron-Wiechec, JET contributors

Organisation: UK Atomic Energy Authority

Quantum technology hub: sensors and metrology

Sensors are used in everyday technologies to detect motion, sound, light and many physical phenomena. They range from the billions of low-cost motion sensors in mobile phones to high-end, high-value systems in healthcare and Earth observation. Currently, there is a global effort underway by the major industrialised nations to exploit quantum mechanics to develop smaller, cheaper, more accurate and energy efficient components and systems. The aim is to translate excellent quantum science from research labs into technology which will have impacts on a range of fields, from aerospace to healthcare. We will report on the current progress of the UK National Quantum Technologies Programme in Sensors and Metrology, part of a £270 million, five-year investment. Amongst a range of technologies, we will focus on a few case studies which indicate the potential of quantum technology. Quantum magnetometers, which offer higher sensitivity to brain scans based on magnetoencephalography, promise to make certain types of healthcare screening more cost-effective [1]. Cold-atom sensors are expected to improve gravity surveying and could give the construction industry certainty of the underground environment, reducing delays due to unexpected hazards and removing the need for expensive exploratory excavation [2].

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Author(s): M. G. Bason

Organisation: University of Nottingham

NanoPieZoelecTrics: Novel Nanoporous PZT Materials for Efficient Utrasonic Biomedical Sensors

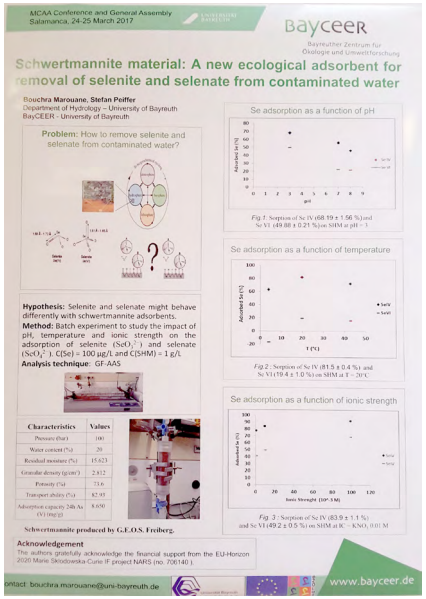
Piezoelectric materials have become a key technology for a wide range of industrial and consumer products with a robust global market of U.S. $21 billion in the last 2013. Current technology includes applications on actuators, ultrasonic motors, sensor arrays for structural health monitoring, transformers, micro-energy harvesting devices, hydrophones, high resolution ultrasonic medical imaging, computer disk drives, and accelerometers in mobile phones and notebooks. Currently the most important piezoelectric ceramic materials are based on mixed oxide crystal system consisting of lead, zirconium and titanium, well known as lead zirconate titanate (PZT). Cost-effective and efficient synthetic strategies, structural modifications and doping by metal ions represent the key steps to significantly improve the performance of piezomaterials, such as piezoelectric, dielectric and mechanical stability properties. In this frame, NanoPieZoelecTrics project proposes a new research methodology based on the preparation, characterization and testing of hierarchical porous PZT-doped using alternative synthetic approaches (EISA method) and new doping materials (porous Mg-Niobate, Graphene/Molybdenite and Nanocellulose) to achieve important innovations and overcome the current state of art on the field of hydrophones and high resolution ultrasonic medical applications. Furthermore, KNN piezoceramics will be also evaluated as new lead-free piezo materials, as recently recommend by the European guidelines, with enhanced properties. Innovations are represented by the preparation of highly-efficient porous PZT and KNN matrices with very-high surface area whit the idea to enhance the contact between piezo-matrix and media (water, medical gels, etc) and then increasing the sensibility and piezoelectric response of the device. The potential of porous piezoceramics for biomedical applications and some of the recent results achieved in the NanoPieZoelecTrics project will be here reported.

Author(s): Dr. Sebastiano Garroni, Dr. Santiago Cuesta Lopez

Organisation: ICCRAM-University of Burgos (UBU)

Schwertmannite material: A new ecological adsorbent for removal of selenite and selenate from contaminated water

Selenium oxyanions; mainly selenite (Se IV) and selenate (Se VI) present a real threat to aquatic environments and human health. The risk shows up when their concentration is higher than the EU drinking water standard (10 µg/L). To remove selenium from contaminated water, adsorbent techniques remain the most advantageous due to their simple design and cost-effectiveness. Schwertmannite (SHM) an iron oxyhydroxide (Fe8O8(OH)6SO4) has been recently applied with success to remove chromate and arsenate. Therefore, SHM is a good candidate to reduce selenium oxyanions. The objective of NARS project is to develop an ecological filter based on SHM adsorbents to reduce both selenite and selenate from contaminated water. The methodology adopts an interdisciplinary approach combining hydrochemistry and technical development. At the beginning, it focuses on two steps: first, understanding the relationship between Se oxyanion adsorption, pH and the surface of SHM adsorbents and second, reducing the competitiveness of sulphate towards selenate in raw water. The expected results aim to: i) Fill in the knowledge gap on SHM-Se oxyanions surface interactions ii) Optimise the performance of SHM adsorbents and predict their long-term loading capacity. iii) Explore the regeneration of SHM adsorbents and the potential use of waste material into industries using Se. The first results of NARS project show that the adsorption on SHM of selenite is stronger than selenate, and it is highly impacted by pH, temperature, and ionic strength.



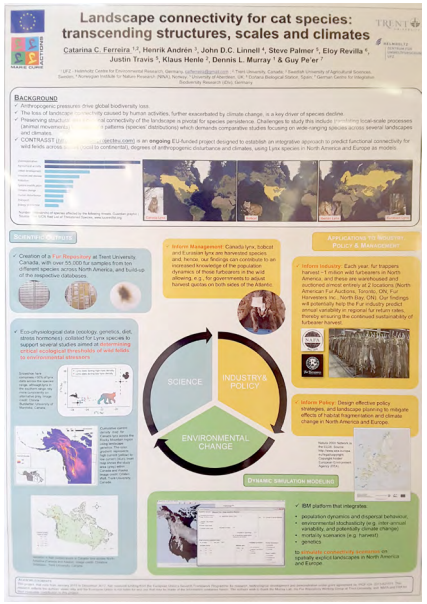
Author(s): Bouchra Marouane, Stefan Peiffer

Organisation: University of Bayreuth

Landscape connectivity for Cat species: transcending structures, scales and climates

Biodiversity loss worldwide results from human induced pressures. Fragmentation of habitats is a key source of pressure on populations and its impacts are likely to be exacerbated by climate change. Thus, identifying the key landscape elements that preserve structural and functional properties of ecosystems across contexts and scales is crucial. Yet, several challenges arise: the spatial scale(s) at which the restoration of connectivity between fragments will best buffer climate change effects, populations' resilience thresholds (e.g. peripheral vs. core populations), the proximate mechanisms driving migration pulses, and the translation of local-scale processes (animal movements) to large-scale patterns (species' distributions). These issues are best addressed through comparative studies across a wide range of landscapes and climates. Hence, the general aim of project CONTRASST is to establish an integrative ecophysiological approach across scales, to predict functional connectivity for umbrella species, and provide conservation guidelines across fragmentation and climate scenarios. CONTRASST is funded by the European Commission within the 7th Framework Programme of the EU, from 2015 to 2017, through a Marie Curie Outgoing International Fellowship for Career Development. It aims specifically to investigate ecophysiological differences in the tolerance to environmental stressors and determine the proximate mechanisms that drive dispersal pulses between peripheral and core populations; identify important corridors, stepping stones and barriers for dispersal through landscape genetics analyses, and use individual-based models to study how local-scale processes translate into large-scale patterns of species distribution. These research questions are explored using lynx species as models across North America and Europe, by integrating ecological and environmental data from both continents using state-of-the-art modelling tools.

To know more about CONTRASST see http://contrasstprojecteu.com.

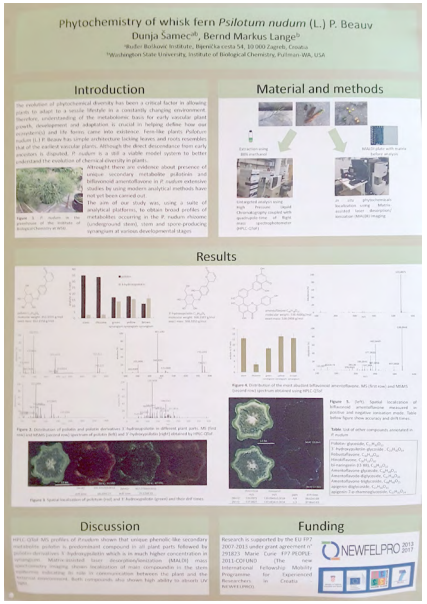


Author(s): Catarina C. Ferreira, Henrik Andrén, John Linnell, Steve Palmer, Eloy Revilla, Justin Travis, Klaus Henle, Dennis L. Murray, Guy Pe'er

Organisation: UFZ

Phytochemistry of whisk fern Psilotum nudum (L.) P. Beauv

Phytochemicals play critical roles in diverse physiological and pathological processes by participating in biological reactions that are necessary for proper biological functions and plant environment interactions. Therefore, phytochemicals diversity of early vascular or so called “living fossils” are crucial in order to understand metabolic processes which regulate plant adaptations. The main goal of our study was assessment of metabolic diversity in whisk fern Psilotum nudum (L.) P. Beauv as representative of early vascular plants. Extracts from various Psilotum nudum (L.) P. Beauv tissues and organs were subjected to untargeted metabolomic analyses by High Performance Liquid Chromatography – Quadrupole Time of Flight Mass Spectrometry which results in hundreds of diverse metabolites. Predominant metabolites, biflavonoid amentoflavone and signature phenolic glycoside psilotin in areal plant parts od P. nudum were in addition subject for Matrix-Assisted Laser Desorption/ Ionization Mass Spectrometry Imaging. Our results provide valuable data about ferns phytochemicals and are discussed in the context of the known phytochemicals of extant seedless vascular plants in order to gain a better understanding of the processes that underpin plant evolution in general.

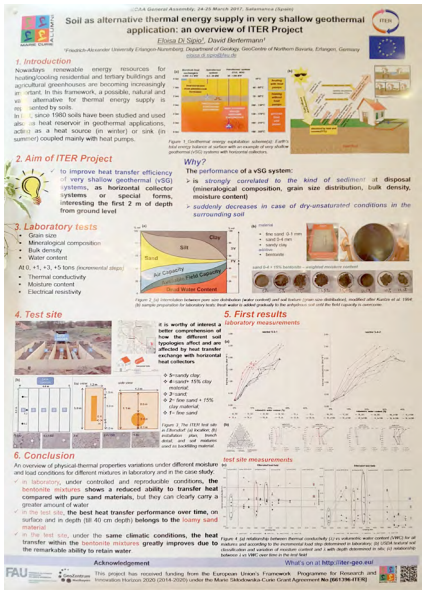


Author(s): Dunja Šamec, Bernd Markus Lange

Organisation: Ruđer Bošković Institute

Soil as alternative thermal energy supply in very shallow geothermal application: an overview of ITER project

Nowadays renewable energy resources for heating/cooling residential and tertiary buildings and agricultural greenhouses are becoming increasingly important. In this framework, a possible, natural and valid alternative for thermal energy supply is represented by soils. In fact, since 1980 soils have been studied and used also as heat reservoir in geothermal applications, acting as a heat source (in winter) or sink (in summer) coupled mainly with heat pumps. Therefore, it is worthy of interest a better comprehension of how the different soil typologies (i.e. sand, loamy sand...) affect and are affected by the heat transfer exchange with heat collectors, especially when horizontal ones (very shallow geothermal installations) are adopted. In this study the preliminary results of ITER Project (http://iter-geo.eu/), funded by European Union, are shown. An overview of physical-thermal properties variations under different moisture and load conditions for different mixtures of natural material is presented, based on laboratory and field test data.



Author(s): Eloisa Di Sipio, David Betermann

Organisation: Friedrich-Alexander University Erlangen-Nuremberg

Characterization of the anaerobic degradation of phenanthrene by a novel sulfate-reducing bacterial enrichment culture

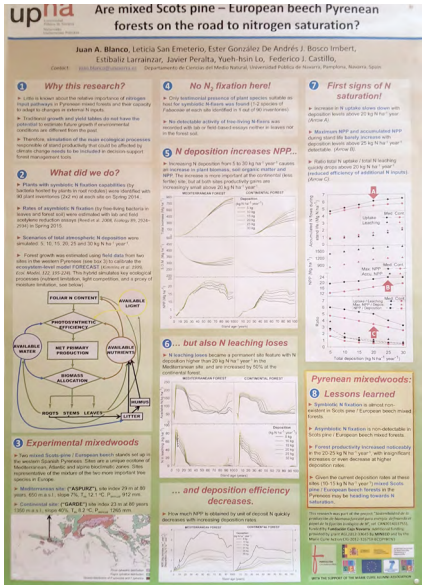
Polycyclic aromatic hydrocarbons (PAHs) are widely distributed contaminants that produce hazardous effects on human health. In PAH-contaminated sites, oxygen is rapidly depleted. Thus, microorganisms able to use these compounds as a carbon source in the absence of molecular oxygen are crucial for their consumption. Phenanthrene is a 3-ring PAH mostly found in fossil fuels and is also one of the products of their incomplete combustion. The aim of this project is to elucidate the enzymes and mechanisms of the anaerobic degradation of phenanthrene by a novel sulfate-reducing enrichment culture (TRIP) obtained from the Pitch Lake in Trinidad-Tobago, the world largest natural asphalt lake. TRIP exhibits surprisingly fast growth rates with phenanthrene as substrate, offering the unique opportunity to study anaerobic phenanthrene degradation in detail. The metagenome of TRIP has been sequenced and annotated at MicroScope (Microbial Genome Annotation & Analysis Platform, Genoscope). Analysis of the sequences corresponding to 16S rRNA genes allowed identifying two bacterial strains belonging to the Desulfobacteraceae family of Deltaproteobacteria, a putative Paludibacter, an uncultured Spirochete and a previously unclassified bacterium. Analysis based on sequence similarity to genes previously characterized for naphthalene degradation resulted in the identification of two gene clusters encoding the subunits of a carboxylase enzyme potentially involved in the activation of phenanthrene. Most of these enzymes were only found in one of the Desulfobacteraceae species suggesting this organism has a major role in phenanthrene degradation. Moreover, gene clusters encoding reductases have been identified potentially involved in subsequent ring dearomatization and reduction steps. A metatranscriptomic analysis of TRIP will be performed. This will allow identifying the genes specifically induced during growth with phenanthrene. Finally, strategies will be developed for obtaining pure bacterial cultures of the phenanthrene-degrading strains. Bacteria will be physiologically characterized to elucidate the optimal environmental conditions for bacterial growth and phenanthrene degradation.

Author(s): Ivana Kraiselburd, Thomas Bruls, Rainer U Meckenstock

Organisation: Biofilm Centre, University of Duisburg-Essen

Are mixed Scots pine - European beech Pyrenean forests on the road to nitrogen saturation?

Anthropogenic activities have caused chronic high N deposition levels that may disrupt N cycling in temperate forests. To test such hypothesis, we researched N cycling at two Scots pine / European beech mixed forests in the Western Pyrenees (Navarre, Spain). One forest is placed at 1350 m.a.s.l. and has a continental climate, whereas the other forest is placed at 650 m.a.s.l. and has a wet Mediterranean climate. We conducted understory plant inventories to identify plant species with capacity to host symbiotic N2-fixers. We also used the acetylene reduction technique to estimate the rates of N2 fixation by free-living N2-fixers. Plant inventories indicated a testimonial to null presence of symbiotic N2-fixers hosts (i.e. legumes) at both sites. Field tests indicated almost null rates of non-symbiotic N2 fixation in the forest soil layers. These results indicated that the main N input was N deposition, and therefore we estimated the dependence of ecosystem productivity with a sensitivity analysis with the FORECAST ecological model, calibrated for these sites. Six scenarios were simulated with N inputs in the range of 5 to 30 kg ha-1 year-1. Simulations results indicated that forest productivity is linked to deposition N inputs, although they can start to get saturated at about 25 kg N ha-1 year-1, approximately twice the current deposition rate.

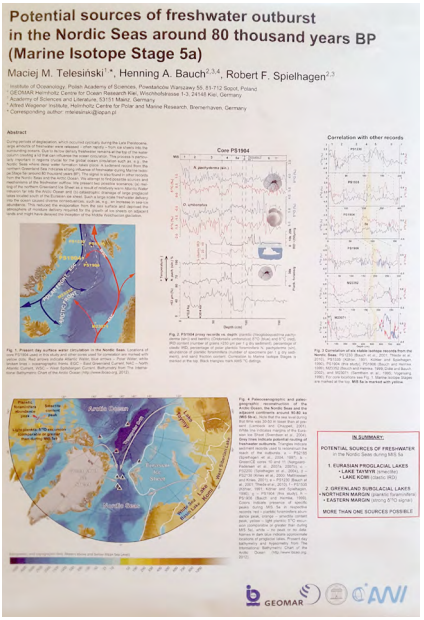


Author(s): JA Blanco, L San Emeterio, E González de Andrés, JB Imbert, E Larrainzar, J Peralta, YH Lo, FJ Castillo

Organisation: Universidad Pública de Navarra

Potential sources of freshwater outburst in the Nordic Seas around 80 thousand years BP (Marine Isotope Stage 5a)

During periods of deglaciation, which occurred cyclically during the Late Pleistocene, large amounts of freshwater were released – often rapidly – from ice sheets into the surrounding oceans. Due to its low density freshwater remains at the top of the water column creating a lid that can influence the ocean circulation. This process is particularly important in regions crucial for the global ocean circulation such as, e.g., the Nordic Seas where deep water formation takes place. A sediment record from the northern Greenland Sea indicates strong influence of freshwater during Marine Isotope Stage 5a (around 80 thousand years BP). The signal is also found in other records from the Nordic Seas and the Arctic Ocean. We attempt to find possible sources and mechanisms of the freshwater outflow. We present two possible scenarios: (a) melting of the northern Greenland Ice Sheet as a result of relatively warm Atlantic Water intrusion far into the Arctic Ocean and (b) catastrophic drainage of large proglacial lakes located south of the Eurasian ice sheet. Such a large scale freshwater delivery into the ocean caused diverse consequences, such as, e.g., an increase in sea-ice abundance. This reduced the evaporation from the sea surface and deprived the atmosphere of moisture delivery required for the growth of ice sheets on adjacent lands and might have delayed the inception of the Middle Weichselian glaciation.



Author(s): Maciej M. Telesiński, Henning A. Bauch, Robert F. Spielhagen

Organisation: Institute of Oceanology Polish Academy of Sciences

Bioassay integration under the European Water Framework Directive?: A step towards an ecological approach: QWATER MC-IF project

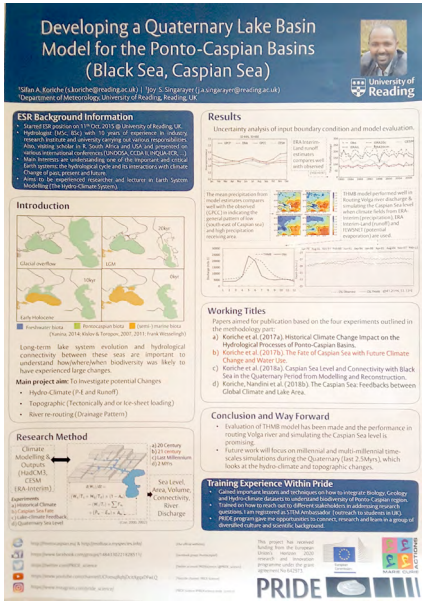
The Water Framework Directive (WFD) aims at ensuring the 'good water status' of EU water bodies and includes both chemical and ecological status. To achieve and assess a 'good ecological status', the WFD advocates the integration of various lines of evidence, and demands a set of low-cost tools and techniques to deliver appropriate data. Under this approach, the European Marie Curie QWATER project was aimed to gauge the ecological relevance of integrating short-term toxicity bioassays and biomarkers into quality elements in the WFD, as these may contribute to our ability to assess and manage EU water bodies. Ecologically relevant in situ cost-effective toxicity bioassays were use in a battery of in situ bioassays using representative species for several key functions in the ecosystem. Biomarkers, determined on the individuals used for the bioassays, were also integrated. Principal component analyses (PCA) were performed independently for each source of information, in order to improve the interpretation of the resultant PCA-factors in biological terms, and to verify whether the integration of 'quality elements' (bioassays and biomarkers) did (or did not) strengthen the robustness of the standard Ecological Quality Status approach used to assess water quality. Results shown some discrepancies in the water quality determined from each independent factor. Therefore, only by interpreting the values of all PCA-factors together is possible to perform a complete assessment of water quality status. The European regulatory authorities are presently in the phase of implementing the WFD based on community level approaches all over Europe. Interestingly, bioassays developed here and biomarkers, are available tools to be introduced as new feasible, cost-effective and sensitive protocols in the WFD for assess the Ecological Quality Status of water bodies. Overall, this project allowed us to efficiently contribute to national and international efforts focused in evaluating the water quality in European water bodies.

Author(s): Martinez-Haro M, Acevedo P, Pais-Costa AJ, Vieira LR, Neto J, Taggart MA, Álvarez-Ospina N, Guilhermino L, Ribeiro R, Marques JC

Organisation: University of Castilla-La Mancha

Developing Quaternary Lake Basin Model for the Ponto-Caspian Basins (Black Sea, Caspian Sea)

The Black and Caspian Seas are home to many endemic aquatic species, which are currently experiencing a biodiversity crisis due to invasive species, habitat destruction, and climate change. Understanding when/where/how the biota has responded to similar natural drivers in the past is key to assessing and managing current and future anthropogenic impacts. Connections between these seas have occurred numerous times, with the possibility of exchange of biotic and abiotic materials, which led to enormous biodiversity change and influenced the distribution and diversity of marine fauna. As part of ITN project funded by EU Horizon 2020 called PRIDE (the drivers of Ponto-Caspian biodiversity RIse and DEmise), my focus is to develop a lake basin model for Ponto-Caspian basins for investigating climate change impacts on hydrological processes, lake/sea level change, and connectivity between the Black and Caspian Seas during the Quaternary period (the last 2.5 million years). These include understanding the main driving mechanisms of lake level change on multi-millennial and millennial time-scales, and reconstructing lake level changes on the basis of known and modelled driving forces (e.g. regional glacial-interglacial climate changes, topographic changes, ice-sheet damming).



Author(s): Sifan A. Koriche, Joy S. Singarayer

Organisation: University of Reading

Non targeted analysis of dissolved organic matter in wastewater treatment

Dissolved organic matter (DOM) in waste water represents a mixture of macromolecules such as polysaccharides, nucleic acids, soluble microbial products and synthetic organic chemicals. The organic chemicals fraction includes surfactants, personal care products, pharmaceuticals, pesticides, but also a wide range of transformation products, intermediates and metabolites.

Analysis of DOM in wastewater and detection of potentially hazardous contaminants with traditional targeted approaches is limited to a narrow range of selected compounds, thus neglecting a multitude of active substances, both from the initial wastewater and those emerging during the treatment. Analysis of the entire content of DOM in waste water using advanced capabilities of liquid chromatography-high resolution mass spectrometry (LC-HRMS) offers to understand treatment processes and fate of contaminants therein better.

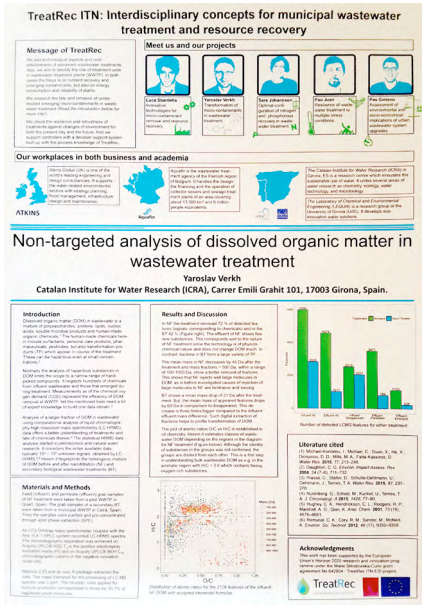
This study focuses on profiling of HRMS data. The method considers the available data (typically 1000 – 10000 mostly unknown signals) obtained by LC-HRMS. A comprehensive list of signals with respective molecular properties is constructed using the signal data of LC-HRMS.

This approach was used to fingerprint the organic content in wastewater cleaned with biological treatment. The data was treated with the open-source software Mzmine 2 (toolbox for MS-data processing) and analyzed with R (free environment for statistical computing). Predicted elemental formulae of signals were employed to construct diagrams of atomic ratios which were then used to compare the chemical picture of the DOM in different samples. Parameters on the overall elimination efficiency of the wastewater treatments and on the molecular characteristics of DOM after treatment were obtained.

Acknowledgment:
This work has been supported by the European Union's Horizon 2020 research and innova-tion programme under the Marie Sklodowska-Curie grant agreement No 642904 - TreatRec ITN-EID project.

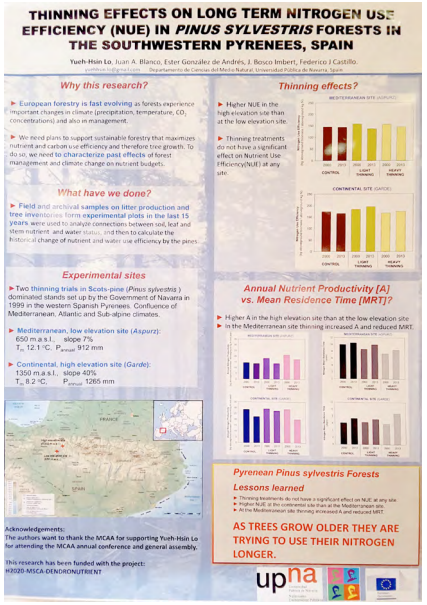
Author(s): Yaroslav Verkh

Organisation: Catalan Institute of Water Research



Thinning Effects on Long Term Nitrogen Use Efficiency (NUE) in Pinus sylvestris forests in the Southwestern Pyrenees, Spain

European forestry is fast evolving as forests are experiencing important changes in climate, biodiversity and management, changing the idoneity of traditional forestry in Scots pine forests. We used inventory data from two Scots pine-dominated sites in the Southwestern Pyrenees. The first is a high elevation (1335 masl) continental/subalpine site, while the second is located in a low elevation (635 masl) Mediterranean/montane forest. At both sites, thinning trials (20 and 30% basal area removed) were carried in 1999, and at the Mediterranean site again in 2009. We calculated the nitrogen use efficiency (NUE) for the past 15 years, and its components (annual nutrient productivity [A], and mean residence time [MRT]). We found that there is higher NUE in the high elevation site than at the low elevation site. Thinning treatments do not have a significant effect on NUE at any site, but in the Mediterrean site thinning increased A and reduced MRT. As trees grew older, NUE has remained similar at both sites, but A has been reduced whereas MRT has been increased, indicating that trees are trying to use their nitrogen longer. Our results indicate that the strategies to use nitrogen are different between sites, and also change over time.

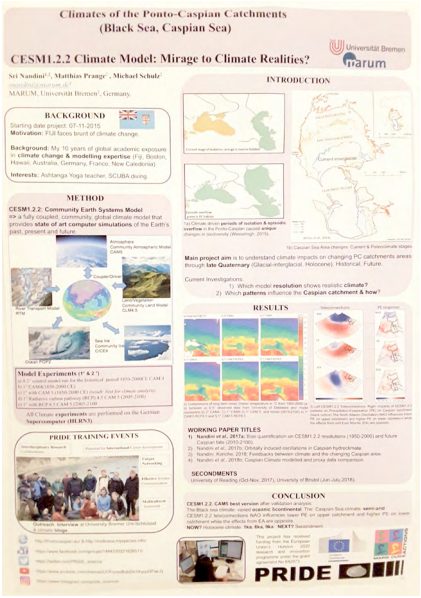


Author(s): Yueh-Hsin Lo, Juan A. Blanco, Ester González de Andrés, J. Bosco Imbert, Federico J Castillo

Organisation: Universidad Pública de Navarra

Climates of the Ponto-Caspian Catchments - CESM 1.2.2 Climate Model: Mirage to Climate Realities?

The Caspian Sea level has undergone dramatic variations of more than 3 m during the past century with important implications for the life of coastal people, economy and the ecosystem. The origin of these variations as well as future changes in the Caspian water budget are still a matter of debate. In this study, we examine the influence of the major seasonal North Atlantic teleconnection patterns, the North Atlantic Oscillation (NAO), the East Atlantic pattern (EA), the Scandinavian pattern (SCA), and the North Sea Caspian Pattern (NCP), on Caspian hydroclimate variability from 1850-2000 CE. Numerical experiments at different atmospheric grid resolutions (2° and 1°) are carried out with the coupled Community Earth System Model (CESM1.2.2). We test model skills under different resolutions through validation against observational data by various statistical methods (Empirical Orthogonal Functions, Taylor diagrams, linear regressions and Spearman rank correlation). Results reveal the strongest simulated signal in winter (DJF) with high explained variances for 1° CESM1.2.2 NAO (39%) and EA (15.7%), similar to observational data. The model is unable to reproduce the SCA pattern in the third EOF, which is found in the observations. The modelled NAO has a strong influence on winter temperature and rainfall over the Caspian catchment area. A strong winter NCP induces above-average 2-meter temperatures over north Caspian region and lower-than-normal precipitation over the eastern Caspian sea. Our study suggests that the 1° version of CESM1.2.2 (with CAM5 atmosphere physics) shows adequate performance with respect to teleconnection maps during the historical period. Lastly, 1° model climate projections (2005-2100 CE) are performed with different Representative Concentration Pathways (RCP 4.5 and RCP 8.5) to examine potential changes in the teleconnection patterns and their influence on the Caspian region.

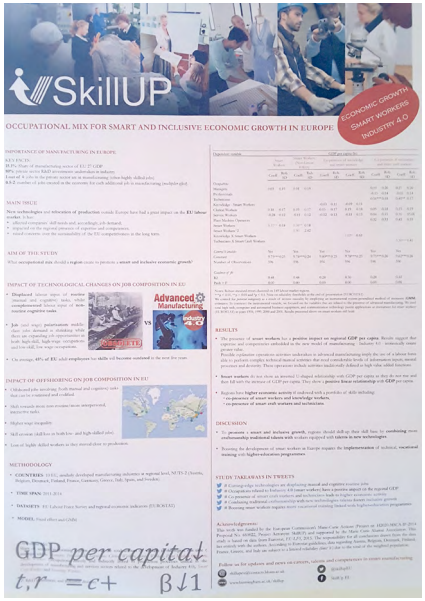


Author(s): Sri Nandini, Matthias Prange, Michael Schulz

Organisation: MARUM – Center for Marine Environmental Sciences Faculty of Geosciences, University of Bremen

Occupational Mix for Smart and Inclusive Economic Growth in Europe

New technologies and the hollowing out of manufacturing activities had a great impact on the EU labour market: they have affected EU job demand, as well as the local and regional stock of competences, raising concerns over the sustainability of the EU manufacturing industries longer term. Notwithstanding the importance and the related threats attributed to these changes, there is scant evidence of the composition of job profiles that are needed to sustain the economic performances of European regions. Our main research question is therefore aimed at addressing this gap, namely: What occupational mix should a region aim to create in order to promote a smart and inclusive economic growth? The paper empirically addresses this question by using regional data from the European Union Labour Force Survey (EU-LFS) and Eurostat regional statistics. A panel analysis is performed to study which occupational mix leads to a higher gross value added at NUT-II geographical disaggregation level. Findings and policy implications to promote a smart and inclusive economic growth are discussed in the poster.

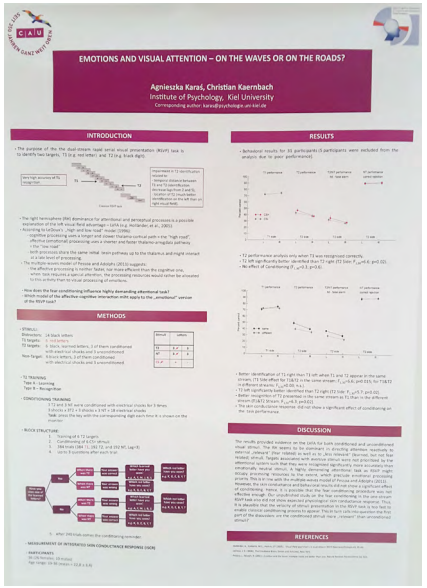


Author(s): Mariachiara Barzotto, Lisa De Propris

Organisation: University of Birmingham

Emotions and Visual Attention - on the waves or on the roads?

In the field of cognitive psychology one of the most interesting questions is whether and how emotions influence human visual attention. According to LeDoux's model (1996) cognitive processing uses a longer and slower thalamo-cortical path - the "high road", whereas affective (emotional) processing uses a shorter and faster thalamo-amygdala pathway – the "low road". Both processes share the same initial brain pathway up to the thalamus and might interact at a late level of processing. An alternative model - the multiple-waves model of Pessoa and Adolphs (2010) suggests that the affective processing is neither faster, nor more efficient than the cognitive one. Moreover, when a task requires a special attention, the processing resources would rather be allocated to this activity than to visual processing of emotions. To test both models and study the relation between cognitive and emotional processing, we joined the dual-stream Rapid Serial Visual Presentation (RSVP) task (an alternative form of the well established attentional blink paradigm), with the classical fear conditioning procedure. We measured skin conductance in the dual-stream RSVP task with some of the target letters being fear conditioned. We found a similar pattern of the left visual field advantage (LVFA) for both emotionally loaded and unloaded stimuli. A lack of significant difference between those two kinds of stimuli is interpreted in favour of the multiple-waves model (Pessoa and Adolphs 2010).



Author(s): Agnieszka Karaś, Christian Kaernbach

Organisation: University of Kiel

Building Resilience in Children and Young People facing Climate Change: the project CUIDAR in Portugal

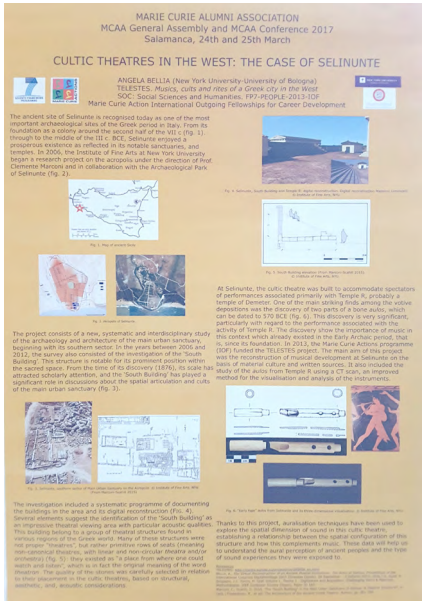
CUIDAR - Cultures of Disaster Resilience among Children and Young People, is an European project (Coordination and Support Action) funded by the Horizon 2020, whose main objective is to understand the perceptions of risk, needs and capacities of children and young people in the context of urban disasters and to promote the communication with civil protection services and other stakeholders and decision makers at local and national level. Lead by the University of Lancaster, the project brings together academic and NGO partners from Italy (Save the Children IT), Spain (Universitat Oberta de Catalunya), Greece (Panepistimio Thessalias), UK (Save the Children UK) and Portugal (ICS-University of Lisbon). Although there is a common framework for strengthening disaster resilience, each partner develops activities tailored to its own local context. In Portugal, the team choose to focus on disasters caused by climate change. The project is composed of consultation workshops held in three municipalities with children and young people from the 4th and 9th grades. These workshops, in addition to stimulating children's reflections on this theme, provide a space for the elaboration of communication materials with specific messages addressed to stakeholders. The workshops are followed by meetings with representatives of local institutions involved in disaster planning and response, where the participants present their ideas and debate on equal footing. Ultimately the project expects to empower children and young people in their relationship with institutional representatives, promoting the expression of their active and participatory citizenship.

Author(s): Ana Sofia Ribeiro, Ana Delicado, Jussara Rowland

Organisation: Instituto de Ciências Sociais-Universidade de Lisboa

Cultic Theatres in the West: The Case of Selinunte

The ancient site of Selinunte is recognised today as one of the most important archaeological sites of the Greek period in Italy. In 2006, the Institute of Fine Arts at NYU began a research project on the acropolis in collaboration with the Archaeological Park of Selinunte. The survey also consisted of the investigation of the 'South Building'. Several elements suggest the identification of this structure as an impressive theatral viewing area with particular acoustic qualities. This building belong to a group of theatral structures found in various regions of the Greek world. Many of these structures were not proper "theatres", but rather primitive rows of seats (meaning non-canonical theatres, with linear and non-circular theatra and/or orchestra). The quality of the stones was carefully selected in relation to their placement in the cultic theatres, based on structural, aesthetic, and, acoustic considerations. At Selinunte, the cultic theatre was built to accommodate spectators of performances associated primarily with Temple R, probably a temple of Demeter. One of the main striking finds among the votive depositions was the discovery of a bone aulos, which can be dated to 570 BCE. This discovery is very significant, particularly with regard to the performance associated with the activity of Temple R. In 2013, the Marie Curie Actions programme (IOF) funded the TELESTES project: the main aim of this project was the reconstruction of musical development at Selinunte on the basis of material culture and written sources. It also included the study of the aulos from Temple R using a CT scan, an improved method for the visualisation and analysis of the instruments. This project offers an innovative research method in the study of ancient Greek music, not only in its contextualisation of archaeological evidence, but also by making connections between digital and acoustical techniques.

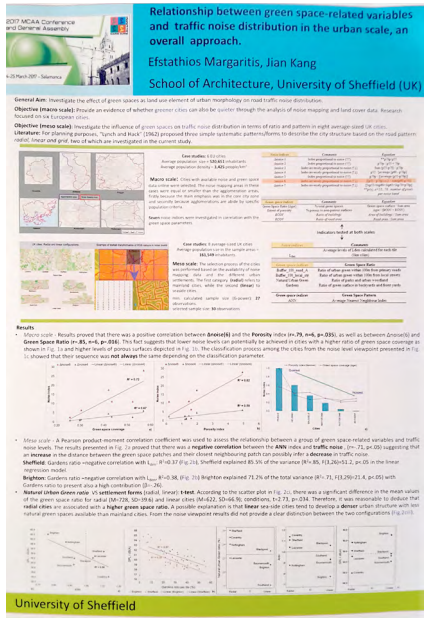


Author(s): Angela Bellia

Organisation: Institute of Fine Arts (New York University) - Department of Cultural Heritage (University of Bologna)

Relationship between green space-related variables and traffic noise distribution in the urban scale, an overall approach.

The aim of this paper is to investigate the effect of green spaces as land use element of urban morphology on road traffic noise distribution. Two different scales of approach (macro, meso) were used for the analysis. In the macro-scale, six European cities were investigated for correlations between noise and green space parameters in order to explore whether greener cities can also be quieter. In the meso-scale, the analysis was focused on a sample area of 30km2 in eight UK cities by incorporating features of green space ratio, pattern and road configurations. Results at this level proved that apart from the differences in the morphological features, traffic noise distribution can also be affected by the different settlement forms, such as linear and radial configurations. The scale of analysis was also proved to be a crucial factor in the extent of correlations.



Author(s): Efstathios Margarits, Jian Kang

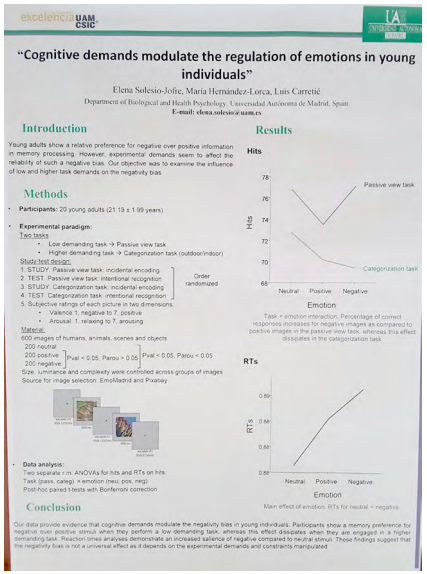
Organisation: University of Sheffield

Cognitive demands modulate the regulation of emotions in young individuals

Aging is a primary health concern for all European countries and the entire world. Healthy adults experience memory declines that affect daily functioning, yet their ability to process emotion is well-preserved. Specifically, an age-related increase in the preference for positive over negative information in attention and memory, namely the positivity effect, seems to relate to a better cognitive functioning. However, several studies have challenged the consistency, size and reliability of this effect. The objective of the present study is to examine one crucial moderator that may affect the reliability of the positivity effect, which is related to the "experimental constraints" imposed by certain tasks. To this end, we will develop a memory task with emotional material that will manipulate low and high cognitive demands in young and older participants. We expect older adults to show an increased positive preference in the less demanding condition compared to their younger counterparts, and a suppression of such a positive preference in the high demanding condition.

Author(s): Elena Solesio-Jofre, María Hernández-Lorca, Luis Carretié

Organisation: Univesidad Autónoma de Madrid



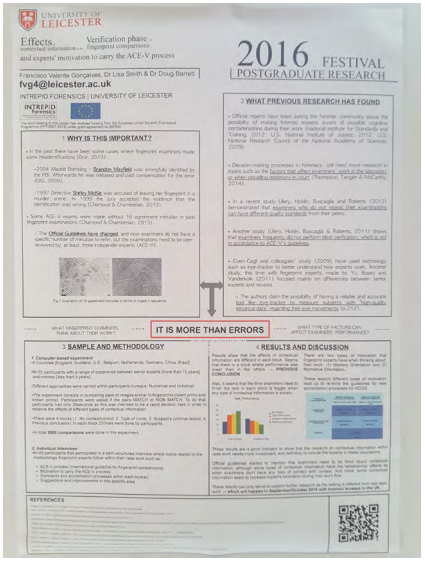
Effects of contextual information on the verification phase fingerprint comparisons and experts' motivation to carry the ACE-V process

Criminal investigation is an area of interest where there is a need to systematically keep the links with forensic sciences disciplines. Amongst those, the forensic community found some disciplines which have been the target of research within cognitive bias, namely fingerprints and DNA. Back to 2004, after an erroneous decision by fingerprint examiners from the FBI, this field received an enormous focus of research relatively to examiners' performance.

From all of the suggestions that previous research proposed, the ACE methodology has been given an independent phase, the verification, changing the methodology into what it is known currently as ACE-V. On the other hand, the vision on contextual information took great dimensions, making this type of variable to be seen only as negative for examiners' performance.

Examiners (England, Scotland, U.S., Brazil, China, Belgium, Germany, Netherlands, Portugal, Switzerland, Australia and New Zealand) were interviewed [n=55] with the aim to understand what these professionals think on this topics.

Qualitative data from interviews provided a view that has not been acknowledged in a great extent. Examiners have claimed that there are some guidelines which might not be useful or even possible to accomplish. Regarding their motivation, there are two distinct types of motivation, being one of these a motivation towards carrying their work linked with having some types contextual information or for instance feedback from other departments.

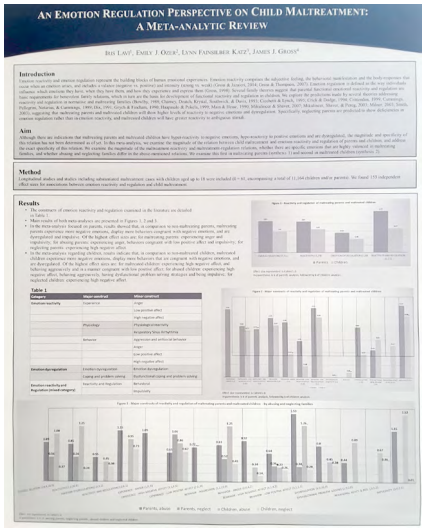


Author(s): Francisco Goncalves, Lisa Smith, Doug Barrett

Organisation: University of Leicester

An Emotion Regulation Perspective on Child Maltreatment: A meta-analytic review

Child maltreatment has been linked with a range of deleterious outcomes for human development. In this meta-analysis, we present conceptual rationale and extant empirical evidence for emotion reactivity and regulation as basic psychological processes in families challenged with maltreatment, while addressing three major processes: reactivity to negative affect, reactivity to positive affect and behavioral and physiological emotion regulation. We review, organize and quantitatively summarize literature for two paths, targeting parents and children. In the first reviewed path, we ascertain whether parental processes of emotion reactivity and regulation are risk factors for child maltreatment. This meta-analysis encompassed 22 papers, and revealed that nearly all emotion constructs examined are indeed significant risk factors, with medium to high effect sizes (d of .44 for dysfunctional problem solving to d of 1.15 for reactivity, regulation and impulsivity). In comparison to non-maltreating parents, maltreating parents experience more negative emotions, display more behaviors congruent with negative emotions, are dysregulated and impulsive. In the second reviewed path, we address outcomes of child maltreatment, and examine whether processes of emotion reactivity and regulation exhibited by the child are outcomes of child maltreatment. This meta-analysis encompassed 55 papers, finding most emotion constructs are significant outcomes, with small to high effect sizes (d of .18 for negative affect to d of 0.96 for low positive affect). In comparison to non-maltreated children, children who experienced maltreatment experience more negative emotions, display more behaviors that are congruent with negative emotions and are dysregulated. From a theoretical perspective, implications include suggesting emotion reactivity and regulation as core processes, impacting other risk factors for and outcomes of maltreatment, such as psychopathology, substance abuse and non-secure attachment patterns. From a practical perspective, the study informs prevention and treatment, illuminating the risk in parental dysfunctional emotion processing and highlighting dysfunctional emotion processing of maltreated children.



Author(s): Iris Lavi, Emily J. Ozer, Lynn Fainsilber Katz, James J. Gross

Organisation: Univeristy of Haifa

History and Methodology of protection of cultural heritage in former Yugoslavia between two world wars

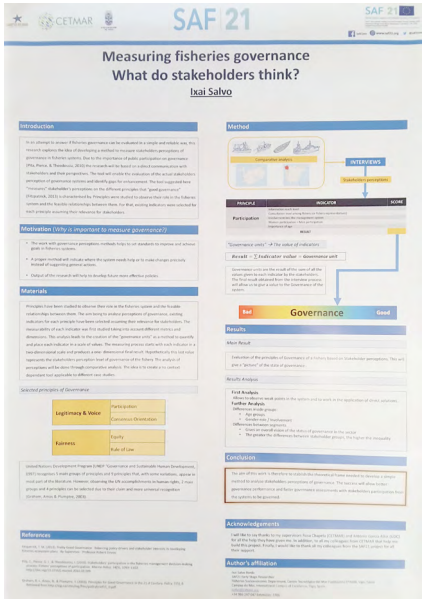
The comparison of conservation methodology approach in practice in the ex Yugoslavian region have not yet been researched, and it is crucial for a better documentation of the development of conservation practices. This, in turn, provides a better understanding and implementation of conservation practices in our times. In this work, archival data of the history and theory of the monument protection in Croatia and Slovenia have been compared through the work of conservators and art historians Ljubo Karaman and France Stele. The focus has been placed on the period from just after the collapse of the Austrian Hungarian Monarchy until the end of the WWII.Through this work, a better understanding of the usage of different types of material and the current state of the monument as a base for future conservation works has been achieved. The research of these cultural heritage conservation-restoration procedures has yielded a chronological representation of the most important restored artworks, and the descriptions of their respective restoration procedures and used materials. All of this acquired knowledge has been ordered using data mapping techniques (data, position, master, restoration work and photography of the monument or artwork), and related to their socio-political context by the study of the political situation of their time. During this research many traces of looted art during the WWII and the process of their restitution have also been identified and exposed. This work has also provided new data on the art historical, historical (especially political) and contemporary influences in Europe in the protection of ex-Yugoslavian monuments during the period after WWII. Its interdisciplinary approach, using statistical, historical, material science, and political science techniques, makes it applicable in a wide variety of fields, and most importantly, gives it interest to the general public.

Author(s): Ivana Nina Unkovic

Organisation: Faculty of Arts, University of Ljubljana; Faculty of Humanities and Social Sciences, University of Split

Measuring fisheries governance: What do stakeholders think?

In an attempt to answer if fisheries governance can be measured in a simple and reliable way, this paper explores the idea of developing a method for measure the quality of governance in fisheries systems, through a direct communication with stakeholders. That tool will enable evaluation of the actual design and functioning of governance system and identify gaps for enhancement. The tool suggested here draws on the different principles that good governance is characterised by. The principles were studied to observe their role in the fisheries system and the feasible relationships between them. Being the aim of this study to analyse the metrics of governance, existing indicators for each principle were selected. The criteria was an assumption of the relevance that each indicator could have for stakeholders. The mesurability of each indicator was studied taking into account the different metrics and dimensions. This analysis derivate in the creation of the “governance units” as a method to quantify and place each indicator in a scale of values. The measuring starts with each indicator in a two-dimensional scale and produces a one- dimensional final result. Hypothetically this last value represents the governance level of the fishery. The aim of this work is therefore to establish the theoretical frame needed to develop the tool. Future works will include interactions with stakeholders to observe and compare different aspects of the tool and to validate the measuring process. The success will allow better governance performance and faster governance assessments with an easy inclusion of all the stakeholders of the system to be governed.

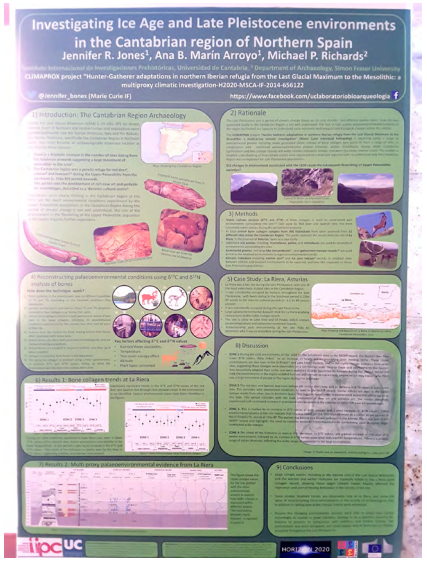


Author(s): Ixai Salvo Borda

Organisation: Fundación CETMAR

Investigating Ice Age and Late Pleistocene environments in the Cantabrian region of Northern Spain

During the Last Glacial Maximum (LGM) (21-18ka BP) ice sheets covered much of Northern and central Europe and populations were pushed South. The Iberian Peninsula, specifically the Cantabrian Region of Northern Spain was an important LGM refugium for plants, animals, and humans. At this time, we see a large increase in the number of archaeological sites, signifying the movement of people to the region, in addition to the appearance of rich cave art and portable art assemblages. Whilst climatic evidence from ice and marine cores give an idea of past temperatures in Europe, the exact environmental conditions experienced by human populations on a continental level in the Cantabrian region throughout the late Pleistocene is not well known. Using stable isotope analysis (δ13C and δ15N) of bone collagen from hunted ungulates from key Upper Palaeolithic sites, in combination with traditional palaeoenvironmental proxies (charcoal, pollen, microfauna, fauna), and wider continental (speleothems and lake records) and offshore climatic indicators (ice cores, marine cores), it is possible to determine the localised conditions faced by populations living in the region, and how this related to the wider climatic backdrop. Results show cooler LGM temperatures pushed Spanish ibex into a different ecological niche, but they were still plentifully available for human exploitation. After 18ka BP there was an increase in temperature, and the environment becomes more stable. The onset of the Holocene (11 k BP) is marked by the environment becoming warmer and wetter, and a shift in the δ13C and δ15N values of Spanish ibex and red deer is seen. Localised conditions between archaeological sites varied, showing the importance of understanding environmental changes on local, regional, and global scales. The Cantabrian region provided a more tempered environment than those experienced in Northern Europe, enabling populations to thrive, and even flourish during the Late Pleistocene.

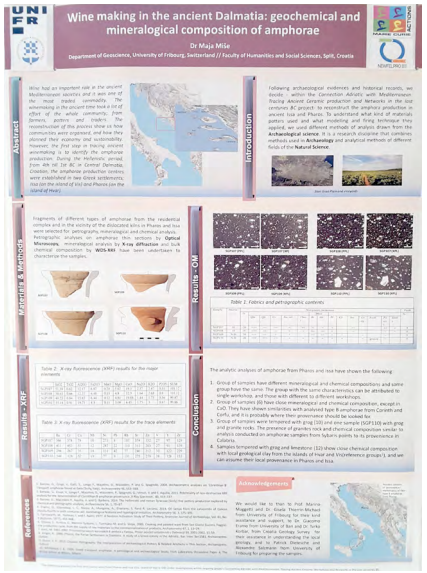


Author(s): Jennifer R. Jones, Ana. B. Marín Arroyo, Michael Richards

Organisation: Instituto Internacional de Investigaciones Prehistóricas, Universidad de Cantabria

Wine making in the ancient Dalmatia: geochemical and mineralogical composition of amphorae

Wine had an important role in the ancient Mediterranean societies and it was one of the most traded commodity. The wine making in the ancient time took a lot of effort of the whole community; from farmers, potters and traders. The reconstruction of this process show us how communities were organised, and how they planned their economy and sustainability. However, the first step in tracing ancient wine making is to identify the amphorae production. During the Hellenistic period, from 4th till 1st BC in Central Dalmatia, today southern Croatian, the amphorae production centers were established in two Greek settlements; Issa (on the island of Vis) and Pharos (on the island of Hvar). Archaeological evidences, such as pottery kilns, discards of poorly fired amphorae sherds and a large number of amphorae were found in both settlements. Furthermore, the ancient writers informed us how the wine from Issa is of the best quality. Following archaeological evidences and historical records, we decide - within the Connection Adriatic with Mediterranean: Tracing Ancient Ceramic production and Networks in the last centuries BC project- to reconstruct the amphora production in ancient Issa and Pharos. To understand what kind of materials potters used and what modelling and firing technique they applied, we used different methods of analysis drawn from the archaeological science. It is a research discipline that combines methods used in archaeology and in different fields of the Natural Science. The results have shown, which I will present in this poster, that potters in Issa and Pharos produced different types of amphorae made from the local clay gather in the vicinity of the ceramic workshop and that among amphorae unearthed in both settlements there are large amount of imported amphorae indicating trade connections between ancient Dalmatia and large trading centers in Greece and Southern Italy.

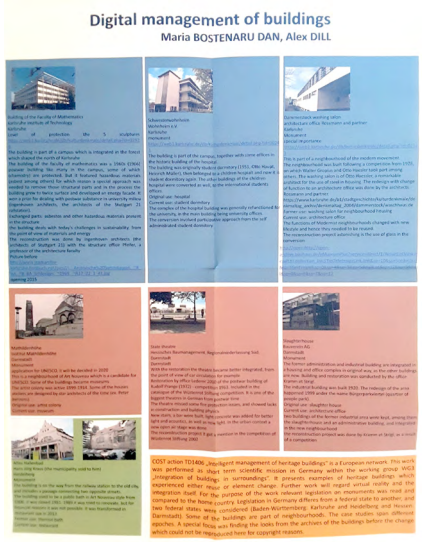


Author(s): Maja Mise

Organisation: University of Split, Faculty of Humanities and Social Sciences

Digital Management of Buildings

The poster is presenting the results of a Short Term Scientific Mission in Karlsruhe, Germany, in frame of the COST action TD1406 “Intelligent management of buildings”, where two categories of heritage buildings were explored: - changed function - replaced elements. The German building stock features buildings reconstructed after WWII bombing, and such are two detailed case studies, namely the so-called aula building, the university building for architecture at the Karlsruhe Institute of Technology and the castle in Bruchsal. Another detailed building is the former industrial munition factory of WWI now Centre for Art and Media, museum and university. Other case studies include heritage buildings in Darmstadt (state theatre, Mathildenhöhe, and Art Nouveau ensamble to be UNESCO heritage, and an industrial building in a new neighbourhood of Bürgerpark). In Karlsruhe, other case studies include the bombed church of Saint Stephan, the former thermal bath Stephanien, now church, the former chamber theatre now part of the facade of a shopping mall and another campus building, which was full of asbestos, the mathematics building as well as a student dormitory on the campus, formerly hospital. Further, there is a former bath in Heidelberg, now shopping centre, considered as case study. These case studies are put in comparison to Romanian case studies, namely the church in Dealu Frumos and the industrial building of The Ark for conversion, and the Gabroveni inn, the headquarters of the Union of Architects and Wilson block of flats for replacement of elements.

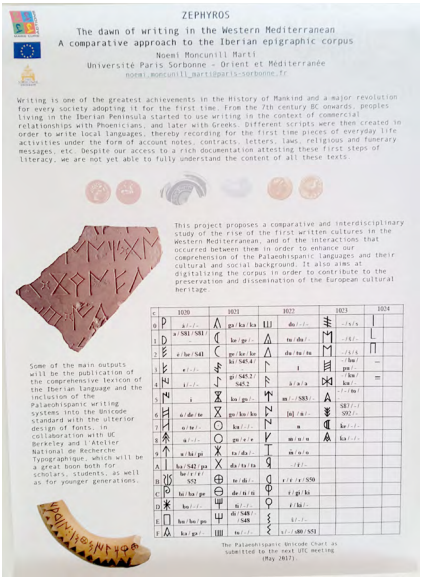


Author(s): Maria Bostenaru Dan, Alex Dill

Organisation: “Ion Mincu” Universität für Architektur und Städtebau

The dawn of writing in Western Mediterranean: a comparative approach to the Iberian epigraphic corpus

Although the Iberian language in not yet fully deciphered, its epigraphic texts represent a cornerstone of the ethnological and cultural understanding of the protohistoric peninsular peoples and their insertion within the Mediterranean world. For the time being, however, there is no comprehensive study of the Iberian corpus, which has grown considerably over the past decades. On the other hand, there has been a tendency to study the Iberian world and its written culture in an overly isolated way, without sufficiently considering the panorama of neighbouring territories, which provide significant parallels. This project proposes a study of all known Iberian inscriptions (about 2,250 items dating from the 5th century BC to the 1st century AD) in a comparative and interdisciplinary perspective. The study of the Iberian corpus is set in a broad cultural context, including the rise of the first Western written traditions and their linguistic and cultural contacts. I focus on issues such as the relationship between text and object, the Iberian adoption of exogenous epigraphic models (mainly Phoenician/Punic, Greek and Latin), and the level of literacy within the male and female spheres of this society. The objectives of this project can be synthesized as follows: publication of Iberian inscriptions according to current academic criteria, including a digital open access version; linguistic analysis of these texts with a special attention to the cultural context in which they were produced; study of the Iberian written culture in a broad cultural context, including neighbouring territories such as Northern Africa. This project will therefore contribute to the understanding of the Iberian language as well as the circulation of cultural models within the Western Mediterranean. It will ultimately represent an innovative step toward the comprehension of the birth of European identities.



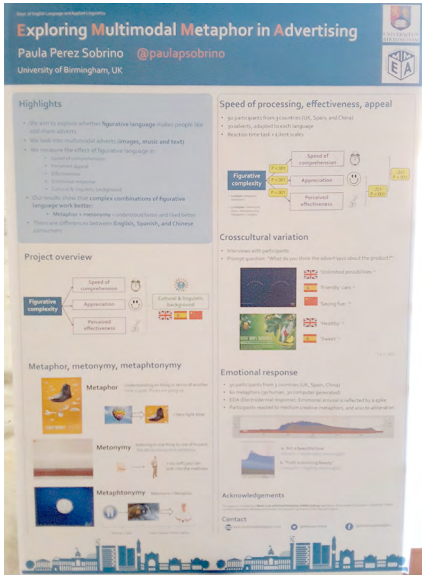
Author(s): Noemí Moncunill

Organisation: Université Paris Sorbonne

Exploring Multimodal Metaphor in Advertising

Metaphor and metonymy are key tools in communication, particularly when abstract ideas or emotions are discussed. While a number of studies have explored the role played by metaphor and metonymy in language and images, few studies have investigated the combination of metaphor and metonymy in the multimodal context of advertising. Researchers are only just beginning to investigate the ways in which people actually process metaphors in advertisements, and how long it takes them to do so. Speed of processing can be important in cases, for example, where advertisements are on billboards which people drive past quickly, or where they appear on websites that people view rapidly while browsing the Internet. Even less is known about the extent to which audiences actually process multimodal metaphor or combinations of metaphor and metonymy in advertisements. We do not know how much of this information is actually picked up by viewers, how they process the information, and whether processing styles vary from one person to another.

My study investigates the nature of figurative complexity (i.e. the ways in which metaphor and metonymy combine) in advertisements containing both words and images, and explores the relationship between figurative complexity and comprehension, accuracy of interpretation and advertising effectiveness. Through a mixed-methods approach of lab experiments and qualitative inquiry we assess the speed and depth of comprehension, the perceived appeal, and the physiological effect of advertisements on participants from three linguistic and cultural backgrounds (English, Spanish, and Chinese). I also explore variation in the types of interpretations provided by participants with different linguistic and cultural backgrounds. There is there likely to be a degree of cross-linguistic and cross-cultural variation in terms of the amount of time required to understand the multimodal metaphors and metonymies, the ways in which they are understood, and their appeal.

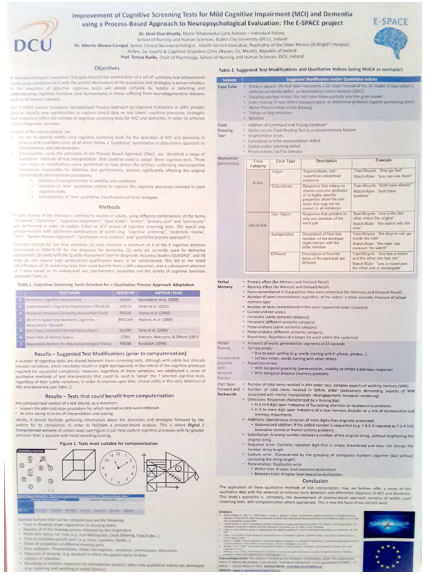


Author(s): Paula Pérez-Sobrino

Organisation: University of Birmingham

Improvement of Cognitive Screening Tests for Mild Cognitive Impairment (MCI) and Dementia using a Process-Based Approach to Neuropsychological Evaluation: The E-SPACE Project

A neuropsychological evaluation that goes beyond the 'mere' examination of a set of summary test achievement scores (and complements it with the careful observation of the processes and strategies a person employs in the execution of objective cognitive tests) will almost certainly be helpful in detecting and understanding cognitive functions and dysfunctions in those suffering from neurodegenerative diseases such as Alzheimer's disease. Our E-SPACE project (European Standardized Process Approach to Cognitive Evaluation in older people) aims to identify new opportunities to capture clinical data on test takers' cognitive processes, strategies and responses within the context of cognitive screening tests for MCI and dementia, in order to enhance clinical diagnostic accuracy. Concrete examples on how to introduce a process-based approach to these tests, without altering their administration process and the applicability of existing normative data will be presented. The feasibility of applying a process-based approach to the scoring and interpretation of specific 'traditional' screening cognitive tests in a way that will increase the quantity and quality of information generated to aid clinical decisions – without significantly increasing the length of time of administrating screening protocols – will be discussed. Finally, this presentation will include an overview of those cognitive tests that could benefit more clearly from undergoing a computerisation process in order to capture the array of cognitive processes involved in these tests, which would otherwise be difficult to observe using the 'traditional' paper-and-pencil version. Any computerised version of a test should respect the administration procedure for which normative data were obtained, should save time for interpretation and scoring and should facilitate gathering information about the processes and strategies followed by the test taker for its completion. With these requirements in mind, clues on the specific processes, strategies and features that may be captured with the aid of computerisation will be highlighted.

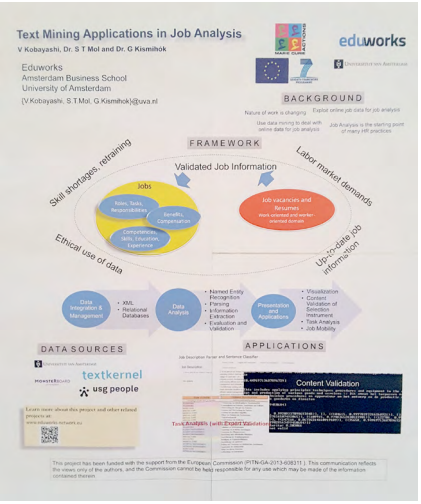


Author(s): Unai Diaz-Orueta, Alberto Blanco-Campal, Teresa Burke

Organisation: DUBLIN CITY UNIVERSITY

Text Mining Application in Job Analysis

Traditional work analysis (WA) strategies are not able to keep up with the dynamic nature of work. Additionally, potential and existing data sources for WA are increasing at a rapid rate. One source of such data is online. An example of online data that may be relevant to WA are job advertisements. Thousands of job advertisements, or vacancies, are posted online daily and they contain up-to-date job information. Researchers are presented with an opportunity to make use of these data to enhance WA, however, the sheer size and high velocity of these data sometimes hinder their full utilization. One strategy is to use techniques from text mining (TM) in WA. In this way, we augment traditional WA with TM techniques so that it can deal with these massive data. Our research explores the potential of using state-of-the-art TM methods to analyze data relevant to WA. We specifically apply TM methods to handle free text in job vacancies. Vacancies consist of information pertaining to job title, job location, workers' requirements and job activities among others. The most challenging information to disentangle are perhaps job activities and workers requirements since they are embedded within the job description without distinctive tags. Therefore, our work lies in automatizing the extraction of these job information types. We conclude that TM methods are useful to supplement existing WA techniques. Using TM methods we can leverage the information from textual data sources. This provides us with an opportunity to obtain up-to-date job information by automatically extracting this information from job vacancies. Although, it can argued that vacancies may not provide a representative information about jobs but when coupled with other data, this will enhance and enrich work analysis strategies. The results from the extraction are catapults for more detailed studies about skills and tasks.

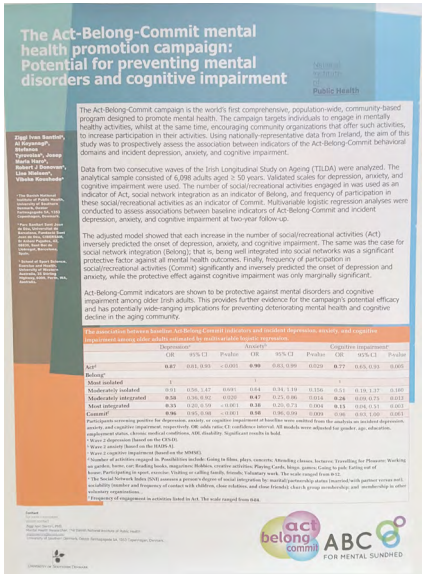


Author(s): Vladimer Kobayashi, Stefan Mol, Gabor Kismihok

Organisation: university of amsterdam

The Act-Belong-Commit mental health promotion campaign: Potential for preventing mental disorders and cognitive impairment

The Act-Belong-Commit campaign is the world's first comprehensive, population-wide, community-based program designed to promote mental health. The campaign targets individuals to engage in mentally healthy activities, whilst at the same time, encouraging community organizations that offer such activities, to increase participation in their activities. Using nationally-representative data from Ireland, the aim of this study was to prospectively assess the association between indicators of the Act-Belong-Commit behavioral domains and incident depression, anxiety, and cognitive impairment. Data from two consecutive waves of the Irish Longitudinal Study on Ageing (TILDA) were analyzed. The analytical sample consisted of 6,098 adults aged ≥ 50 years. Validated scales for depression, anxiety, and cognitive impairment were used. The number of social/recreational activities engaged in was used as an indicator of Act, social network integration as an indicator of Belong, and frequency of participation in these social/recreational activities as an indicator of Commit. Multivariable logistic regression analyses were conducted to assess associations between baseline indicators of Act-Belong-Commit and incident depression, anxiety, and cognitive impairment at two-year follow-up. The adjusted model showed that each increase in the number of social/recreational activities (Act) inversely predicted the onset of depression, anxiety, and cognitive impairment. The same was the case for social network integration (Belong); that is, being well integrated into social networks was a significant protective factor against all mental health outcomes. Finally, frequency of participation in social/recreational activities (Commit) significantly and inversely predicted the onset of depression and anxiety, while the protective effect against cognitive impairment was only marginally significant. Act-Belong-Commit indicators are shown to be protective against mental disorders and cognitive impairment among older Irish adults. This provides further evidence for the campaign's potential efficacy and has potentially wide-ranging implications for preventing deteriorating mental health and cognitive decline in the aging community.



Author(s): Ziggi Ivan Santini, Ai Koyanagi, Stefanos Tyrovolas, Josep Maria Haro, Robert J. Donovan, Line Nielsen, Vibeke Koushede

Organisation: Danish National Institute of Public Health

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