Marie Sklodowska Curie Actions 2014
Conference
The Empowerment of the Next Generation of Researchers "Promoting talents, spreading excellence"

Trento, 18-19 November 2014

Poster session
List of projects presented by the finalists of the 2014 MSCA prizes

Contact at the European Commission: Ms *Arya-Marie Ba Trung*
Contact at the Autonomous Province of Trento: Ms *Sara Ferretti*

Paolo Aversa

Title: "Driving innovation. Determinants of performance in the Formula One racing industry"

Project acronym: **Formula_One** (aj86rh5gym)

Date: From15.07.2012 to 16.07.2014

Project details

Project reference no.: 301688
Subprogramme area: Economic Sciences ECO
Call for proposal: FP7-PEOPLE-2011-IEF
Funding scheme: MARIE CURIE ACTIONS
Status: Completed

Total cost*:* EUR 230,000€
EU contribution: EUR 200 371,80€
Coordinated in: Cass Business School, City University London

Objective:

In its 24 months of development, my Marie Curie project successfully explored one of the most critical question in management theory and practice "what are the determinants of firm superior performance in competitive and regulated environments?". The study was conducted in the field of Formula 1 racing, a highly technological setting where firm-level decisions related to technology, strategy, and team formation, are influenced by the yearly variation of the FIA's regulation, which significantly impacts the firms' possibility of gaining performance returns from their innovation efforts. The analyses were based on an extensive 30 year population-level database (in some cases this was extended to 60 years), whose results took shape in form of academic articles first, and later media release later.

The main results demonstrated that in environments where regulations change radically, firms whose technological innovation are incremental in nature will enjoy major performance returns compared to their competitors who opt for radical innovations. On the other hand, technological radical innovations will lead to better results when the regulatory environment remains stable or changes incrementally. Two fine-grained mechanisms underpinning these results have been explored. In fact when technological products undergo major architectural redesign, adding new modules or components might throw the transient product architecture off balance, thus dampening its performance and functionality (namely "architectural product complexity").

Also, when competition is fierce and time-constrained, managers might lack the necessary attention resource to solve the challenges connected to fitting these new components into an optimized and well-balanced product architecture (namely "time-based cognitive limitations").

The research design mainly observed and compared three major type of variables: (1) detailed technological changes of all the racing cars; (2) interfirm mobility of the team members—including drivers— and related individual capabilities deployment; (3) impact of alliances and collaborations between racing teams and their suppliers/external partners. I leveraged a wide range of analytical methods, including both quantitative and qualitative techniques

http://www.cass.city.ac.uk/research-and-faculty/centres/centive/formula-1

Coordinator: Paolo Aversa, Lecturer in Strategy, Cass Business School, UK

Supervising Scientist: Prof. Charles Baden-Fuller, Centenary Professor of Strategy, Cass Business School

Co-authors:
1. Dr Alessandro Marino (Luiss University Rome)
2. Prof Luiz Mesquita (Arizona State University)
3. Dr Stefan Haefliger (Cass Business School)
4. Prof. Gino Cattani (New York University)
5. Prof Jaideep Anand (Ohio State University)
6. Prof Mark Jenkins (Cranfield University)
7. Dr Santi Furnari (Cass Business School)
8. Dr Simone Santoni (Cass Business School)

Subjects/Keywords:
Performance; Innovation; Technology; Suppliers; Formula One; Automotive; Strategic Management.

Nicolas Bruot

Title: Physics of Complex Colloids – Equilibrium and Driven

Project acronym: **ITN-COMPLOIDS**

Date: From 01/11/2009 to 31/10/2013

Project details

Project reference no.: 234810
Call for proposal: FP7-PEOPLE-ITN-2008
Funding scheme: Support for training and career development of researchers (Marie Curie)
Status: Ended

Total cost*:* 4,714,765 EUR max
EU contribution*:* 4,714,765 EUR max

Objective:

Soft matter physics is an expanding research field of both fundamental interest and high technological relevance. It is a powerful discipline for training young scientists: They must develop the ability to both make order-of-magnitude estimates and subsequently to be rigorous.
The scientific purpose of COMPLOIDS is to launch a thorough investigation of the properties and collective behaviour of complex colloids (micron-sized particles). The notion of complexity refers to a number of characteristics of the particles involved such as an anisotropy of shape (e.g. nonspherical colloids), an anisotropy of the interactions (dipolar moments), hard-core colloids coated with grafted DNA polymer chains. The complex interactions that arise between the particles can lead to the formation of associating colloids, and softness and deformability. This opens the way for novel ordering, structuring, and flow scenarios. The properties of those can be finely tuned by modifying the interactions between the particles, and predicting the global structure formation from the local interactions is one of the main challenges of statistical physics and material science.
The long-term scientific goals of COMPLOIDS are to gain a deep understanding of the physics of self-organization of complex colloids and to apply this knowledge for the purpose of manufacturing novel materials with desired properties.
www.itn-comploids.eu

Coordinator: Prof Christos Likos

Participants: D. Frenkel, E. Eiser, P. Cicuta, J.H. Huppert, J. Dobnikar (University of Cambridge, UK), E. Zaccarelli, F. Sciortino (Università di Roma La Sapienza, Italy), P.J. Camp, D. Marenduzzo, P. Clegg, W. Poon, E. Cates (University of Edinburgh, UK), G. Kahl, D. Coslovich (Technische Universität Wien, Austria), C. Likos, R. Blaak, A. Wynveen, S. Overduin, A. Narros (Universität Wien, Austria), I. Poberaj, D. Babić (University of Ljubljana, Slovenia), J.-C. Loudet, P. Poulin, O. Mondain-Monval, V. Poncinet, C. Zakri, B. Pouligny, P. Cluzeau (CNRS, France), P. Ziherl (Jožef Stefan Institute, Slovenia), D. Vlassopoulos, B. Loppinet, U. Jonas, G. Fytas, A. Wilk, B. Erwin (FORTH, Greece), C. Beschinger, L. Helden (Universität Stuttgart, Germany), E. Boek, S. Sheppard (Schlumberger, UK), A. Colin, P. Maestro, H. Bodiguel, P. Jopp Colin, H. Lannibois Drean, J.-C. Castaing (Rhodia, France) + 16 ESRs + 6 ERs

Subjects/Keywords: Self-assembly; Phase and glass transitions; Colloidal gels; Polymer brushes (DNA); Dendrimers; Star-polymers; Block copolymers; Quasicrystals; Micro-rheology; Active systems; Collective behaviours; Artificial swimmers

Ravinder Dahiya

Title: Flexible Electronics & Sensors for Large Areas

Project acronym: FLEXSENOTRONICS

Date: May 2010-May 2013

Project details

Project reference no.: PCOFUND-GA-2008-226070
Subprogramme area: Information and Communication Technologies / ICT
Call for proposal: post-doc 2009 – Incoming
Funding scheme: COFUND
Status: Completed

Total cost: 149,000 EUR
Coordinated in: Fondazione Bruno Kessler, Trento, Italy

Objective:
The value addition in established nano-/microelectronic systems has primarily come through scaling down of the devices. However, the demands, applications and expectations from integrated electronics have grown and traditional downscaling offers limited solutions to challenges such as 3D coverage, flexible and shrinkable devices etc. And hence flexible electronics systems with thin-film transistors (TFTs) distributed over large area have recently gained attention. With their unique properties – flexibility, ultra-thin profiles, light weight, potential for low cost and high reliability – these systems enable classes of applications that lie outside those easily addressed with wafer-based electronics. Increasing the functionality of flexible electronic systems by augmenting them with flexible sensors will expand their application domain to areas like wearable electronics, electronic skin, prosthesis and many more. This project envisaged such an expansion by developing TFTs with and without inherent sensing capabilities and integrating them on a large area to obtain 'electronic skin' like structures. The nano-/microstructures (e.g. wires, ribbons, disks, and membranes) needed for devices over flexible substrates were fabricated from conventional bulk wafers through lithographic patterning and etching techniques and transfer printed on to flexible/plastic substrates. An attractive attribute of the approach is that it used well-developed silicon technology and thus offers immediate opportunities for using current technology to fabricate electronic devices on unconventional flexible substrates.
Coordinator: Ravinder Dahiya

Participants: Ravinder Dahiya

Subjects/Keywords: Flexible Electronics, Electronic Touch

Vanessa Diaz

Title: Medical Devices Design in Cardiovascular Applications

Project acronym: MeDDiCA

Date: 1st of September 2009 to 31st of August 2013

Project details

Project reference no.: ITN-GA-2009-238113
Subprogramme area: PEOPLE
Call for proposals: FP7-PEOPLE-ITN-2008
Funding scheme: Marie Curie ITNs
Status: Completed

Total cost: 2,780,636.29 EUR
EU contribution: 2,780,636.29 EUR
Coordinated in: The UK (London, UCL)

Objective:

MeDDiCA was a multidisciplinary and innovative ITN that applied a combination of experiments and advanced simulation techniques (including multiscale and patient-specific modelling) to understand, within the cardiovascular field, the impact of novel medical devices and surgical procedures, test medical devices that were already in the market, guide clinical intervention and design new medical devices and all this by taking into account complex boundary conditions close(r) to the conditions in-vivo and specific characteristics of individual patients. MeDDiCA's foundations were firmly based on the work done by the Virtual Physiological Human initiative, also supported by the EC.

MeDDiCA worked closely with device manufacturers, regulatory agencies and clinicians to engage our young researchers in translational activities as early as possible. It was also highlighted as 'best example' practice in training in a fast and transformational field, covering different areas/disciplines such as computational biomedicine/computational physiology, bioengineering, computer science, ICT for health and software development. MeDDiCA was commended due to the cohesive, multidisciplinary and all embracing training that we provided in-house and the vision that our researchers should not only gather excellent technical skills through cutting-edge research but also 'skills for life' that would help them to work in different (and equally demanding) environments, in order to deal with different professional backgrounds and to take different career paths, either in Industry or Academia.

Coordinator:

University College London (Dr. Vanessa Diaz)

Participants:

The University of Sheffield, University of Amsterdam, Technical University of Cluj-Napoca, Politecnico di Milano, ANSYS, Université des Technologies de Compiègne, Istituto Superiore di Sanitá, Technical University of Eindhoven.

Subjects/Keywords:

Medical devices, multiscale modelling and simulation, patient-specific modelling, Virtual Physiological Human, computational physiology, bioengineering.

Nishanth Dongari

Title: Gas flows in micro electro mechanical systems

Project acronym: GASMEMS

Date: From 1st October 2008 to 30th September 2012

Project details

Project reference no.: 215504
Subprogramme area: PEOPLE-2007-1-1-ITN - Marie Curie Action
Call for proposal: FP7-PEOPLE-2007-1-1-
Funding scheme: MC-ITN - Networks for Initial Training (ITN)
Status: FINISHED

Total cost: EUR 3940190
EU contribution: EUR 3940190
Coordinated in: INSA, FRANCE

Objective:

Gas flows in microsystems are of great interest for various applications that touch almost every industrial field. This diversity is typified through the following examples: fluidic microactuators for active control of aerodynamic flows, vacuum generators for extracting biological samples, mass flow and temperature micro-sensors, pressure gauges, micro heat-exchangers for the cooling of electronic components or for chemical applications, micropumps and microsystems for mixing or separation for local gas analysis, mass spectrometers, vacuum and dosing valves.
The main characteristic of gas microflows is their rarefaction, the level of which often requires a modelling both by continuous and molecular approaches. The role played by the interaction between the gas and the wall becomes essential and is generally badly known. Numerous models of boundary conditions are currently in confrontation and require an empirical adjustment strongly dependent on the micro manufacturing techniques. On the other hand, the experimental data are fragmentary and difficult to confront. Most of them do not address heat transfer and gas mixtures issues. The proposed network has been built from several existing collaborations within bilateral programmes, from scientific collaborations and national networks.

Coordinator: INSTITUT NATIONAL DES SCIENCES APPLIQUEES DE TOULOUSE INSAT

Participants: Alma Mater Studiorum- Università di Bologna, Italy
University of Limerick, Ireland
Panepistimio Thessalias (University of Thessaly), Greece
Science and Technology Facilities Council, United Kingdom
Universite D'Aix Marseille, France
Technische Universiteit Eindhoven , Netherlands
Università Degli Studi di Udine, Italy
University of Strathclyde ,United Kingdom
Technische Universitaet Dresden, Germany
Universite De Provence , France
AOES GROUP BV, Netherlands

Institute of Mechanics , Bulgarian Academy of Sciences, Bulgaria
Karlsruher Institut fuer Technologie, Germany

Subjects/Keywords: Employment issues - Social Aspects - Education, Training

Amos Fatokun

Title: Blending biophysical and drug discovery platforms to investigate allosterism in G-protein-coupled receptors (GPCRs) and find novel allosteric modulators for neurotherapeutics development

Project acronym: FATOKUNEUFP7IIF2010

Date: From Aug 1, 2011 to July 31, 2013

Project details

Project reference no.: 274177
Subprogramme area: Life Sciences
Call for proposal: FP7-PEOPLE-2010-IIF
Funding scheme: Marie Curie Actions – International Incoming Fellowships (IIF)
Status: Completed

Total cost: EUR 210,092.80
EU contribution: EUR 210,092.80
Coordinated in: UK

Objective:

The global socio-economic and health burden of neurological and neurodegenerative diseases is enormous, impacting overall quality of life and overwhelming available resources. The situation is worrying, considering the predicted future explosion in the aging population. There are currently no ideal drugs to manage these debilitating conditions. This project thus sought to achieve two major aims:

1. Use biophysical approaches to improve fidelity of pharmacological observations of ligand-receptor interactions for determining mechanisms of action. This aimed to allow investigations of such interactions at the single-cell level, as opposed to current investigations in cell populations, which are less accurate.
2. Use the platform in aim 1 to develop screening assays to identify allosteric modulators of three receptors of exceptional clinical significance: adenosine, metabotropic and $GABA_B$ receptors. Allosteric modulators bind to a site on the receptor different from where the endogenous ligand binds, with better selectivity and reduced incidence of side effects compared to orthosteric modulators that bind to the same place as the endogenous ligand.

The inter- and multi-disciplinary project combined pharmacology, biochemistry, molecular and cell biology, medicinal and synthetic chemistry, drug discovery and biophysics. It was intersectoral, featuring collaboration with a spin-out company (CellAura). Among other things, it characterised fluorescent ligands as novel tools for the study of ligand-receptor interactions, including allosteric modulation of G-protein-coupled receptors (GPCRs), thus advancing the prospect of developing more efficacious drugs through application of detailed knowledge of these mechanisms. The Fellow brought unique expertise in drug discovery and neuroscience and enhanced his career prospect by engaging in a novel project. The project attained aspects of ERA objectives, including product and technology development and product commercialisation.

Coordinator: University of Nottingham, UK

Participants: University of Nottingham, UK

Subjects/Keywords: pharmacology, drug discovery, receptors, ligands, biophysics, imaging, microscopy, fluorescence

Osman Gulseven

Title: Development, Implementation and Evaluation of Index-Based Insurance Schemes for Optimal Risk Management in Agriculture

Project acronym: AgInsurance

Date: From October 2009 to October 2013

Project details

Project reference no.: 247723
Sub programme area: Economics (FP7 – International Reintegration Grant)
Call for proposal: Marie Sklodowska-Curie actions - Research Fellowship Programme
Funding scheme: FP7 - Marie Sklodowska Curie Fellowship
Status: Project Goals are Successfully Accomplished

Total cost: 200.000 EUR
EU contribution: 100.000 EUR
Coordinated in: Middle East Technical University

Project Website: www.aginsuranceproject.com

Objective:
This project aims to develop, implement, and evaluate an optimal index-based revenue insurance mechanism which will allow the agricultural households to manage and minimize their risks. The index developed will not be affected by households or the insurance agency, thereby eliminating the possibility of adverse selection and moral hazard. Unlike the current insurance schemes, the suggested innovative system will be market-based, self-sustainable, and easily scalable to the entire EU Region and the Associates. It will address both of the major risks faced by farmers while minimizing the need for government involvement in the market. Successful establishment of the proposed insurance mechanism will provide European farmers with the tools necessary to compete in the world markets.

Coordinator: Dr. Osman GULSEVEN

Participants: Middle East Technical University

Subjects/Keywords: Risk Management, Agriculture, Insurance

Piet Lens

Title: Novel Biogeological Engineering Processes For Heavy Metal Removal and Recovery

Project acronym: BIOGEOLOGICAL ENGINE

Date: From 1/6/2004 to 31/5/2008

Project details

Project reference no.: 509567
Subprogramme area: Structuring the European Research Area
Call for proposal: FP6-2002-Mobility-8
Funding scheme: Marie Curie Excellence Grant
Status: Completed

Total cost: 1.600.000 EUR
EU contribution: 1.600.000 EUR
Coordinated in: Wageningen/Delft, the Netherlands

Objective:

The Marie Curie TEAM carried out a research program on "Biogeological engineering", in which biogeological processes (sulfur and heavy metal cycles, with particular emphasis on the transformations between the soluble and solid phase) were elucidated and engineered in order to develop more efficient treatment processes for heavy metal removal, recovery and reuse.

The research program was build around four research topics, corresponding to the four team members, where heavy metals play a key role. These included i) bioavailability and mobility of trace elements, ii) heavy metals for more efficient wastewater treatment, iii) heavy metal removal by dissimilatory metal reduction and iv) optimisation of heavy metal removal by sulfide producing bioreactors. Each topic consisted of a blend of fundamental investigations on basic processes and applied work focused on bioreactors. Each of the research topics provided the contracted researchers training in various innovative aspects of environmental chemistry, environmental engineering and bioprocess technology.

The team was composed of Prof.dr.ir. Piet Lens as team leader, one experienced researcher (<10 year experience) and three early stage researchers. The experienced researcher did research on specific advanced analytical techniques on metal mobility and bioavailability, i.e. chemical sequential extraction, stripping voltametry, DGT, Donnan membrane technique and Nuclear Magnetic Resonance (NMR) spectroscopy and imaging. Each of the three early stage researchers was working on a separate topic, although there was ample opportunity to collaborate among each other. Besides laboratory work, a whole spectrum of national and international courses were available at the host institute via the research school SENSE (www.sense.nl). Thus, the research fellows were able to further study and qualify themselves in other research areas of their interest.

Coordinator: Prof.dr. Piet Lens

Keywords: Sulfur cycle, metal removal, biogeochmistry, sulfidic precipitation, metalloid bioreduction

Filippo Mangolini

Title: In Situ Analytical Tribology for Investigating Advanced Carbon-Based Materials

Project acronym: ISATrIACaM

Date: From April 1st, 2013 to September 30th, 2015

Project details

Project reference no.: PIOF-GA-2012-328776
Subprogramme area: Information Science and Engineering (ENG)
Call for proposal: FP7-PEOPLE-2012-IOF
Funding scheme: MC-IOF (International Outgoing Fellowships (IOF))
Status: active

Total cost: EUR 235,491.45
EU contribution: EUR 235,491.45
Coordinated in: France

Objective:

The goal of the proposed project is to understand the physico-chemical basis underlying the excellent tribological properties of silicon oxide-doped diamond-like carbon (SiO_x-DLC) coatings. SiO_x-DLCs are amorphous films supposedly consisting of two interpenetrating, interbonded networks, one being a hydrogenated amorphous carbon network and the other a silica glass network. They exhibit impressive thermal stability and oxidation resistance and excellent tribological behaviour even at elevated temperatures, high contact stresses and in humid environments, making them promising candidates for several engineering applications.

The goal of the project will be achieved via a hierarchical methodological approach aimed to determine the structure and composition of SiO_x-DLC followed by the investigation of its thermal stability and tribological properties. The project has a strong multidisciplinary character and requires the novel combination of advanced analytical techniques. A new methodology, based on one of the most important surface-analytical developments emerging in the last decade - elevated-pressure X-ray photoelectron spectroscopy - will be used, enabling the study of the surface chemistry of SiO_x-DLC at its critical environmental conditions (partial pressures of water, molecular oxygen, or hydrogen). Furthermore, the research project involves the extensive application, for the first time, of *in situ* tribological tests methods to the study of carbon-based materials for understanding the fundamental mechanisms underlying the environment effect on the tribological performance of SiO_x-DLC.

Establishing a fundamental understanding of the interrelationships between composition, structure, tribological performance, and durability for this class of carbon-based films can lead to new strategies for designing improved solid lubricants that can meet the requirements of advanced industrial applications. This would have significant economic and industrial benefit to the EU.

Coordinator: Ecole Centrale de Lyon (Lyon, France)

Participants: Ecole Centrale de Lyon (Lyon, France); University of Pennsylvania (Philadelphia, U.S.)

Subjects/Keywords: Materials Engineering, Surface Science, Thin Films, Spectroscopic and Spectrometric Techniques

Libu M. Manjakkal

Title: Low-cost and energy-efficient LTCC sensor/IR-UWB transceiver Solutions for sustainable healthy environment

Project acronym: SENSEIVER

Date: From 2011-12-01 to 2014-11-30

Project details

Project reference no.: 289481
Subprogramme area: PEOPLE
Call for proposal: FP7-PEOPLE-2011-ITN
Funding scheme: Marie Curie Actions—Initial Training Networks (ITN)
Status: Execution

Total cost: 3,012,055.00 EUR
EU contribution: 3,012,055.00 EUR
Coordinated in: Serbia

Objective:

Today, more than ever, the public demands credible and understandable information about the quality of the environment in which they live or work. However, the environmental parameters monitored by commercial sensors do not give information about pollutants presence but about general state of our surroundings. Accordingly, innovative and multidisciplinary methods are needed to carry out efficient information exchange across the various sectors involved in environmental monitoring.

The SENSEIVER (SENSor/transcEIVER) proposal presents a joint effort to reinforce the relevant technical bases by providing excellent training opportunities to young researchers in the following fields:

- innovative and cost-effective sensors and their fabrication in LTCC (Low-Temperature Co-fired Ceramics) technology,
- new sensitive materials as coating layers for unique LTCC microsensors platforms,
- highly energy-efficient UWB (ultra wideband) transceivers compatible with designed LTCC sensors, and
- intelligent systems for acquisition, processing and displaying data relevant to soil, air and waterquality.

ITN is composed of five outstanding academic/research participants, three leading industrial partners (SMEs) and three associated partners, from six countries. This training network has significant potential to improve career perspectives of 19 early-stage and 6 experienced researchers from partnering institutions and to spread expertise, knowledge and skills to wider scientific, engineering and environmental communities.

Moreover, this ITN will expose all participants to complementary schools of thought that will initiate research in new areas and new topics within curriculum, giving it fresh perspective to the market oriented applications of designed materials, sensors and transceivers.

Coordinator: University of Novi Sad

Participants:Technische Universitaet Wien-Austria
Technical University 'Gheorghie Asachi' of Iasi-Romania
Instytut Technologii Elektronowej-Poland
INESC Porto - Instituto De Engenharia De Sistemas e Computadores do Porto- Portugal
TES ELECTRONIC SOLUTIONS GMBH-Germany
NORTH POINT LTD-Serbia

Subjects/Keywords: Life Sciences - Scientific Research

Benjamin Martin

Title: Mechanistic Effect Models for Ecological Risk Assessment of Chemicals

Project acronym: CREAM

Date: From Sept. 1, 2009 to Aug. 30, 2014

Project details

Project reference no.: 238148
Subprogramme area: Marie Curie Action: "Networks for Initial Training"
Call for proposal: FP7-PEOPLE-ITN-2008
Funding scheme: ITN: Network for Initial Training
Status: completed

Total cost: 5,023,015.12 EUR
EU contribution: 5,023,015.12 EUR
Coordinated in: Leipzig, Germany

Objective:
Current regulatory risk assessment of chemicals in Europe is based on the ratio between expected exposure in the environment and toxicity endpoints, e.g. hazard quotient, PNEC or TER. However, toxicity is usually determined at the level of individuals under laboratory conditions for a small number of standard test species. It remains unclear how well hazard quotients predict risks to populations and ecosystems, which are important environmental protection goals of current regulations in Europe. Since empirical approaches are too limited to solve this problem, mechanistic effect models are needed to make chemical risk assessment more ecologically relevant. To make this possible, CREAM is designed to (1) develop guidance for Good Modelling Practice which makes modelling more transparent, consistent, comprehensive, and reliable; (2) test and demonstrate the added value of models in a number of case studies; (3) train more researchers in both modelling and regulatory risk assessment so they can be involved in future model-based risk assessments in academia, industry, and regulatory authorities.

Coordinator: Volker Grimm, Helmholtz Center for Enivornmental Research – UFZ, Leipzig, Germany
Participants:
Helmholtz Centre for Environmental Research - UFZ, Germany
Roskilde University, Denmark
Wageningen University, The Netherlands
RWTH Aachen University, Germany
Swiss Federal Institute of Aquatic Science and Technology
Syngenta Ltd., UK
Fraunhofer Gesellschaft, Germany
Reading University, UK
National Institute of Agronomic Research, France
Vrije Universiteit Amsterdam, The Netherlands
University of York, UK

Jagiellonian University, Poland
National Environmental Research Institute, University of Aarhus, Denmark

Subjects/Keywords:
Ecological Risk Assessment, Ecotoxicology, Modelling, Population Dynamics, Toxicokenetics, Toxicodynamics, Individual-based Modelling, Matrix Models, Dynamic Energy Budget theory

Lorenzo Melchor

Title: Intra-clonal heterogeneity and Darwinian evolution in multiple myeloma

Project acronym: HER2 MAMMARYSTEMCELL

Date: From 2009 to 2011

Project details

Project reference no.: 236788 – The influence of Her2 Status on mammary stem/progenitor cells
Subprogramme area: Life Sciences
Call for proposal: FP7-PEOPLE-IEF-2008
Funding scheme: Marie Curie Actions – Intra-European Fellowships (IEF)
Status: FINISHED

Total cost: EUR 166,711.52
EU contribution: EUR 166,711.52
Coordinated in: The Institute of Cancer Research, 237 Fulham Road, London SW3 6JB

Objective:

[The Marie Curie Fellow Dr Lorenzo Melchor finished his Marie Curie project in 2011 with a manuscript published in 2014 (Melchor et al J Pathol 2014). The poster presented in ENGRes 2014 will be, however, focused on the fellow's current research line to facilitate scientific collaborations for his career development]

Cancer process begins when a normal cell acquires an initiating carcinogenic lesion and is followed by additional alterations. The founder cancer cell undergoes successive rounds of genetic diversification and selection resulting in the generation of different cancer clones. These compete for space and sustaining and are related via a phylogenetic tree, resembling the principles from the Darwinian theory of natural selection.[1]

Multiple myeloma (MM) is an incurable disease characterised by the proliferation of aberrant plasma cells in the bone marrow. MM is a good model to understand the process of cancer evolution, because of the well-defined clinical stages and the current understanding of the molecular aberrations occurring during MM initiation and progression.[2]

We have addressed for the last three years different questions about cancer evolution using MM as a disease model. To do so, we have used whole exome sequencing and single cell genetic analysis in different studies, which included from 6 up to 463 patient samples.

Our main conclusions are:

- MM is composed of 5 major clones related through linear or branching phylogenetic trees
- Myeloma clones are already present in the pre-clinical stages of the disease and their proportions fluctuate throughout disease progression[5]
- Patient treatment has different effects on myeloma sub-clones, some are eradicated but others resist and may lead to disease relapse
- Myeloma patients with high sub-clonal diversity have an impaired prognosis outcome[6]

Overall, myeloma is a heterogeneous disease with multiple clones that differentially respond to patient treatment. Better disease monitoring and therapeutic strategies are required to extend patients' lifespans.

REFERENCES

1. Greaves M, Maley CC. Clonal evolution in cancer. *Nature*. 2012;481(7381):306-313.
2. Morgan GJ, Walker BA, Davies FE. The genetic architecture of multiple myeloma. *Nature reviews Cancer*. 2012;12(5):335-348.
3. Walker BA, Wardell CP, Melchor L, et al. Intraclonal heterogeneity and distinct molecular mechanisms characterize the development of t(4;14) and t(11;14) myeloma. *Blood*. 2012;120(5):1077-1086.
4. Melchor L, Brioli A, Wardell CP, et al. Single-cell genetic analysis reveals the composition of initiating clones and phylogenetic patterns of branching and parallel evolution in myeloma. *Leukemia*. 2014.
5. Walker BA, Wardell CP, Melchor L, et al. Intraclonal heterogeneity is a critical early event in the development of myeloma and precedes the development of clinical symptoms. *Leukemia*. 2014;28(2):384-390.
6. Melchor L, Murison A, Boyle EM, et al. The extent of sub-clonal genetic diversity within the myeloma clone may be a predictive biomarker of progression and outcome after treatment. Submitted.

Coordinator: Matthew J Smalley

Subjects/Keywords:
Myeloma, Intra-tumour heterogeneity, Whole exome sequencing, Cancer evolution, Cancer genomics

Oleg Menyailo

Title: The impact of nitrogen on the fate of recently assimilated carbon in forest soils

Project acronym: NITFOR

Date: 01/10/2008 to 30/09/2010

Project details

Project reference no.: PIIF-GA-2008-220880
Subprogramme area: Environmental Sciences
Call for proposal: FP7-PEOPLE-2007-4-2-IIF
Funding scheme: International Incoming Fellowship
Status: completed

Total cost: 232084, 00 EUR
EU contribution: 232084, 00 EUR
Coordinated in: University of York, UK

Objective:
Global climate change is strongly linked to the accumulation of greenhouse gases in the atmosphere. In particular, CO_2 contributes almost 45-60% to the observed anthopogenic global warming yet has the potential to be captured by trees and stored either in woody biomass or in soils over long time periods. While the above-ground carbon cycle is well constrained, there remain great uncertainties in below-ground carbon cycling. We proposed to tackle specific key questions about the fate of carbon in forests by taking advantage of existing afforestation experiments in England (main phase) and in Russian Siberia (return phase), by combining new stable isotopes methods and innovative in-growth core approaches.
Overall, the project 1) greatly advanced our knowledge of belowground C cycling in forest ecosystems and 2) established a new cooperative link between researchers of the Institute of Forest in Krasnoyarsk and the University of York.
As a result of the work four peer-reviewed papers are published in journal Global Change Biology, Soil Biology and Biochemistry, Eurasian Journal of Soil Science, Russia Germany Humboldt Journal and at least two papers are planned for Global Change Biology and New Phytologist.
Coordinator: Phil Ineson

Participants: Oleg Menyailo (Institute of Forest SB RAS, Russia),
Phil Ineson (University of York, UK)

Subjects/Keywords: forest ecosystems, carbon cycle, soils

Akimutsu Narita

Title: SUPramolEculaR functional nanoscale architectures for Organic electronics: a multi-site initial tRaining action

Project acronym: SUPERIOR

Date: From October 1, 2009 to September 30, 2013

Project details

Project reference no.: PITN-GA-2009- 238177
Subprogramme area: PEOPLE
Call for proposal: FP7-PEOPLE-ITN-2008
Funding scheme: Marie Curie Actions—Networks for Initial Training (ITN)
Status: completed

Total cost: final payment to be maid
Overall maximum EU contribution: 3,793,675.59 EUR
Coordinated in: Université de Strasbourg

Objective:
SUPERIOR aims at providing top-quality cross-disciplinary and supra-sectoral training to a pool of promising young researchers, in an area at the interface between Supramolecular Chemistry, Materials- and Nano-Science, Physics and Electrical Engineering. SUPERIOR appointees will be formally trained in lecture courses, dedicated schools and workshops, and through an ambitious and carefully planned research activity that benefits both from the expertise of world-leading senior investigators and of younger and energetic PIs with remarkable track records in both training and research. SUPERIOR is designed to generate new scientific and technological knowledge by combining supramolecularly-engineered nanostructured materials (SENMs), mostly based on organic semiconductors, with tailor-made interfaces to solid substrates and electrodes, for fabricating prototypes of optoelectronic devices. We are particularly interested in developing multiscale SENMs for transistors (FETs), in-plane diodes single-photon emitters, and especially solar cells (PVDs) and organic light-emitting diodes, OLEDs. The specific training and research objectives are: 1. Supramolecular synthetic chemistry of electrically/optically 1D and 2D (macro)molecules 2. Hierarchical self-organisation of multifunctional SENMs at surfaces. Multiscale SPMs studies of physico-chemical properties 3. Time-resolved photophysical studies of single-molecules and SENMs 4.
Time-resolved spectroscopy of materials and devices 5. Modelling the geometric and electronic structures and the optical properties of SENMs 6. Advanced devices processing/(nano)fabrication 7. Formation of controlled interfaces of SENMs with substrate and electrodes 8. Devices I: FETs: Measurement of charge mobility in stacks, also upon photodoping. 9. Devices II: PVDs – addressing the charge collection problem. 10. Devices III: Emissive devices - Single photon emitters and OLEDs 11. Dissemination and strategic development 12. Management

Coordinator: Prof. Paolo Samorì

Participants: Prof. Paolo Samorì (ISIS - University of Strasbourg), Dr. Peter Erk (BASF SE), Prof. Richard H. Friend (University of Cambridge), Prof. Johan Hofkens (Katholieke Universiteit Leuven), Prof. Klaus Müllen (Max Planck Institute for Polymer Research), Dr. Stefano De Monte (A.P.E. Research SRL), Prof. Franco Cacialli (University College London), Dr. David Beljonne, Dr. Jérôme Cornil, Prof. Roberto Lazzaroni (University of Mons), Prof. Alan Rowan (Radboud University Nijmegen)

Subjects/Keywords: Macromolecular chemistry, Optoelectronics, Molecular electronics, Molecular chemistry, Carbon chemistry, Photochemistry, Surface chemistry

Ofure Obazee

Title: Priorities and Standards in Pharmacogenomic Research: Opportunities for a Safer and More Efficient Pharmacotherapy

Project acronym: FightingDrugFailure (FDF) Initial Training Network (ITN)

Date: From 1 October 2009 to 30 September 2013

Project details

Project reference no.: Grant Agreement Number 238132

Sub-programme area: Health

Call for proposal: **FP7-PEOPLE-ITN-2008**

Funding scheme: FP7-MC-ITN

Status: Completed

Total cost: EUR 3,012,929.62

EU contribution: EUR 3,012,929.62 (100%)

Coordinated in: Dr. Margarete Fischer Bosch Institute for Clinical Pharmacology within the "Robert Bosch Gesellschaft für Medizinische Forschung MBH" in Stuttgart, Germany

Objective:

Breast cancer is the most frequent cancer in women (global incidence of 1.7 million new diagnoses and >520,000 deaths each year) and is caused by estrogens (e.g. 17β-estradiol), known to be growth factors. Numerous breast cancer risk factors have been defined that relate to the cumulative estrogen exposure across a woman's lifespan. Genetic risk factors have been identified including more than 90 common germline genetic variants (single nucleotide polymorphisms; SNPs) to be associated with breast cancer risk. In breast cancer patients, tumor growth signaling occurs via the estrogen receptor expressed in the tumor. Tamoxifen is a selective estrogen receptor modulator which interferes with estrogen binding at the estrogen receptor frequently used to treat breast cancer. This work focused on two aspects of breast cancer risk associations relevant to postmenopausal healthy women (MHT-related breast cancer risk) and patients (prediction of tamoxifen efficacy).

First, we investigated whether common SNPs can flag a breast cancer risk in healthy women using menopausal hormone therapy (MHT) for the relief of menopausal symptoms. The comparison of 1,428 cases and 1,056 controls revealed an association between HSD17β1_rs605059_A>G and a MHT-related breast cancer risk (OR: 0.86, *P* = 0.48). Secondly, we focused on breast cancer patients

whose tumor expressed the estrogen receptor and had received tamoxifen treatment. We investigated the association of known breast cancer risk susceptibility loci for their relevance in drug efficacy. Survival analyses (Kaplan Meier and Cox regression) revealed an association at one locus with a 2.2-fold increased risk to experience a breast cancer recurrence.

In conclusion, we showed that common SNPs can flag breast cancer risk conferred by menopausal hormone therapy and moreover the efficacy of tamoxifen can be predicted by a SNP. Thus,

common genetic variants (SNPs) hold the potential to pave the way for personalized medicine with regard to breast cancer prevention and treatment.
http://www.fightingdrugfailure.net/

Subjects/Keywords: Breast cancer, pharmacogenomics, hormone therapy, personalized medicine

Coordinator: Prof. Hiltrud Brauch and Prof. Matthias Schwab

Participants: : Ofure Obazee, Tarek Mohamed, Arian Emami-Riedmeier, Joanna Achinger, Adviti Naik, Monika Lewinska, Steffen Rädish, Pilar Saladores, Wing-yee Lo, Maike Lichtenfels, Philippe Marlot, Elena Cornejo-Castro, Teresa Sanchez-Pascua, Werner Pfeifer, Francisco Gutierrez Mariscal, Joanna Widomska, Suparna Mitra and Prof. Craig V. Jordan

Niam O'Sullivan

Title: Spastic paraplegia genes and endosomal signalling in *Drosophila*: Investigating motor neuron degeneration in fruit flies.

Project acronym: Paraplegia Endosomes

Date: From October 2009 to September 2011

Project details

Project reference no.: 2008 – IEF - 236777
Subprogramme area: Marie Curie Actions
Call for proposal: Intra-European Fellowship (IEF) 2008
Funding scheme: Seventh Framework Programme (FP7)
Status: Completed

Total cost: EUR 136,586.89
EU contribution: EUR 136,586.89
Coordinated in: University of Cambridge, England

Objective :

Hereditary spastic paraplegias (HSPs) are a group of diseases in which the longest motor neurons that connect our brain to the muscles in our legs degenerate and die resulting in spasticity and weakness in the lower limbs. There are currently no treatments to cure or even to slow the course of these disorders therefore we need to better understand what is going wrong in the motor neurons of affected people so that we can identify new avenues for targeted treatments.

HSPs are inherited disorders meaning that they are caused by gene mutations which can be passed from one generation to the next. While many of the gene mutations causing HSP have been identified, it is not known how these mutations give rise to motor neuron degeneration in HSP. To being to address this question, I set out to investigate the function of HSP-causing genes in the fruit fly (*Drosophila melanogaster*). Mutations in Reticulon 2 cause HSP in humans (Montenegro *et al*., 2012) therefore I studied the equivalent gene in flies, Reticulon-like 1 (Rtnl1). I generated flies which lack Rtnl1 thereby developing a model for HSP which I found to recapitulate several features of the human disease including progressive locomotor deficits.

I identified that the protein encoded by Rtnl1 is expressed along the full length of motor neurons where it is required for the organisation of vital structural and functional neuronal components including mitochondria. In particular, loss of Rtnl1 results in a length-dependent loss of mitochondria from the synapses of the longest motor neurons while synapses of shorter motor neurons are unaffected. Mitochondria provide the energy that neurons need to enable them to survive. My findings therefore provide a novel mechanism by which mutations in Reticulon may give rise to motor neuron degeneration in HSP patients.

These findings were published in the journal '*Human Molecular Genetics*' (O'Sullivan *et al*., 2012).

Coordinator: University of Cambridge

Participants: Niamh O'Sullivan (Researcher), Cahir O'Kane (Scientist in Charge)

Subjects/Keywords: Motor neurons, disease model, gene loss, fruit fly.

Giorgio Signorello

Title: Fundamentals of Molecolar Electronic Assemblies

Project acronym: FUNMOLS

Date: From 1st October 2008 to 30th September 2012

Project details

Project reference no.: 212942
Subprogramme area: PEOPLE-2007-1-1-ITN - Marie Curie Action: "Networks for Initial Training"
Poster Information:Uniaxial Stress in III-V Nanowires:
Unprecedented Color Tunability and Novel Bandstructure Transitions
Call for proposal: FP7-PEOPLE-2007-1-1-ITN
Funding scheme: MC-ITN - Networks for Initial Training (ITN)
Status: Project Completed

Total cost: 2,799,062 EUR
EU contribution: 2,799,062 EUR
Coordinated in: United Kingdom

Objective:

The FUNMOLS network will tackle major challenges in the field of molecular electronics. Ten internationally-leading European research groups from five different countries [including one of Europe s leading industrial electronics-research groups (IBM Zurich)] have joined forces as full participants, combining expertise in synthetic chemistry, nanoscale physics and device engineering, surface electrochemistry and electronic structure calculations. Our highly-integrated approach involves a convergence of experiments including syntheses and theory in electron transport through single molecules, which will represent a major step towards the realization of future scalable molecular electronics technologies and processes. In the longer term, the insights gained will contribute to the fabrication of functional nanoscopic architectures and their integration into a higher hierarchical level. System parameters like electric field, light, temperature or chemical reactivity are envisaged as possible triggers of future nanoelectronic devices. This European consortium is committed to promote breakthroughs at the frontier of science. The training dimension of the FUNMOLS network is reflected in the high priority we will give to a series of actions specifically aimed at early stage researchers (ESRs).

Today's semiconductor industry faces two grand challenges: how to shrink the transistor dimensions and overcome performance limitations? How to improve speed and decrease the energy footprint of the future integrated circuit connectivity? We think strain engineering, novel materials and device structures can provide the solution. The nanowire structure offers an optimal electrostatic control in transistors and, at the same time, enables the direct integration of new materials (like III-Vs) on silicon, leading to ultimately fast transistors and the integration of light sources on chip. Strain engineering in III-Vs can increase the speed of transistors even further and permits to tune continuously the color of emission and improve the performance of semiconductor lasers. Inspired by these applications, we have explored the effect of strain in III-V nanowires, with a special focus on the material which enabled the first semiconductor lasers: GaAs. We have shown that by tuning the strain continuously up to 3.5%, we can modify color of

the light emitted by a single GaAs nanowire over a range of 180 nm (a color range equivalent to the one between green and red). We also have performed similar experiments on nanostructures of the same chemical composition, with atoms arranged with a unique order and position (wurtzite GaAs). In these nanowires we have discovered that elastic deformations can induce a unique bandgap transition: when tensile stress is applied, the nanowires emit light efficiently; upon compression, the electrons rearrange in a new order and light emission gets suppressed, similarly to what happens in silicon or germanium. In this state, this material can be a good light detector. Our results are at the foundation of wide range of applications like integrating lasers on chip, obtaining fine control of the color of the light emitted over a large range, and integrating within the same device an efficient light emitter and detector.

Coordinator:
University of Durham

Participants:
IBM RESEARCH GMBH,
Friedrich-Alexander Universitaet Erlangen-Nuernberg
Universitaet Bern
Bangor University
Lancaster University
Universitaet Basel
Universidad Complutense de Madrid
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- *IBM Research - Zurich (Switzerland)*
- *SolVoltaics AB, Lund (Sweden)*

Norwegian University of Science & Technology - NTNU, Trondheim (Norway)

Keywords: Semiconductors, III-V, Light Emission, Nanowire, Uniaxial Stress, Photoluminescence, Raman, Poisson Ratio, Deformation Potentials, Direct Bandgap, Pseudodirect Bandgap

Valerie Babinsky

Title: **The Calcium-Sensing Receptor in Glucose Homeostasis**

Organisation: **University of Oxford Academic Endocrine Unit**