Preface

In recent years, the generation gap in science and technology has risen sharply, and the international situation has changed rapidly as well. Countries have sought to optimize their scientific research to actively respond to the ever-changing situation. In order to cope with the multiple challenges that future technological development trends might bring to human life, the Taiwan government formulated an "Innovative, Inclusive, and Sustainable" program called "Taiwan's 2030 Science & Technology Vision".The program puts forward five goals, " a happy society, a high-value economy, a strong environment, innovative education and inclusiveness". The Ministry of Science and Technology has also promoted Taiwan's precision health initiatives, advanced network infrastructure, forward-looking semiconductors, digital transformation, information security excellence, satellites and space, collectively known as "six major development spindles". It was done with a view of integrating the United Nations Sustainable Development Goals (SDG), paying attention to deepening humanistic literacy, continuing to promote emerging and forward-looking technologies, and building Taiwan's core strategic industries. Leading the general trends of Taiwan's future development through local strengths and international links is also a priority.

In order to enhance the influence of Taiwan's international scientific research and innovation and the visibility of international academic services, the Ministry of Science and Technology encourages domestic scientific research teams to actively participate in the "Horizon Europe 2020" research and innovation plan, and specifically formulated three strategies：
Start the network project to make preparations for Taiwanese researchers to participate in the EU large-scale planning team proposal.
Support the "Bottom-up" Taiwan-EU multilateral plan evaluated and approved by the European Commission.
Actively participate in the EU's joint research and innovation projects through the public sector cooperation mechanism.

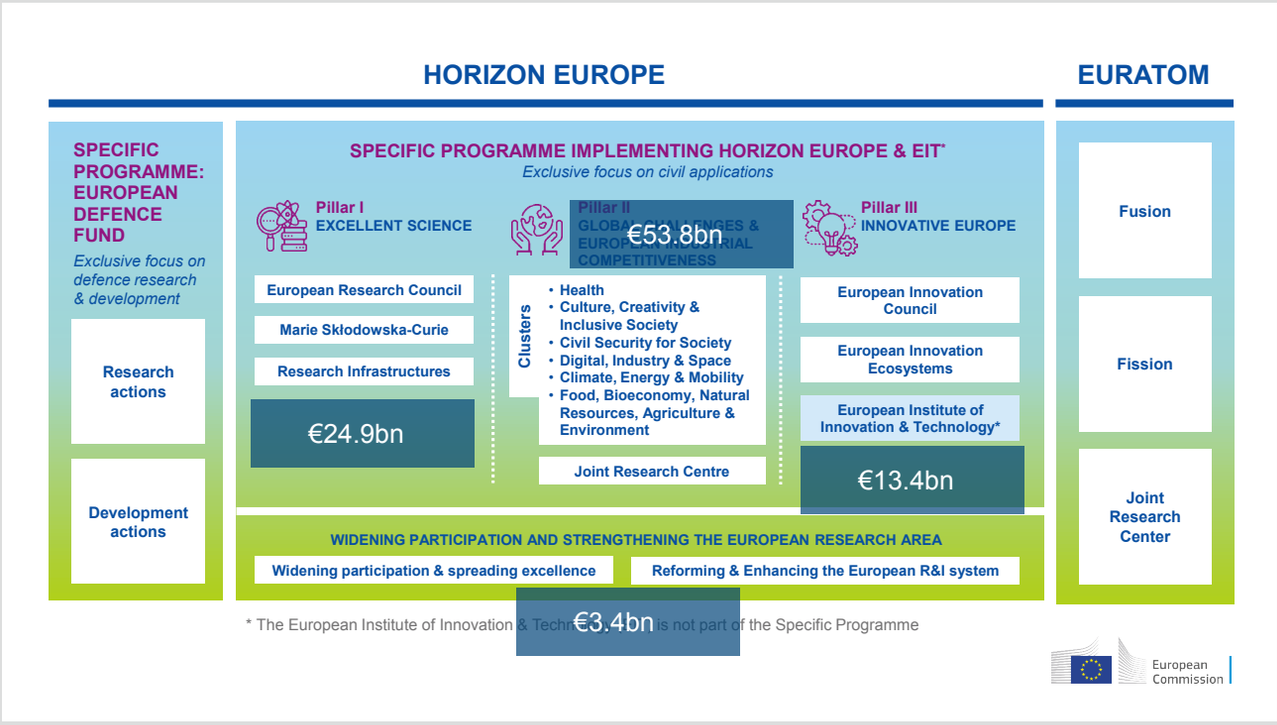
According to the statistics published on the EU website on April 6, 2021, Taiwan's success rate is twice the average of the H2020 proposal. Taiwan has more than 60 partners around the world, and most of the priority topics in which they participate include information, communications and technology (ICT), health and food. In addition, with the joint support of the Ministry of Foreign Affairs, the Ministry of Education, the Ministry of Economy, and the Ministry of Science and Technology, 56 large-scale projects based on three pillars of scientific excellence,industrial leadership,and social challenges under the framework of H2020 have been successfully signed. Of the 46 projects subsidized by the Ministry of Science and Technology so far, 26 projects have been covered, including 10 ERA-NET Co fund projects (29 plans) and 16 non-ERA-NET Co fund projects (17 plans). There are aslo 2 more EU projects, namely, "Environmental and Climate Action Project and Copernicus Project" that were subsidized. To conclude, a total of 48 projects were subsidized, 30 of which have been included in this special issue.
The next scientific research project "Horizon Europe" was promoted in early 2021 and will continue until 2027.I believe that with Taiwan's scientific research energy accumulated in the past, the number and success rate of future applications for "Horizon Europe" will all be brilliant.

Department of International Cooperation and Science Education, MOST
Director General Dr. Chih-Peng Chu

Program overview

Nowadays, many human problems have already evolved into global issues, and global crises need to be resolved through cross-regional cooperation. The European Union has long played an active role in the process of maintaining environmental sustainability and pursuing peaceful development. It is committed to the initiative and implementation of the United Nations Sustainable Development Goals (SDGs), and has also carried out many international scientific research cooperation with partner countries.

"Horizon Europe" is a new phase (2021-2027) of the European Union's technology research and development framework plan launched after the end of Horizon 2020. It is also the world's largest multi-year research framework plan. A total of €95.5 billion will be invested to promote it. The promotion will be divided into five major tasks: "fighting cancer ", "adapting to climate change ", "protecting our oceans ", "living in greener cities " and "ensuring soil health and food ". The most important purpose of this plan is to make the EU a leader in the innovation market, thus great importance is attached to investment in R&D "Research and Development" and innovation. According to EU estimates, " Horizon Europe " will generate more GDP, and more than 35% of the expenditure will be used to combat climate change. It is estimated that more than 300,000 high-skilled jobs will be created by 2040. The " Horizon Europe " project is divided into two parts, namely: " European Defense Fund" and " European Institute of Innovation and Technology " (see figure below).



Source

Official website of the European Commission, Taiwan European Union Innovation and Cooperation Platform remake.
https://ec.europa.eu/info/sites/info/files/research_and_innovation/funding/presentations/ec_rtd_he-investing-to-shape-our-future.pdf

" Horizon Europe " will both continue with and adjust the concept of Horizon 2020, starting from the three pillars,namely:

[Pillar 1] Excellence Science: Strengthen the scientific capabilities of the European Union through the European Research Council, the New Curie Talent Cultivation Program and the research infrastructure.

[Pillar 2] Global Challenges and European Industrial Competitiveness: There are six clusters, namely: (1) health; (2) culture, creativity and inclusive society; (3) civil security for society ;(4) Digital, industry and space; (5) Climate, energy and mobility; (6) Food, bio-economy, natural resources and agriculture and environment.

[Pillar 3] Innovative Europe: aims to assist the European innovation ecosystem and promote education and R&D through the European Innovation Council and the European Institute of Technology.

According to different research topics, each cluster of Pillars 2 and 3 has three possible partnerships, that is to say, a co-programmed one, a co-founded one, and an institutionalized one which will generate different types of subsidies. At present, the European Commission has announced partnerships in 49 sub-topics (see figure below).

Source

Official website of the European Commission
https://ec.europa.eu/info/sites/info/files/research_and_innovation/funding/presentations/ec_rtd_he-investing-to-shape-our-future.pdf

Project host team

Engineering Platform and
the host of the integrated project system

National Taiwan University of Science and Technology

Distinguished Professor
Jeng-Ywan Jeng

Natural Platform

National Yang Ming Chiao Tung University

Vice President
Yung-Fu Chen

Taiwanese academia performed well in EU scientific research projects in the past.In order to encourage Taiwanese scholars to join EU scientific research projects,the Ministry of Science and Technology actively takes part in co-funded projects and provides Taiwanese scholars with more opportunities for participation.At present,Taiwan's participation in EU scientific research projects has achieved fruitful results. This special issue includes the results of the participation in the EU projects of 30 scholars and experts from various schools. This information can be used by scholars who are interested in gaining a deeper understanding of the EU projects.

In order to maintain the outstanding performance of the new"Horizon Europe"scientific research program,since the second half of 2020,the Ministry of Science and Technology has subsidized National Taiwan University of Science and Technology, National Yang Ming Chiao Tung University and National Cheng Kung University to jointly form the"Taiwan European Union Innovation and Cooperation Platform".Serving as the host of the integrated planning and engineering platform for this integrated project system,I had invitations extended to three project hosts including Vice President Yung-Fu Chen(Natural Platform) of National Yang Ming Chiao Tung University, Associate Professor Charlotte Pollet(Social Science Platform),and Associate Professor Shang-Rung Wu of National Cheng Kung University (Life Science Platform)to join the program; Additionally,we provide domestic scholars with information and services from the four fields to give access to various international scientific research cooperation opportunities; We also conduct research and analysis on the latest scientific research developments in various fields,and supplie the

Social Science Platform

National Yang Ming Chiao Tung University

Associate Professor
Charlotte Pollet

government department with reference for policy planning.

This project is a service platform. In the past year, we already achieved some preliminary results: with the previous efforts of the Ministry of Science and Technology,the National Research Institute and various universities,we successfully promoted 3 Taiwan and EU projects last year and successfully held 4 regional experience sharing sessions in order to enhance the exchange of experiences among domestic scholars; we wrote 4 research reports on recommended fields, and suggested a"co-funded project" that the Ministry of Science and Technology can participate in.We also established and already convened 3 advisory committee meetings,set up a Chinese and English website (teuicp.tw),launched a FAQ area and a Facebook fan page (facebook.com/TEUICP) to occasionally announce the latest news of "Horizon Europe"and partner seeking information.We published special issues in both Chinese and English to generate publicity and provide more opportunities for domestic scholars to participate in EU project cooperation. It is expected that in the follow-up plan,we will continue to increase the effectiveness of implementation in all aspects and give full play to the role and function of this platform.Any suggestions that you would like to share will be welcome.

Life Science Platform

National Cheng Kung University

Associate Professor
Shang-Rung Wu

Taiwan European Union Innovation and Cooperation Platform
the host of the integrated project department and Engineering Platform

Distinguished Professor
Jeng-Ywan Jeng

Principal Investigator

Shing-Jiang Lue

Chang Gung University |
Department of Chemical and
Materials Engineering

Coordinator

Slovenia / University of Maribor

Participants

1. Slovenia / University of Nova Gorica
2. Norway / Norwegian University of Science and Technology
   Norway / Abalonyx AS

Brief introduction

Prof. Shingjiang Jessie LUE is a professor of the Department of Chemical and Materials Engineer at Chang Gung University (CGU),Taiwan.Prof.Lue obtained a B.S. and M.S. degrees from National Taiwan University,and a Ph.D. degree of Biotechnology Engineering from University of Missouri-Columbia,USA,in 1990. She joined Chang Gung University in 1996 and was promoted to a full professor in 2007.She was the department chair of Department of Chemical and Materials Engineering at CGU during 2014-2016,and the group leader of Green Technology Research Center for 2013-19 at CGU. Her research interest focuses on the development of high-performance materials for separation,energy,and biotechnology applications.Prof.Lue has published more than 120 SCI papers and 2 book chapters,given 200 conference presentations,and applied 3 patents.

Project title

Developing new renewable nano-structured electrode and membrane materials for direct alkaline ethanol fuel cells (NanoElMem)

Project number 106-2923-M-182-001-MY3 **Duration** 2017/5/1-2020/4/30

Programme Acronym
NanoElMem

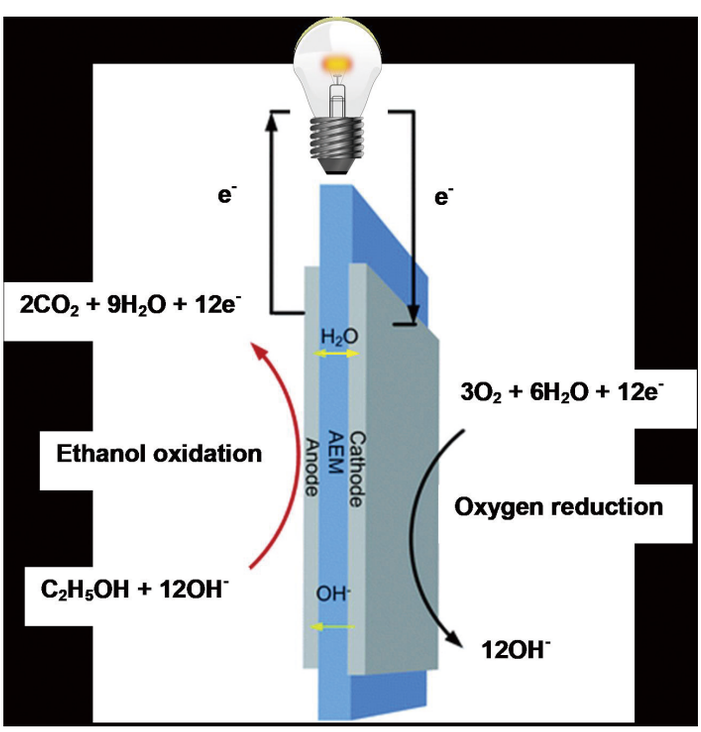
Topic
Functional materials

Programme
M-ERA.NET

Call for proposal
M-ERA.NET Call 2016

Abstract

The increased demand for energy,coupled with concerns about environmental pollution and growing fossil fuel costs have created a great need for clean and efficient power sources and energy storage technologies.Fuel cells directly convert chemical energy stored in fuels into electrical energy through electrochemical reactions, and have been identified as one of the most promising technologies for the clean energy industry of the future.The overall concept of the NanoElMem project relates to developing novel stable and highly effective materials for the direct alkaline ethanol fuel cell (DAEFC),which directly converts ethanol to electric power.The enhancement of the performance of DAEFCs is based on the development of platinum (Pt)-free electrode catalysts and nano-composite membranes by using environmental-friendly inorganic and polysaccharide materials and technologies. The enormous technical and scientific potential of graphene will be explored by producing new graphene-polysaccharide based membranes.



Principal Investigator

Jeng-Shiung Jan

National Cheng Kung University |
Chemical Engineering Department

Coordinator

Taiwan / National Cheng Kung University

Participants

1. Taiwan / National Cheng Kung University
   Taiwan / National University of Kaohsiung
2. Luxembourg / University Luxembourg
3. Hungary / Hungarian Academy of Sciences
4. Israel / The Hebrew University of Jerusalem
5. Switzerland / ETH Zurich
   Switzerland / MagnebotiX AG

Brief introduction

Professor Jeng-Shiung Jan is currently working at the Department of Chemical Engineering in National Cheng Kung University. He earned both his B.S. and M.S. in Chemical Engineering from National Taiwan University in 1994 and 1996,respectively.After serving in the army for two years,he went to work in industry for four years.Then he pursued his Ph.D. in Chemical Engineering at Texas A&M University between 2002 and 2006.His Ph.D. work is to study polypeptide-mediated nanomaterials.After earning his PhD degree,he conducted his postdoctoral research at Georgia Institute of Technology with the funding supported by Procter & Gamble Company.He began his independent career at the Department of Chemical Engineering in National Cheng Kung University in the August of 2008 and was promoted to full professor in the August of 2016.He has published more than 50 papers,filed several patents,and acquired awards and funding programs.Currently,his group is collaborating with several research groups in Japan and Europe.The focus of his group is on the synthesis and self-assembly of amphiphilic polypeptides/glycopeptides and the evaluation of their potential biomedical applications.Recently, the group also focuses on exploring the bioactivity of these polypeptides/oligopeptides and found that certain oligopeptides can be HuR protein inhibitors for treatment of inflammation and cancer related diseases.

Project title

M-era NET- European Union's Horizon 2020 research and innovation programme

Project number MOST107-2923-M-006-002-MY3 **Duration** 2018/06/01-2021/05/31

Programme Acronym
NanoPD

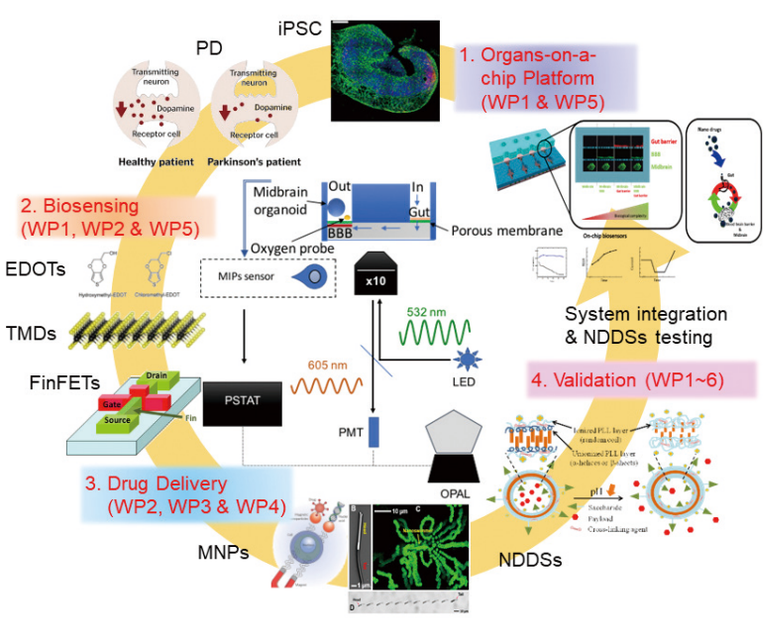
Topic
NMP-14-2015-ERA-NET on Materials including Materials for Energy

Programme
M-ERA.NET

Call for proposal
H2020-NMP-ERA-NET-2015

Abstract

This project is aimed to design and synthesize peptide- and glycopeptide-based nanodrug delivery systems (NDDSs) for the delivery of Parkinson's disease (PD) drugs.The synthetic peptides and glycopeptides have been demonstrated to be promising candidates for drug delivery due to their biodegr adability,biocompatibility,and non-toxicity.They possessed essential structure-function properties of proteins, which made them to be advantageous as compared to conventional polymers.They have been demonstrated to be promising biomaterials as NDDSs.The efficacy of nandrugs and NDDSs on in vitro dopaminergic neurons in substation nigra pars compacta will be evaluated and validated in vivo in PD-simulating mouse models.The efficacy of NDDSs would be further improved by conjugating with blood-brain-barrier (BBB) shuttle peptides to enhance penetration across the BBB in vivo.Moreover,the NDDSs will be used to deliver therapeutic agents to midbrain-organoids using membrane-integrated microfluidic devices developed by our partners. The results will be compared to those obtained from in vivo in PD-simulating mouse model in order to evaluate the validity of the designed organs-on-chip microfluidic devices.



Principal Investigator

Hung-Yin Lin

National University of Kaohsiung | Department of Materials and Chemical Engineering

Coordinator

Taiwan / National Cheng Kung University

Participants

1. Taiwan / National Cheng Kung University
   Taiwan / National University of Kaohsiung
2. Luxembourg / University Luxembourg
3. Hungary / Hungarian Academy of Sciences
4. Israel / The Hebrew University of Jerusalem
5. Switzerland / ETH Zurich
   Switzerland / MagnebotiX AG

Brief introduction

Dr.Hung-Yin Lin earned his PhD from Columbia University in the City of New York in 2003.He then joined National University of Kaohsiung (Taiwan),and is currently distinguished professor and the chair in the Department of Chemical and Materials Engineering.He has published over 260 peer-reviewed papers,and been elected as a fellow of the Royal Society of Chemistry (FRSC) and associate fellow of the Institution of Chemical Engineers (AFIChemE) in 2015 and 2016,respectively. His expertise is in the field of translational biomedical engineering; especially biosensors and biomaterials.Lin's group has published several articles in the journal of Biosensors and Bioelectronics,which he also serves as an outstanding reviewer.He is now Associate Editor of Frontiers in Bioengineering and Biotechnology.

Project title

New strategies for advanced material-based technologies in health applications

Project number MOST 107-2923-M-390-001-MY3 **Duration** 2018/06/01-2021/05/31

Programme Acronym
NanoPD

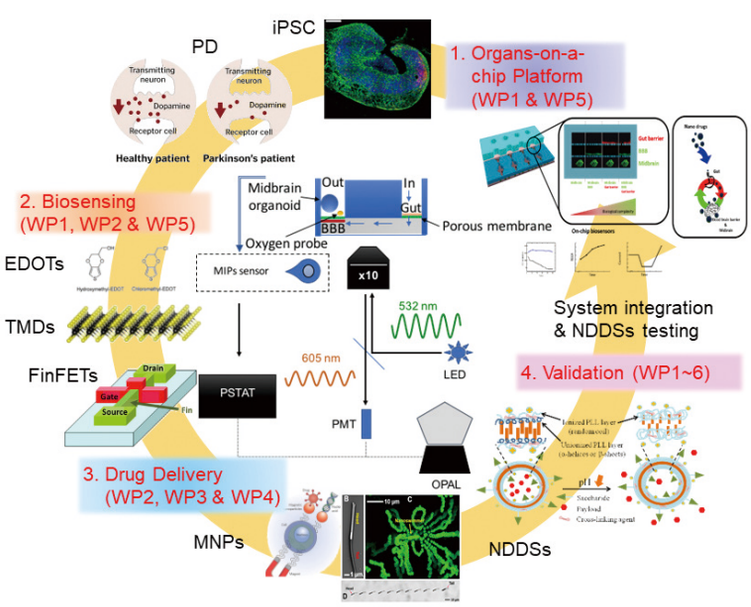
Topic
NMP-14-2015-ERA-NET on Materials including Materials for Energy

Programme
M-ERA.NET

Call for proposal
H2020-NMP-ERA-NET-2015

Abstract

The proposed project intends to establish the usage of on-chip-solutions,with integrated sensors,for in vitro disease modeling and to study the ability of the newly-designed nanodrug delivery systems (NDDSs) to deliver therapeutic agents to midbrain-organoids using membrane-integrated microfluidic devices.A particular focus is aiming at developing an organs-on-a-chip device for Parkinson's disease (PD) that should address the effect of biological barriers for disease onset and treatment and elucidate the drug inhibiting mechanisms. The success of this project would not only provide insights on the mechanisms and principles on designing these NDDSs,but also drastically reduce the use of animal models for drugs and therapy testing. Moreover,it will highlight the development of a novel screening platform with patient specific induced pluripotent stem cells (iPSC) for advanced personalized medicine.



Principal Investigator

Liou, Yuei-An

National Central University |
Center for Space and Remote Sensing Research

Coordinator

Italy / R3 GIS srl

Participants

1. Italy / R3 GIS srl
   Italy / Universita degli Studi di Milano
2. Poland / Gmina Miejska Krakow – Municipality of Krakow

Brief introduction

Prof.Yuei-An Liou received a double Ph.D. degree in Electrical Engineering and Atmospheric, Oceanic,and Space Sciences from the University of Michigan,Ann Arbor.He is currently a distinguished professor and head of Hydrology Remote Sensing Laboratory,Center for Space and Remote Sensing Research (CSRSR), National Central University; Founding President, Taiwan Group on Earth Observations (2010~);Honorary President,Vietnamese Experts Association in Taiwan (2017/1~). He was awarded as Honorary Life Member,Korean Society of Remote Sensing in 2007; Foreign Member,A.M. Prokhorov Russian Academy of Engineering Sciences in 2008;Member, International Academy of Astronautics in 2014;Crystal Achievement Award,Vietnam Academy of Science and Technology in 2019; Outstanding Research Award,MOST of Taiwan in 2019;and included in The World's Top 2% Scientists List published by Stanford University in 2020.He published more than 140 scientific (journals) papers among which 135 papers were published in SCI journals with citations (SCI/Google Scholar) more than 2478/4190 times with h-index of 27/36 as of 2021/4.Prof.Liou's research outcomes were recently reported by AGU-EOS twice in August 2020 with titles:"Typhoons Getting Stronger,Making Landfall More Often"and"Storms Interact but Rarely Merge into Bigger Tempests".Prof. Liou is an editor and Editorial Advisory Board member for several journals: GPS Solutions since 2001;Progress in Earth and Planetary Science,since 2017/5;Geomatics, Natural Hazards and Risk, since 2017/9;Remote Sensing, since 2017/11.

Project title

GIS and remote sensing assessment framework for urban greenspaces vulnerability to typhoons in Taiwan

Project number MOST 108-2923-M-008-002-MY3 **Duration** 2019/07/01-2022/06/30

Programme Acronym

LIFE URBANGREEN
(LIFE17 CCA/IT/000079)

Topic

LIFE Climate Change Adaptation (Innovative technological platform to improve management of green areas for better climate adaptation in urban areas)

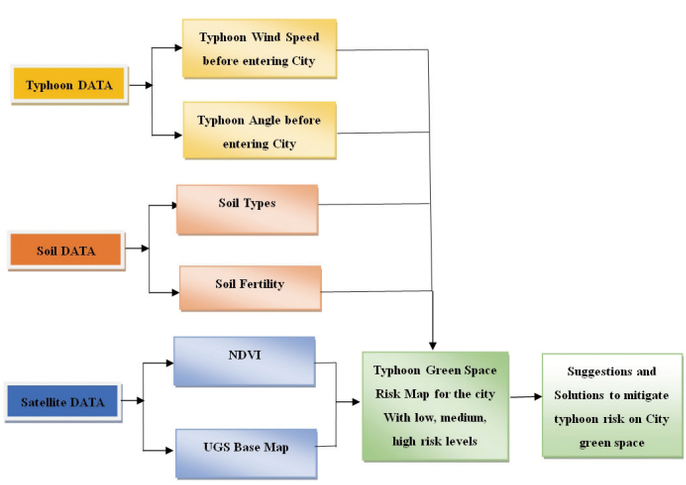
Programme

歐盟「環境和氣候行動計畫」
LIFE Program

Call for proposal

LIFE17/CCA/IT/000079–LIFE URBANGREEN

Abstract



This research proposes a vulnerable assessment framework of urban greenspaces (UGSs) to typhoons by using remote sensing and GIS approaches.The main objective is to reduce potential damages caused by typhoons.For the first year (7/1/2019~6/30/2020),analyze the typhoon characteristics and identify the impacts of typhoons on the UGSs in Taiwan;derive the UGS information (biological and physical features) from multi-sensor satellite images to build GIS database for the UGS server for further assessment.For the second year (7/1/2020~6/30/2021),derive the soil characteristics from the soil map and remote sensing data;propose an assessment framework to evaluate the vulnerability of the UGSs to typhoon in major cities in Taiwan;implement the R3 GIS platform and integrate it with new tools in testbed of Taipei City in accordance with the selected Actions in the Life Urbangreen Project.For the third year (7/1/2021~6/30/2022),the improved R3 GIS platform after integrating with new tools of assessing vulnerability of UGSs to typhoons will be tested and performed in accordance with selected Actions from the Life UrbanGreen Project for demonstration of its benefits to UGS management in Taiwan. Also, establish a Taiwan-EU Joint Research Promotion Office,aiming to promote and sustain bilateral cooperation.

Research outcomes will provide a warning system to serve the related authorities for mitigating the damages of typhoons on UGSs.The vulnerability of UGS in Taiwan to typhoon winds can be assessed via three components:(1) typhoon characteristics; (2) UGS features;and (3) soil composition.

Findings of this proposed study will be valid in three areas:

- Incorporating typhoon connection into design or management of greenspace systems is of high priority.
- Increasing dialogue between government and scientists is important towards integrated thinking and learning methods required to effectively mitigate impacts of typhoons on UGSs.
- Good understanding of typhoon influence on greenspaces may lead to improved vegetation protection strategies for mitigating the damages.

Principal Investigator

Mitch Ming-Chi Chou

National Sun Yat-sen University |
Department of Materials and
Optoelectronic Science

Coordinator

Taiwan /
Department of Materials and Optoelectronic Science,
National Sun Yat-Sen University,Taiwan

Participants

1. Latvia / Institute of Solid State Physics, University of Latvia
2. Lithuania / Center for Physical Sciences and Technology, Lithuania
   Lithuania / Institute of Photonics and Nanotechnology, Vilnius University Lithuania

Brief introduction

Professor Mitch,Ming-Chi Chou received his Ph.D. from School of Optics (CREOL),University of Central Florida (UCF) in 2000.He joined the Department of Materials and Optoelectronic Science at National Sun Yat-sen University in 2004.He now serves as the Vice President for Research and Development.His majors are single crystal growth and condensed matter physics.He is the recipients of the Award for Outstanding Contribution in Science and Technology,granted by Taiwan's Executive Yuan in 2014,and the Outstanding Research Award from Ministry of Science and Technology in 2011 and 2014. His research topics include laser,high-temperature superconductor,topological insulator, and scintillator.

Project title

ZnMgO materials with tunable band gap for solar-blind UV sensors

Project number MOST 108-2923-M-110-006-MY3 **Duration** 2019/09/01-2022/08/31

Programme Acronym
ZMOMUVS

Topic
M-ERA.NET Call 2018 on Functional Materials

Programme
M-ERA.NET

Call for proposal
M-ERA.NET Call 2018

Abstract

Deep UV photon sensors based on wide bandgap semiconductors can be used as biological and chemical sensors for ozone detection,detectors for water purification, determination of pollution levels in any biological agent.The concept of this project is to use the ZnO-MgO pseudobinary system,which has tunable bandgap from 3.3eV to 7.8eV, thus significantly enhancing the ability of the sensor to detect signals at different energies simultaneously.Our recent results indicated that the limitation of ZnO and MgO mutual solubilities can be broken by stablizing the high MgO-content wurtzite Zn1-xMgxO and high ZnO-content rocksalt Zn1-xMgxO epilayers by using low lattice mismatch substrates such as ScAlMgO4, MgO and Cu2O.

The international consortium includes five partners:Partner 1 & 5 (Taiwan) will be responsible for the growth of single crystal substrate and epitaxial growth of ultra-wide bandgap Zn1-xMgxO epilayers/heterostructures.Partners 2-4 (Latvia & Lithuania) study opto-electrical properties, and provide feedback of the optimal growth parameters. Besides Partner 2 fulfills computer modelling of the material structure,providing the theoretical support of the project.Participation in this project will help to increase technology readiness level of all partners:up to TRL 4 in Taiwan and TRL 3 in Latvia and Lithuania.We believe this project will bring benefits for each partner and provide new contributions to the European society.

Principal Investigator

Tsung Ming Tsai

National Sun Yat-sen University |
Materials and Optoelectronic Science

Coordinator

Taiwan / National Sun Yat-sen University

Participants

1. Taiwan/ National Sun Yat-sen University
2. Latvia / University of Latvia
3. Lithuania / Center for Physical Sciences and Technology
   Lithuania / Vilnius University

Brief introduction

In recent years,the team of Dr. Tsai has been dedicated to investigate the applications of supercritical fluid technology on various electronic devices and its reaction mechanism.In the past five years,Dr. Tsai has successfully investigated and developed a variety of applied technology.He also proposed physical mechanisms of device through electrical and material analyses.The research topics not only devote to innovation but also make a number of applied technology breakthroughs. The purpose of innovative applications of supercritical fluids in the field of electronic materials can be achieved through a variety of materials analyses and electrical measurement technology.In the past five year (2015~2020),the team of Dr.Tsai has published 77 international SCI papers.These papers include the outstanding SCI journals listed below:

Materials Today (IF：26.4): 1
Applied Physics Letters (IF：3.60): 6
IEEE Electron Device Letters (IF: 4.22) : 23
Nanoscale Res. Lett. (IF:3.58) : 6
Applied Physics Express (IF:3.09) : 9

He also acquired 15 R.O.C patents,9 US patents and obtained the ‘Material Innovation Award’ and 3 papers won the ‘Student Paper Award’ in MRS-T.

Project title

Device Fabrication and electrical characterization of ZnMgO materials with tunable band gap for solar-blind UV sensors

Project number MOST 108-2923-M-110-005-MY3 **Duration** 108/09/01-111/08/31

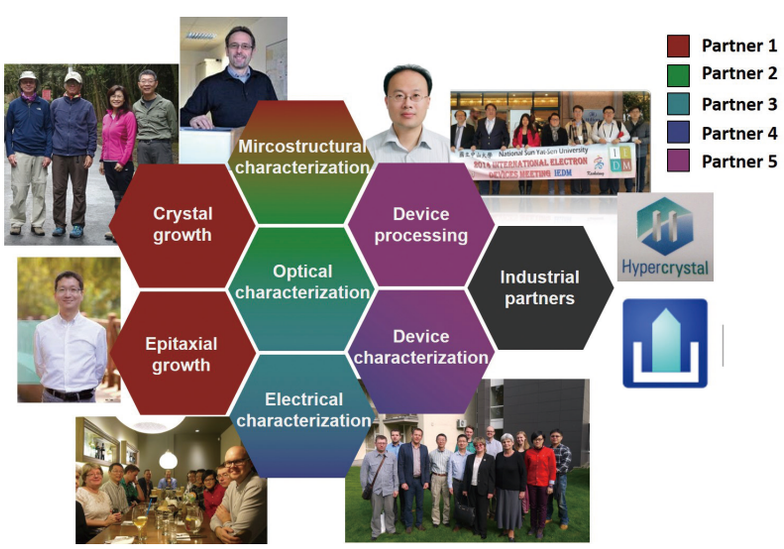
Programme Acronym
ZMOMUVS

Topic
M-ERA.NET 2-JTC2018 on Functional Materials

Programme
M-ERA.NET

Call for proposal
M-ERA.NET 2-JTC2018

Abstract



Deep UV photon sensors based on wide or ultra-wide bandgap semiconductors,such as II-oxides,III-nitrides,diamond,and SiC can be used extensively in applications such as biological and chemical sensors for ozone detection, detectors for water purification,determination of pollution levels in air or any biological agent,etc.However,more and more applications require the photosensing device/system enabling discrimination between emitting or polluting species.For example, current aerosol ultraviolet laser-induced fluorescence (UVLIF) detection systems measures fluorescence intensity using bulky spectral filters and multi-anode photomultiplier for acquiring multiple-point spectra.The identification and quantification of SO2,NOx,H2S and O3 emission based on photo-absorption /fluorescence techniques can also be benefited by the solid state detectors with multiple-bandwidth capability of detection. However,the bandgaps of diamond and SiC are not tunable, whereas those of AlGaN(composite III-nitrides) can only be varied from 3.4eV to less than 4.5eV through bandgap engineering.

The radically novel concept of this project is to use the ZnO-MgO pseudobinary system,which has the merit of providing materials with tunable bandgap from 3.3~7.8 eV,thus significantly enhancing the ability of the devices at different energies simultaneously. Our recent results indicated that the limitation of ZnOand MgO mutual solubilities can be broken by stablizing the high MgO-content wurtzite Zn1-xMgxO and high ZnO-content rocksalt Zn1-xMgxO by using low lattice mismatch substrates such as ScAlMgO4, MgO and Cu2O.Both Zn1-xMgxO p-n junction and TFT-type devices with cut-off wavelength < 320 nm,<280 nm,< 240 nm will be fabricated for deep UV photosensing.We will explore the physics mechanism of devices and utilize the supercritical fluid technology to develop the high performance and high reliability ZMO solar-blind sensors.

Principal Investigator

Chai-Lin Kao

Kaohsiung Medical University |
Department of Medicinal and
Applied Chemistry

Coordinator

Italy / Istituto Nazionale Tumori IRCCS
"Fondazione G. Pascale"

Participants

1. France / The CENTRE NATIONAL de la RECHERCHE SCIENTIFIQUE and AIX-MARSEILLE UNIVERSITE
2. Spain / Fundació Hospital Universitari Vall d'Hebron
3. Czech Republic / Palacký University Olomouc
4. Norway / Oslo University Hospital

Brief introduction

Chai-Lin Kao received a B.Sc from the Department of Chemistry, National Taiwan University (NTU).After military service,he moved to the School of Pharmacy,NTU,to pursue his Ph.D. degree under Prof. Ji-Wang Chern's supervision.During this period, he worked on the total synthesis of XH-14,a ligand for adenosine receptors and a potential natural product for cardiovascular disease. After received Ph.D. degree,he was awarded an Overseas Postdoctoral scholarship by the Ministry of Education,Taiwan.With this support,he joined Prof. Hung-wen Liu's group to study the carbohydrate biosynthesis and the enzyme mechanism catalyzed by coenzyme B6.After that, he started his independent research career in 2005 at the Department of Medicinal and Applied Chemistry, Kaohsiung Medical University (KMU).He has received an Excellent young researcher grant from the Ministry of Science and Technology,Taiwan,an outstanding research paper award by KMU,and two Asia-core program lectureships.

The Chai-Lin Kao Lab works on the synthesis and applications of nanomedicine and peptides.It is a more efficient and convenient method to prepare functional material without laborious purification on the more abstract level.Examples include new synthetic methods of dendrimers and dendritic compounds and their applications,preparation of active peptides,and therapeutic potential.

For the preparation of pure dendrimers and dendritic compounds,solid-phase dendrimer synthesis (SPDS) was applied.The product could be collected in a short period,which has never been reached before.Moreover, SPDS makes the dendrimers a potential product for biomedical applications because of the mature solid-phase technique in industrial production.Besides, various dendrimers were prepared and subjected as catalysts and sensors.One recent example is applying boronic acid-decorated poly(amidoamine) dendrimer as a selective sensor for specific carbohydrates, such as glucose.

For peptides,functional peptides were prepared for evaluating their potential as an analgesic.During the development, a new resin was developed for the lack of suitable techniques.A new 3,4-aminobenzoic acid (Dbz) was created as a linker between peptides and resin.This newly developed safe-catch type resin was successfully applied to the preparation of C-terminal functional peptides,branched peptides,and amphiphilic peptides.Remarkably,the products from this approach do not require chromatographic purifications

Project title

Project number MOST 109-2923-M-037-001-MY3 **Duration** 109/07/01-112/06/30

Programme Acronym
NAN-4-TUM

Topic
European Innovative Research & Technological Development Projects in Nanomedicine

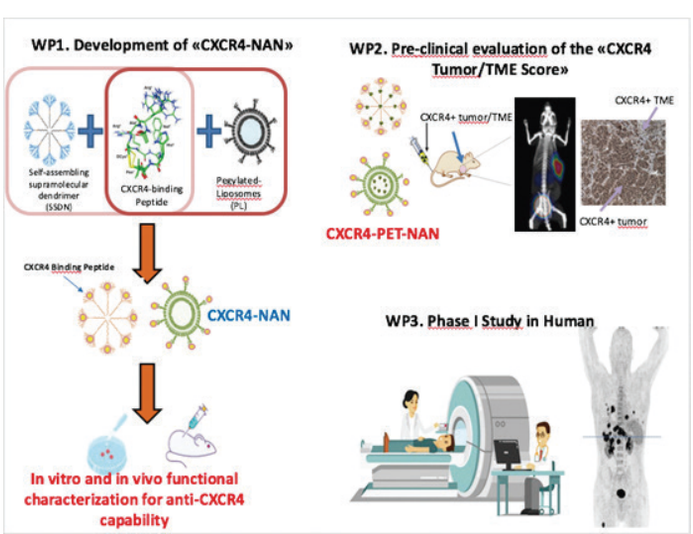
Programme
ENM III

Call for proposal
EURONANOMED 3

Abstract

The lifetime probability of developing invasive cancer in Europe is approximately 35-40%,with solid cancers representing more than 90%.Early diagnosis and precise follow-up constitute essential elements for successful cancer management.For diagnosis and follow-up,most patients undergo diagnostic imaging through computed tomography scan (CT) and Positron Emitting Tomography (PET) evaluation.Nevertheless,the widely utilized PET tracer,18Fluorodeoxyglucose ([18F]-FDG),has several limitations regarding specificity and sensitivity;thus,cancer lesions are often undetectable.

The use of next-generation nano-tracer may allow tumor-specific molecular targeting that could overcome [18F]-FDG limitations. The chemokine receptor C-X-C chemokine-receptor-4 (CXCR4) is overexpressed in most solid tumors characterizing the cellular most aggressive components and their microenvironment (TME).



We recently developed a new anti-CXCR4 PET probe ([68Ga]NOTA-Ahx-R54) to detect CXCR4-expressing tumor lesions.Coupling capability CXCR4 targeting-PET probe with nanotechnology could magnify the specificity and sensitivity through increased tumor accumulation, multiple targeting ligands per particle,and contrast signal amplification.In this project,we aim to develop a new CXCR4 targeting nanovectors-specific PET tracer {CXCR4-PET-NAN) to improve early diagnosis of primary/secondary cancer lesions that overexpress CXCR4,such as breast,colon,melanoma,pancreas,lung,and neuroendocrine tumors (NETs). Besides, the information that will be achieved by targeting TME cells CXCR4 expressing will assist the characterization of TME and identification of therapeutical targets.

Principal Investigator

Hui-Ting Chen

National Yang Ming Chiao Tung University | Faculty of Pharmacy

Coordinator

Spain / Universidad de Castilla-La Mancha

Participants

1. Taiwan / National Yang Ming Chiao Tung University
   Taiwan / National University of Kaohsiung
2. France / CNRS
3. Canada / Universite du Quebec
   Canada / Glycovax Pharma Inc.
4. Spain / Ramon y Cajal University Hospital
5. Latvia / Latvian Institute of Organic Synthesis

Brief introduction

The PI received her bachelor's and master's degrees from the Faculty of Pharmacy at Kaohsiung Medical College,and earned a doctorate degree from National Taiwan University, majoring in medicinal chemistry.She also received post-doctoral researcher training at the Institute of Chemistry,Academia Sinica, and the Department of Chemistry at Texas A&M University.After returning to Taiwan,she first joined a faculty position in the Department of Fragrance and Cosmetic Science at Kaohsiung Medical University,and now works in the Faculty of Pharmacy at National Yang Ming Chiao Tung University.Her research interests include the development of functional peptides,bone formation agents, and dendrimeric drug carriers.

Project title

The development of dendrimeric carrier with blood-brain-barrier crossing ability

Project number MOST 109-2923-M-010-001-MY3 **Duration** 109/07/01-112/06/30

Programme Acronym
NANO4GLIO

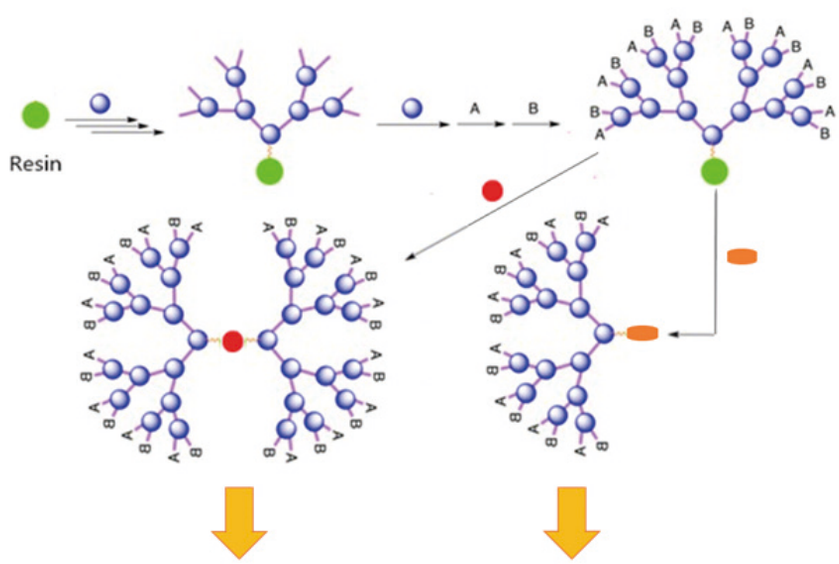
Topic
NMBP-11-2016-ERA-NET on Nanomedicine

Programme
ENM III

Call for proposal
H2020-NMBP-ERA-NET-2016

Abstract

This is one sub-project in the EuroNanoMed joint project.This integration project aims to discover a potential therapy against glioblastoma, to incorporate novel frontier multitasking nanoparticles,and to deliver small interfering RNA (siRNA) specifically targeting to brain.The overall goal is to establish a new cancer treatment strategy.The task of the Taiwan team is to produce dendrimers with high purity and the ability to cross the blood-brain barrier.In addition to the synthesis work during the project,we will study the blood-brain barrier crossing abilities related to the structure of dendrimers,the brain targeting abilities affected by peptide sequence and/or conjugated orientation,as well as the carrying capacity of the payloads induced by the arrangement of the carrier structure,etc.,thereafter,we will provide dendrimer products to other partners as their required carriers which will be used for enhancing the susceptibilities of tumor cells to anti-cancer drug treatment. The results received can not only be applied to being the brain disease treatment or diagnosis but also being a vector used for gene transfection to improve the progress of biomedical research.



To deliver SiRNA for glioblastoma treatment

Principal Investigator

Wen-Jong Wu

National Taiwan University |
Department of Engineering Science and Ocean Engineering

Coordinator

Slovenia / Jozef Stefan Institute

Participants

1. Norway / Stiftelsen SINTEF
2. Taiwan / National Taiwan University
3. Slovenia / COSYLAB, Laboratorij za kontrolne sisteme, d.d

Brief introduction

With the rapid development of IoT and the high attention of scavenge energy from ambient environment,the project investigator has focused on the development of micro piezoelectric energy harvester (PEH) and dedicated to the product realization of technique for over 15 years.There are much of opportunities of international cooperation, including the exhibition of self-powered wireless sensor with NTU-Intel Center & Intel Research Lab.With the support of MOST & M-era.net,cooperation of teams from Slovenia & Norway and MOST-ANR project,our research team has concentrated on the optimization and stabilization of aerosol deposition process for thick film.The PI also developed the rotational piezoelectric energy harvesting technology,innovation of interface circuit and application of smart bearing.In order to put these technologies in products,our research team put a lot of effort in optimization of material preparation process.We've also developed about 10μm piezoelectric ceramic thick film for energy harvester circuit. Furthermore, we are the only research team from all over the world who can integrate from self-made process equipment,the development of material & component process and IC design,which is rare and incredible.This piezoelectric ceramic thick film technique is not only applied in the development of scavenge energy from ambient environment,but also has great potentials on the production of micro-actuator.

Project title

Enabling technology for high-quality piezoMEMS

Project number MOST 103-2120-M-002-007-
MOST 104-2923-M-002-010
MOST 105-2923-M-002-010

Duration 2014/09/01-2017/08/31

Programme Acronym
ENPIEZO

Topic
Interfaces,Surfaces and Coating

Programme
M-ERA.NET

Call for proposal
Enabling technology for high-quality piezoMEMS
https://www.m-era.net/success-stories/enabling-technology-for-high-quality-piezomems

Abstract

ENPIEZO aims to develop piezoelectric-based energy-harvesting (EH) devices to provide a remote source of electricity from waste vibrations with countless applications.For instance,EH devices can be powered by a heartbeat to operate pace-makers or it can provide electricity for sensors at remote locations like wind-turbine air blades.Fabrication-friendly pulsed-laser deposition of high-quality Pb (Mg1/3Nb2/3) O3- PbTiO3 thin films on silicon will be developed,based on the delicate engineering of silicon-oxide interfaces.The study will be performed on laboratory and industrial-scale systems,the first of its kind in the world, which is believed to result in a breakthrough for the production of EH devices with state-of-the-art performance. In the project,aerosol deposition and environmentally friendly Na0.5Bi0.5TiO3-based piezoelectric alternatives will also be investigated.The project brings together four partners with expertise in a very diverse field of research and development.

Work package list:

WP no.	Work package title	Main content (keyword)	Total effort (Person-months)	Work package leader	Participating project partners
1	**Small-area growth**	PMN-PT and NBT-based film on Si, interface control	51	JSI	JSI, NTU
2	**Up-scaling**	Large-area PLD and aerosol deposition, PMN-PT on Si	54	SINTEF	SINTEF, NTU, JSI
3	**MEMS transducer**	Transducer design and fabrication, electromechanical test	58	NTU	NTU, SINTEF, JSI
4	**Device integration**	EH circuit design and test, validation of EH with remote sensors	66	NTU	NTU, Cosylab
5	**Management**	Dissemination, coordination, reporting	28	JSI	All

Work package time schedule:

Work Package	1st year	2nd year	3rd year
WP1			
WP2			
WP3			
WP4			
WP5			

Principal Investigator

Hsiao-Wen Zan

National Yang Ming Chiao Tung University
Department of Photonics

Coordinator

Austria / Danube University Krems

Participants

1. Austria / Danube University Krems
   Austria / Attophotonics Biosciences GmbH
2. Vienna / Vienna University of Technology
3. Taiwan / NYCU,Organic Semiconductor Lab
   Taiwan / NYCU,Sensing Techn. and Control Lab

Brief introduction

In recent years,Hsiao-Wen Zan focus on developing semiconductor or electro-optical sensors and transistors for biomedical applications.With the background of semiconductor devices and processing,she closely collaborated with chemists and medical doctors to do interdisciplinary research and clinical trials.She published more than 145 papers in leading SCI journals (i.e.Advanced Materials,Biosensors and Bioelectronics,Analytical Chemistry,ACS Advanced Materials and Interfaces,ACS Sensors,Sensors and Actuators B, etc.),she is also the inventors of 82 invention patents,(including 22 US invention patents).

Project title

ERA-NET on Materials including Materials for Energy

Project number 103-2120-M-009-008-
104-2923-M-009-003-
105-2923-M-009-007-

Duration 2014/09/01-2017/07/31

Programme Acronym
COSiFlex

Topic
NMP-14-2015-ERA-NET on Materials including Materials for Energy

Programme
M-ERA.NET

Call for proposal
H2020-NMP-ERA-NET-2015

Abstract

Organic light-emitting diodes (OLED) and photodetectors (OPD),particularly the ones processed in a solution,are very well suited for fabricating thin,large-area devices.OLED technology together with appropriate electronic circuitry is already widely used in commercial display applications,but typically limited to this application domain. The main project extended the state of the art by integrating organic LEDs and organic photodetectors in interdigitated form on a single carrier.Such integrated OLED/OPD processing technology creates a basis for sophisticated thin-film flexible sensor and actuator devices.

Composite technologies combining OLED/OPD structures with polymer film and silicon substrates were established to build novel high-tech composites that can further serve as basis for new,smart products. Examples for novel applications are customizable,“film-like”,high-resolution proximity sensors based on a combination of OLEDs and OPDs.Other application examples are tightly integrated combinations of organic devices and MEMS structures for high-sensitivity displacement or vibration sensors,or novel concepts for direction-selective light sensors.In this sub-project,we fabricated the miniaturized OLED/OPD sensor and collaborated with CISS to integrate the OLED/OPD with MEMS devices.The miniaturized OLED/OPD sensor was produced by low-cost solution process on various kinds of substrates including flexible substrate. New patterning methods including metal transferring and hybrid (including inorganic sol-gel material and organic material) lithography were evaluated in the proposed OLED/OPD miniaturized sensor.Good-enough process uniformity,reproducibility,and device lifetime were performed by developing large-area blade coating process and multi-layer encapsulation process.We aim to deliver sensitive sensors (proximity,optical, and displacement sensors) as well as large-area solution-process technologies,which are promising for the development of commercialized production line and sensor products.

Principal Investigator

Nae-Lih Wu

National Taiwan University |
Department of Chemical Engineering

Coordinator

Germany / University of Münster

Participants

1. Taiwan / National Taiwan University of Science and Technology
2. Germany / Freie Universität Berlin
   Germany / VARTA Microbattery GmbH

Brief introduction

The PI of NTU team has been conducting research on synthesis and characterization of electrode materials for electrochemical energy storage devices,including batteries and supercapacitors,for over ten years.For battery research,the team has been focusing on various anode materials for Li- and Na-ion based batteries, including the state-of-the-art high performance graphite,Li-alloying metals and conversion-type of metal oxides.NTU team also has the expertise in synchrotron X-ray based analytical methodologies,including in operando X-ray absorption spectroscopy,X-ray diffraction, and X-ray tomography.

Project title

NMP-14-2014-ERA-NET on Materials including Materials for Energy

Project number MOST 104-2923-M-002-011-MY3 **Duration** 2015/09/01-2018/07/31

Programme Acronym
ACHiLiS

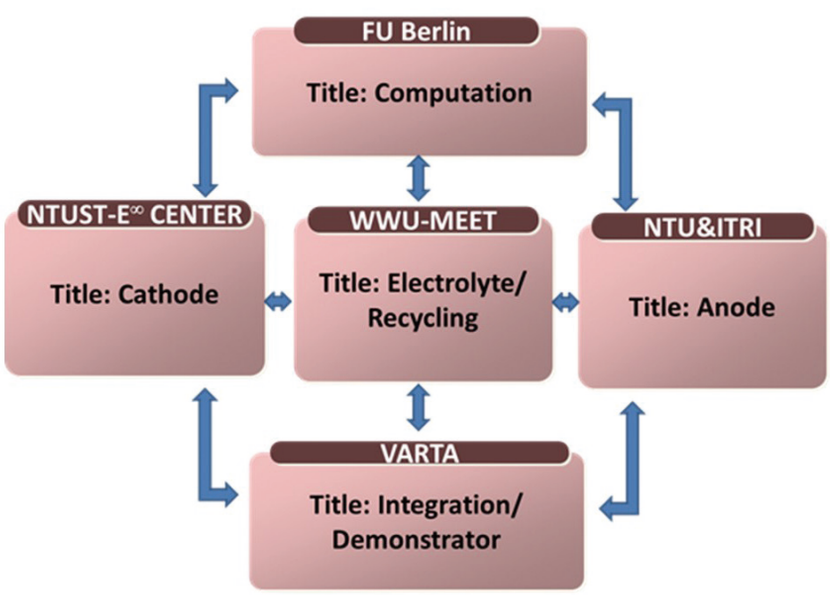
Topic
Composite Technology

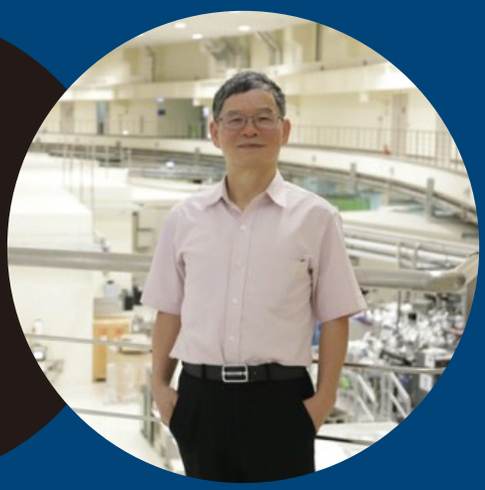
Programme
M-ERA.NET

Call for proposal
M-ERA.NET Transnational Call 2014

Abstract

In the present project,an advanced lithium/sulfur battery is in developing,which is a potential candidate for the post lithium-ion battery technology. Therefore,all parts of a battery are in focus of research: cathode,anode,electrolyte,computational simulation and an industrial partner to integrate and construct all components for actual applications. Li_2S will be used as the cathode material.Li-ion insertion type of anode materials,such as Si,Sn and Ge,which form alloys with Li ions, can be matched with Li sulfide, Li_2S,cathode, which releases Li ions upon the first charge cycle.Different gel/composite polymer systems consisting of ionic liquids,lithium salts,polymers and/or more molecular components will be investigated.The focus will be on the formation of an interphase on the cathode side in addition to the separator.Theoretical study on the electronic and atomic structures,properties,and processes for the Li-S battery materials proposed by the experimental groups of the project will be conducted.





Principal Investigator

Bing Joe Hwang

National Taiwan University of
Science and Technology |
Chemical Engineering Department

Coordinator

Germany / University of Münster

Participants

1. Taiwan / National Taiwan University of Science and Technology
2. Germany / Freie Universität Berlin
   Germany / VARTA Microbattery GmbH

Brief introduction

PI currently holds the National Chair Professorship from the Ministry of Education (Taiwan) and University Chair Professor at NTUST.Recently,he received Humboldt research award from Humboldt Foundation.He is the director of Sustainable Energy Development Center at NTUST.His team has devoted to the electrochemical research for decades focusing on the understanding electrochemical energy storage and conversion reactions by various in-situ spectroscopic techniques,such as in-situ X-ray absorption spectroscopy,in-situ Raman spectroscopy,in-situ IR spectroscopy and so on.His team has explored the‘nanoscience’underpinning in reactions and interfacial phenomena directly related to electrochemical systems and contributed significantly to the development of fuel cells and lithium-ion batteries.

Project title

NMP-14-2014-ERA-NET on Materials including Materials for Energy

Project number MOST 104-2923-M-002-011-MY3 **Duration** 2015/09/01-2018/07/31

Programme Acronym
ACHiLiS

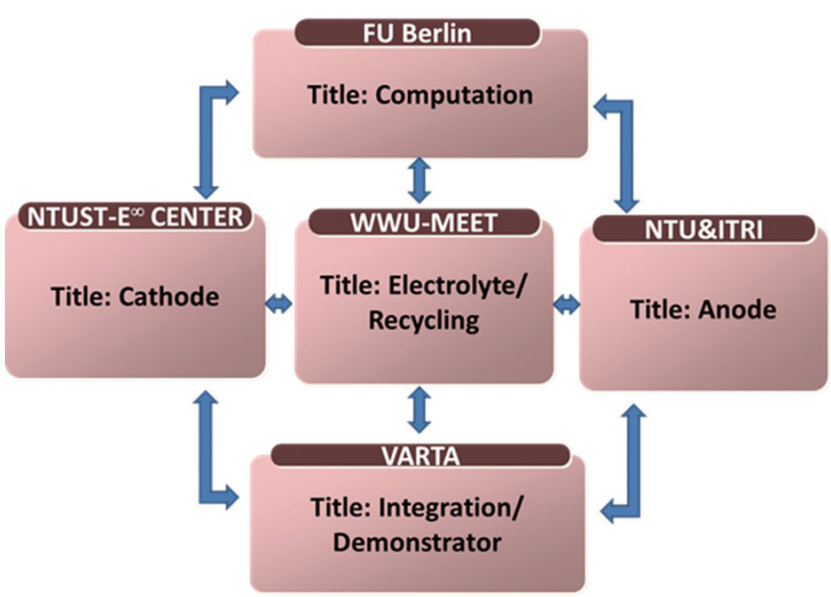
Topic
NMP-14-2015-ERA-NET on Materials including Materials for Energy

Programme
M-ERA.NET

Call for proposal
H2020-NMP-ERA-NET-2015

Abstract

To overcome the intrinsic poor conductivity of Li2S,its unavoidable volumetric changes during charging/discharging,and undesired shuttle effect induced by the dissolution of intermediate polysulfides in the electrolyte,lithium sulfide on polyacrylonitrile (Li2S-PAN) composite material has been synthesized by various methods.In particular,the Li2S-PAN composite obtained by an electrochemical-discharging method effectively resolves the above-mentioned intrinsic problems by the strong S-PAN covalent bonding.In addition,we conducted in-situ Raman spectroscopy and X-ray absorption spectroscopy to study the structural evolution upon cycling. With the help of theoretical computation,the charge/discharge mechanism of S-PAN and Li2S-PAN is proposed.



Principal Investigator

Shabbir Syed-Abdul

Taipei Medical University |
Graduate Institute of Biomedical Informatics

Coordinator

Spain / Salumedia Tecnologias

Participants

1. Taiwan / TMU
2. Greece / Aristotle University of Thessaloniki
3. Spain / Salumedia
   Spain / University of Seville

Brief introduction

Dr.Shabbir Syed-Abdul is an associate professor at Institute of Biomedical Informatics,a leading researcher and a principal investigator at the International Center for Health Information Technology, Taipei, Taiwan.He is an educator for MOOCs on FutureLearn,one of his renowned course is on INTERNET OF THINGS FOR ACTIVE AGING.Shabbir's major research interests are Long-term care with Wearable technologies, mHealth, Big data analysis and visualisation, Artificial Intelligence, Personal Health Records,Social Network in healthcare and Hospital Information System.He wants to empower care providers and improve patient engagement.He feels one of the ways to achieve it is to focus on the management and flow of the health/ medical information among health care providers and seekers.

Dr.Shabbir's previous experiences working as a physician,researcher and principal investigator both in the developed and developing world,makes him to lead advance global knowledge on the factors that impact on the development of sustainable healthcare,in particular focusing on innovation and ageing populations.

Project title

SmokeFreeBrain: Multidisciplinary tools for improving the efficacy of public prevention measures against smoking

Project number 106-2923-E-038-001-MY2 **Duration** 2017/05/01-2018/10/31

Programme Acronym

SmokeFreeBrain

Topic

HCO-06-2015-Global Alliance for Chronic Diseases. Prevention and treatment of lung diseases

Programme

RIA - Research and Innovation action

Call for proposal

H2020-HCO-2015

Abstract

Smoking is the largest avoidable cause of preventable morbidity and premature mortality worldwide. The prevalence of smoking worldwide is estimated at about one billion smokers, half of which will die prematurely as a consequence of their addiction, unless they quit. Smoking causes approximately 85% of the cases of lung cancer and chronic obstructive pulmonary disease (COPD) and contributes to the development of many other lung diseases,such as Cancer of the trachea, bronchus and lung (1, 2). Deaths from lung cancer 70-90% are due to smoking (since 4000 chemical compounds are contained in a cigarette that have been listed by the International Agency for Research on Cancer (IARC) as directly associated with cancer in humans ("class A" carcinogens).The overall objective of the project is to evaluate the effectiveness of the proposed approaches in terms of health economics,by studying their cost-effectiveness,and proposing a scalable plan for integrating these interventions into policy and practice both in LMIC as well as in HMIC. At the same time the realization of the project will allow the generation of new knowledge regarding the effects of smoking cessation aids in various levels of health and disease, promoting thus scientific excellence regarding the effects of smoking in the domains of toxicology, physiology,pulmonary and neuroscience via state of the art approaches of a European multidisciplinary consortium. This is ongoing H2020 project with 12 partners from 8 countries from Europe.Taiwan (Taipei Medical University) has joined the consortium as the 13th partner. Taipei Medical University (TMU) will design the smoking cessation protocol for the Mobile Motivational Messages for Change (3M4Chan) intervention,and its data management plan.This step will be based on close collaboration and discussion with Salumedia Technologies SL (SAL), Virgen del Rocío University Hospital (VRUH) from the Andalusian Health Service (SAS),and the University of Seville (USE). SAS will perform an applicability analysis of the algorithm for relapse prediction developed by TMU to study its feasibility to be applied in the VRUH environment. TMU and USE will also design the study protocol for the public health intervention. One of the many goals of this project is to be able to compare the intervention effectiveness of the smoking cessation m-health interventions and usual care.We have to make sure the data that is going to be registered can be compared with the Social-Local-Mobilie (SoLoMo) pilot data.Since some of the data of the project will be public, we have to carefully discuss and select what unidentified patient data can be publically shared. This task will allow including new parameters to register that are of interest for the TMU,and specify what parameters should be followed for the massive public m-health intervention (for instance, acceptance of motivational messages,and physical activity level).A clinical trial will be conducted to explore methods effecting successful abstinence in the candidates willing to quit smoking when compared with usual care.

Principal Investigator

Juuen CHANG

National Cheng Kung University
Department of Environmental Engineering

Coordinator

Spain / EIT CLIMATE-KIC SL

Participants

1. France / Bluenove
   France / CEA
   France / LGI
2. Belgium / CEPS
   Belgium / VITO
3. Germany / EIT Raw Materials
   Germany / GKZ
   Germany / Jülich Project Management Agency (PtJ)
   Germany / Wuppertal Institute
4. Italy / ENEA
5. Estonia / Estonian Research Council
6. Polland / IETU
7. Sweden / IVL
8. Taiwan / NCKU
9. Netherlands / PNO
   Netherlands / RVO
   Netherlands / TNO
10. Bulgaria / SDA
11. Romania / UEFISCDI
12. Slovenia / University of Maribor
13. Finland / VTT
14. Switzerland / World Resources Forum Association
15. Spain / DXCACC

Brief introduction

Dr Juu-en Chang received his PhD degree in Civil and Environmental Engineering from Tohoku University,Japan in 1982.As the distinguished professor in NCKU (Since Feb 1,2021,the title has changed to Professor Emeritus),he specializes in the field of solid waste processing,waste water processing and environmental engineering,and has dedicated himself to research and policy on waste and recycling.

Prof. Chang used to work as the former Minister of EPA Taiwan and the director of EU-FP7 ENV.NCP.
During Year 2013-2015,he implemented an FP7 eco-innovation project-greenXpo.

At present,he is the Honorary Director-general of Formosa Association of Resource Recycling and the representative of its International Communication Committee,Honorary director of SERL NCKU to name a few.

Project title

CIrCular Economy platfoRm for eurOpeaN priorities strategic agEnda

Project number 107-2923-I-006-001-MY3 **Duration** 2018/11/01-2021/12/31

Programme Acronym

CICERONE

Topic

CE-SC5-05-2018-Coordinated approaches to funding and promotion of research and innovation for the circular economy

Programme

CSA-Coordination and support action

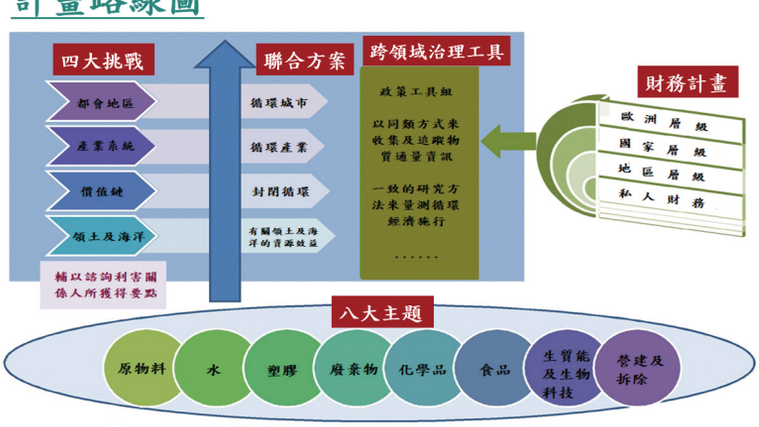
Call for proposal

H2020-SC5-2018-1

Abstract

The ways to turn a large amount of waste into renewable resources to replace existing natural resources, to integrate the sharing economic model and to enhance the utilization of resources will be the key point to carry out the sustainable industrial operation.Therefore,in 2015, European Commission put forward"Closing the Loop-an EU action plans for the circular Economy",viewing the transition from linear economy to circular economy as a priority.Through recycling products and material resource and reusing,circular economy has endowed the product or material with new usages.Over past years,EU has also announced the implementation report of the Circular Economy Action plan,and set up a circular economy funding subsidy assessment to encourage investment and innovation.

計畫路線圖



One of the three pillars of the EU Horizon 2020 project raises the issue of fragmentation of scarce resources,difficulties in implementing international synergies without a joint platform and lack of institutionalized outreach throughout Europe."Actually, EU has conducted a number of circular economy initiatives,and previous research has been fruitful,but European Committee has also found that the results of these initiatives,which are too fragmented and not systematically disseminated,have not been widely publicized among policymakers, industries,the public and stakeholders.Therefore,the concept of CICERONE project emerged.CICERONE's goals are to align as much as possible pan-European, national and regional research and innovation in order to speed up the transition to a European circular economy.

Principal Investigator

Chi-Sheng WU

National Taiwan University |
Chemical Engineering Department

Coordinator

Slovania / Jožef Stefan Institute

Participants

1. Slovania / Jozef Stefan Institute
2. Latvia / Institute of Solid State Physics,University of Latvia
3. Taiwan / Department of Chemical Engineering,National Taiwan University

Brief introduction

Prof. Jeffrey C.S. Wu received his PhD D degree in Chemical Engineering from University of Pittsburgh.His research interest is photocatalysis include (a) photoreduction of CO2 to fuel,(b) photocatalytic water splitting for H2 and (c) photocatalytic oxidation of air pollutants.(d) Biomass conversion of biodiesel and bioethanol.He has received a number of awards including, Outstanding Engineering Professors Award,Chinese Institute of Engineers Taiwan in 2016;Outstanding Cross-Sector Collaboration Award,2nd National Industrial Innovation in 2012;"Lai Tzai-Der award"of Taiwan Institute of Chemical Engineers in 2009,"Chemical Technology Award"of Taiwan Institute of Chemical Engineers in 2006,and "Silver medal of National Invention",Taiwan in 2004.He also serves as an Editor of the Catalysis Communications,a member of editorial boards of Applied Catalysis A:General.His H-index is 41 with total citation 6987.

Project title

M-ERA.NET 2-JTC2018：Functional materials

Project number MOST 108-2923-E-002-006-MY3 **Duration** 2019/07/01-2022/06/30

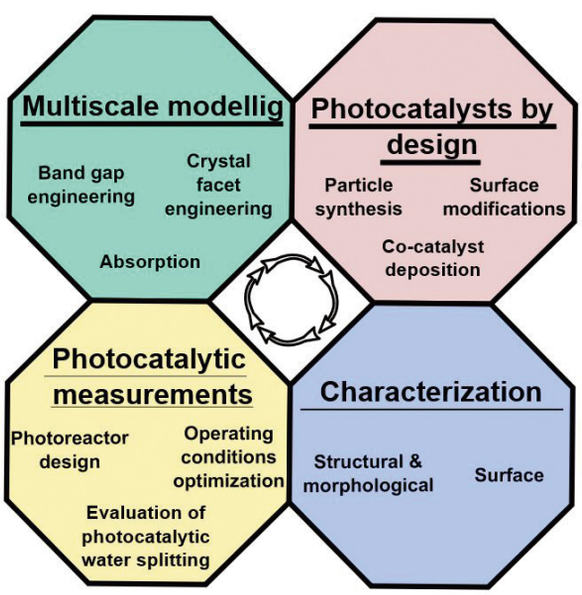
Programme Acronym
SunToChem

Topic
Functional materials

Programme
M-ERA.NET

Call for proposal
M-ERA.NET 2 Call 2018

Abstract



The project of M-ERA.NET 2 JTC2018 is a research collaboration over 3 countries,included Taiwan (Chemical Engineering,National Taiwan University,ChE-NTU),Slovenia (Jožef Stefan Institute,JSI) and Latvia (Institute of Solid State Physics,University of Latvia，ISSP LU). In this project SunToChem, the latest knowledge in density functional theory (DFT),particle crystallization mechanisms,and photo reactor design are combined to promote the understanding of key parameters in photocatalytic water splitting and provide guidelines for preparation of MTiO3(M=Sr, Ba,Ti) perovskite photocatalyst particles by design.This concept includes enhancement of photocatalytic activity of defined-shape perovskite particles through improvement of the spatial separation of photogenerated charges on the same particle by means of ferroelectricity/flexoelectricity or different polarity of the facets due to different orientation/termination, and improvement of solar light absorption by doping. The main objectives of the project include band gap and crystal facet engineering by DFT to guide the development of the perovskite particles with defined size,shape,exposed facets,and terminations and evaluation of the particles for the H2 generation from photocatalytic water splitting reaction. The result will be fed back to the modification of DFT calculation in order to continuously improve the defined perovskite.The goal is to achieve Solar-to-Hydrogen over 1%,ambitiously up to 2%.JSI leads the whole project to develop novel perovskites.ISSP LU works on DFT calculation.ChE-NTU focuses on photocatalytic water splitting to generate hydrogen. The work plan of ChE-NTU in 3 years are;(1)characterize novel defined perovskite and design photoreactor;(2)perform photocatalytic water splitting experiments and seek the optimal photo reaction conditions;(3)evaluate the best perovskite photocatalyst and find the key parameters and guidelines.

Principal Investigator

Wen-Che Hou

National Cheng Kung University
Department of Environmental Engineering

Coordinator

Consejo Superior de Investigaciones Científicas
CSIC (Spanish National Research Council)

Participants

1. Spain / Consejo Superior de Investigaciones Científicas CSIC
   Spain / UNIVERSITAT ROVIRA I VIRGILI
2. Taiwan / National Cheng Kung University
3. UK / IOM
   UK / SWANSEA UNIVERSITY
4. Germany / EUROPEAN RESEARCH SERVICEE GMBH
   Germany / Federal Institute for Risk Assessment
   Germany / HELMHOLTZ-ZENTRUM FUR UMWELTFORSCHUNG GMBH – UFZ
5. Denmark / Aarhus University
   Denmark / The National Research Center for Work Environment
6. Italy / GREENDECISION SRL
   Italy / UNIVERSITA DEGLI STUDI DI ROMA TOR VERGATA
   Italy / POLITECNICO DI TORINO
   Italy / WARRANT HUB SPA
   Italy / CONSIGLIO NAZIONALE DELLE RICERCHE
7. Belgium / THOMAS MORE KEMPEN VZW
8. Israel / TEL AVIV UNIVERSITY
9. Poland / UNIWERSYTET GDANSKI
10. Ireland / NATIONAL UNIVERSITY OF IRELAND, DUBLIN
11. Bulgaria / IDEACONSULT LIMITED LIABILITY COMPANY
    Bulgaria / EAST EUROPEAN RESEARCH AND INNOVATION ENTERPRISE LTD
12. Finland / University of Helsinki
    Finland / TYOTERVEYSLAITOS
13. Netherland / Leiden University
14. Norway / SINTEF OCEAN AS
15. Greece / NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"
16. Portugal / UNIVERSIDADE DE AVEIRO
17. Switzerland / Swiss Federal Laboratories for Materials Science and Technology、EMPA
    Switzerland / TEMAS AG TECHNOLOGY AND MANAGEMENT SERVICES
18. Estonia / UPPINTECH OU
19. France / UNIVERSITE D'AIX MARSEILLE
    France / SORBONNE UNIVERSITE (學)
    France / ASSOCIATION SAINT YVES, Catholic University of the West
20. South Africa / MINTEK
21. China / NATIONAL CENTER FOR NANOSCIENCE AND TECHNOLOGY

Brief introduction

This project is based on the successful participation of the Department of Environmental Engineering,National Cheng Kung University (NCKU),in a Horizon 2020 (H2020) framework programme multinational project of the European Union (EU).The H2020 project entitled"Development and Implementation of a Sustainable Modelling Platform for NanoInformatics (NanoInformaTIX)"belongs to the second pillar"Industrial Leadership" and involves 36 institutes or companies across 22 countries with a budget of~270 millions NTD over a period of 50 months.NanoInformaTIX aims to create a comprehensive,sustainable,and multi-scale Sustainable Nanoinformatics Framework (SNF) that can assess the environmental and health risks of engineered nanomaterials using model predictions. It enhances the cost-effectiveness of risk assessments.Taiwan as a major country focusing on nanotechnology-enabled electronics and materials manufacturing, the tool developed from this project has the opportunity to offer the industries and the regulatory agency,the Taiwan Environmental Protection Administration,a time-and money-saving environmental and health risk assessment approach,less reliant on animal tests.It will strongly enhance the competitiveness of our industries by significantly reducing the time required for nano-products from product development to the markets. This project plans a 4-year research and development work that integrates expertise in environmental fates and bioaccumulation of engineered nanomaterials (ENMs) of Prof.Wen-Che Hou and that in environmental water quality modeling of Prof.Chih-Hua Chang to develop two types of models:(1)environmental surface water exposure and (2)biodistribution models for three selected,representative ENMs that can be applicable in the selected sites of Taiwan and Europe. Our models can be linked to the ocean transport models,environmental release models, and dose-response models developed by the partners of NanoInformaTIX project.This project also includes experiments for model parameterization,and supports the model integration and case studies,and model training.

Project title

Development and Implementation of a Sustainable Modelling Platform for NanoInformatics

Project number 109-2923-E-006-003-MY4 **Duration** 109/01/01-112/12/31

Programme Acronym
NanoInformaTIX

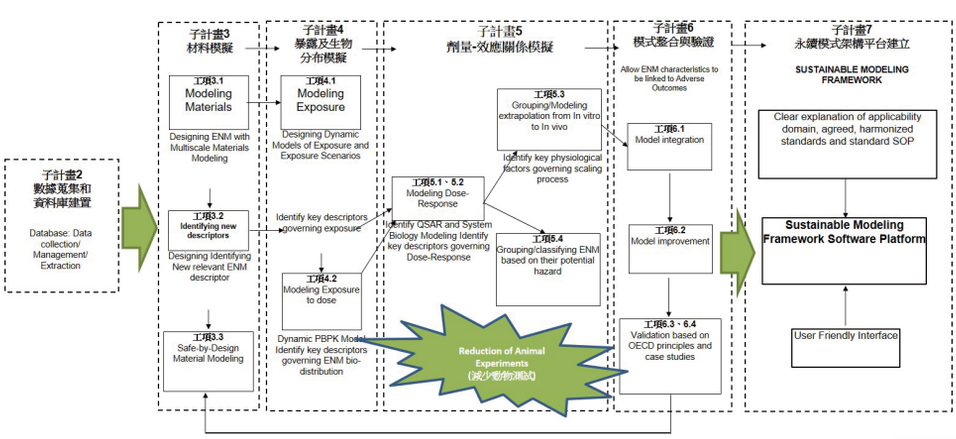
Topic
NMBP-14-2018-Nanoinformatics: from materials models to predictive toxicology and ecotoxicology (RIA)

Programme
H2020

Call for proposal
H2020-NMBP-TO-IND-2018

Abstract

This project is based on the successful participation of the Department of Environmental Engineering, National Cheng Kung University (NCKU),in a Horizon 2020(H2020)framework programme multinational project of the European Union (EU).The H2020 project entitled"Development and Implementation of a Sustainable Modelling Platform for NanoInformatics (NanoInformaTIX)"belongs to the second pillar "Industrial Leadership"and involves 36 institutes or companies across 22 countries with a budget of~270 millions NTD over a period of 50 months.NanoInformaTIX aims to create a comprehensive,sustainable,and multi-scale Sustainable Nanoinformatics Framework (SNF) that can assess the environmental and health risks of engineered nanomaterials using model predictions.It enhances the cost-effectiveness of risk assessments.Taiwan as a major country focusing on nanotechnology-enabled electronics and materials manufacturing,the tool developed from this project has the opportunity to offer the industries and the regulatory agency,the Taiwan Environmental Protection Administration,a time- and money-saving environmental and health risk assessment approach, less reliant on animal tests.It will strongly enhance the competitiveness of our industries by significantly reducing the time required for nano-products from product development to the markets.This project plans a 4-year research and development work that integrates expertise in environmental fates and bioaccumulation of engineered nanomaterials (ENMs) of Prof.Wen-Che Hou and that in environmental water quality modeling of Prof.Chih-Hua Chang to develop two types of models:(1)environmental surface water exposure and (2) biodistribution models for three selected,representative ENMs that can be applicable in the selected sites of Taiwan and Europe.Our models can be linked to the ocean transport models, environmental release models,and dose-response models developed by the partners of NanoInformaTIX project.This project also includes experiments for model parameterization,and supports the model integration and case studies,and model training.



Principal Investigator

Liou, Yuei-An

National Central University |
Center for Space and Remote Sensing Research

Coordinator

Finnish / Finnish Meteorological Institute

Participants

1. Taiwan / Center for Space and Remote Sensing Research (CSRSR) of National Central University (NCU)
2. Finnish / Finnish Meteorological Institute
3. Chile / EUROCHILE
4. Germany / Deutsche Zentrum für Luft- und Raumfahrt e.V. + 22 units

Brief introduction

Prof.Yuei-An Liou received a double Ph.D. degree in Electrical Engineering and Atmospheric,Oceanic,and Space Sciences from the University of Michigan,Ann Arbor.He is currently a distinguished professor and head of Hydrology Remote Sensing Laboratory,Center for Space and Remote Sensing Research (CSRSR),National Central University;Founding President,Taiwan Group on Earth Observations (2010~); Honorary President,Vietnamese Experts Association in Taiwan (2017/1~). He was awarded as Honorary Life Member,Korean Society of Remote Sensing in 2007;Foreign Member,A.M. Prokhorov Russian Academy of Engineering Sciences in 2008;Member,International Academy of Astronautics in 2014;Crystal Achievement Award,Vietnam Academy of Science and Technology in 2019;Outstanding Research Award, MOST of Taiwan in 2019;and included in The World's Top 2% Scientists List published by Stanford University in 2020.He published more than 140 scientific (journals) papers among which 135 papers were published in SCI journals with citations (SCI/Google Scholar) more than 2478/4190 times with h-index of 27/36 as of 2021/4.Prof.Liou’s research outcomes were recently reported by AGU-EOS twice in August 2020 with titles:“Typhoons Getting Stronger, Making Landfall More Often” and “Storms Interact but Rarely Merge into Bigger Tempests”.Prof.Liou is an editor and Editorial Advisory Board member for several journals: GPS Solutions since 2001;Progress in Earth and Planetary Science,since 2017/5;Geomatics,Natural Hazards and Risk,since 2017/9;Remote Sensing,since 2017/11.

Project title

Copernicus data and information for monitoring agricultural crop water usage

Project number MOST 109-2923-E-008-004-MY2 **Duration** 109/02/01-111/01/31

Programme Acronym

FPCUP

Topic

Action 2019-3-37: Extending user uptake activities in Asia and South America

Programme

方案 2019-3-37：
擴展亞洲和南美的用戶吸收活動

Call for proposal

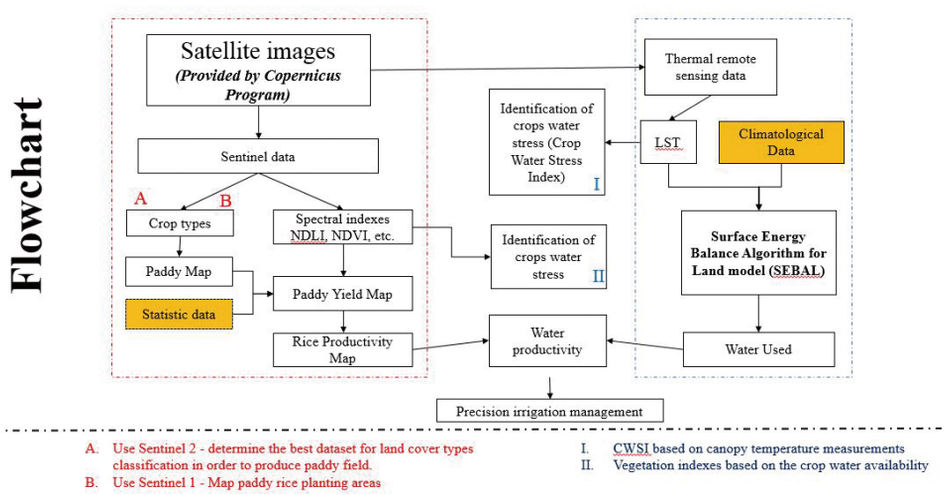
Framework Partnership Agreement on Copernicus User Uptake (FPCUP)

Abstract

We collaborate with Finnish Meteorological Institute (FMI) of Finland for the project "Action 2019-3-37:Extending user uptake activities in Asia and South America" within the "Copernicus User Uptake-Framework Partnership Agreement on Copernicus User Uptake (FPCUP) Work Programme 2019". The main objective of "Action 2019-3-37" is Copernicus user uptake in Chile and Taiwan and possibly extending to the other countries.The "Action 2019-3-37" aims at targeted countries to (1)raise awareness and knowledge of the Copernicus program (https://en.wikipedia.org/wiki/Copernicus_Programme),(2)engage Copernicus users in public and private sectors,and (3)enable access to Copernicus data and information. In addition, we conduct further research by implementing our developed Normalized Difference Latent heat Index (NDLI).We will utilize the Copernicus data and information to develop consistent,reliable,and cost-effective crop productivity maps by using the NDLI as an indicator.

Specifically,the tasks proposed in our two-year project.For the first year (2/1/2020~1/31/2021),we have collected the data,and then through data analysis,have converted the data into a structured format.An alluvial plain located along the south-west coast of Taiwan, including Yunlin and Chiayi counties,and Chiayi,Tainan,and Kaohsiung cities,is selected as our case study area.The paddy rice field map was developed by using the Copernicus data.Moreover, the land surface biophysical properties were characterized by using NDLI and commonly used remote sensing-derived indicators,such as land surface temperature and Normalized Difference Vegetation Index (NDVI). For the second year (2/1/2021~1/31/2022),we will continue to assist the tasks involving Copernicus user uptake,estimate the crop water productivity,identify crop water stress,and develop prescription maps for precision irrigation water management.

Flowchart



Principal Investigator

Hsuan-Jung Su

National Taiwan University | Graduate Institute of Communication Engineering

Coordinator

UK / University of Surrey

Participants

1. Taiwan / National Taiwan University
   Taiwan / Institute for Information Industry (III)
   Taiwan / Fair Friend Enterprise Co., LTD
   Taiwan / ADLINK
2. Netherlands / Nederlandse Organisatie voor Toegepast
3. Natuurwetenschappelijk Onderzoek,TNO
4. England / University of Surrey
   England / Toshiba Research Europe
5. France / CEA
6. Greece / WINGS
7. Turkey / Turk Telekom
   Turkey / AGELA

Brief introduction

Hsuan-Jung Su received the Ph.D. degree in Electrical Engineering from the University of Maryland,College Park in 1999. Prior to joining the National Taiwan University (NTU) in 2003,he was with the Bell Laboratories,Lucent Technologies, Holmdel,New Jersey,where he received the Central Bell Labs Teamwork Award in 2002 and the Bell Labs President's Gold Award in 2003 for his contribution to the 3G wireless network design and standardization.He is currently a Professor with the Department of Electrical Engineering,NTU,and the Director of the Graduate Institute of Communication Engineering.Dr. Su received the 2020 Outstanding Electrical Engineering Professor Award from Chinese Institute of Electrical Engineering (CIEE), the 2019 Future Tech Breakthrough Award,2012-2014 Project for Excellent Young Research Investigators, both awarded by MOST,and the 2007 Award of University Contribution to Industry by MOEA,Taiwan.He has served as Editor-in-Chief, Editor and Guest Editor of many international journals,and the program chair/co-chair of many international conferences. His research interests cover coding,modulation,signal processing,interference management,resource allocation,and MAC protocols of wireless communication,cognitive,M2M (IoT),D2D and full-duplex networks.

Project title

5G Mobile Communications for Factories of the Future

Project number H2020 761745
MOST 106-2923-E-002-015-MY3

Duration 2017/09-2020/02

Programme Acronym
Clear5G

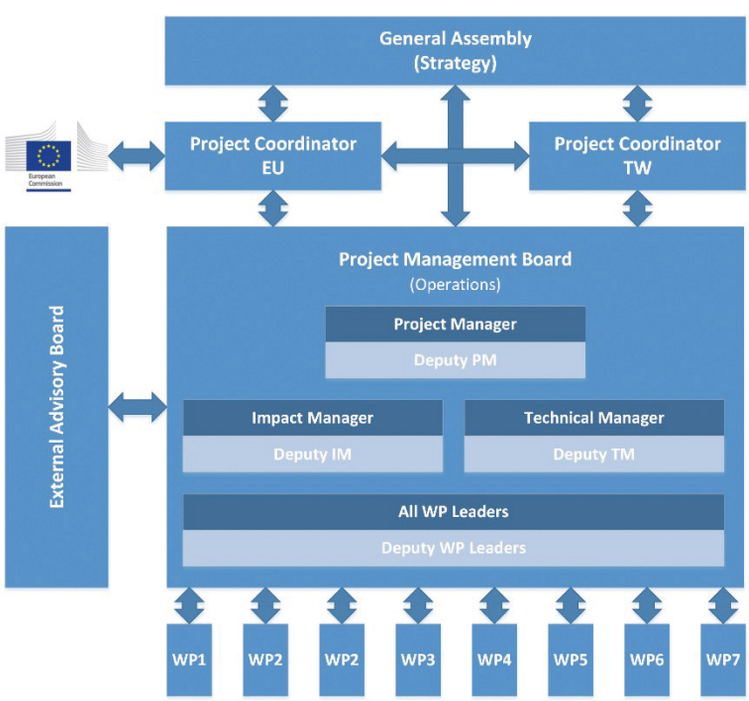
Topic
ICT-08-2017-5G PPP Convergent Technologies

Programme
RIA-Research and Innovation action

Call for proposal
H2020-ICT-2016-2

Abstract

This H2020 project investigates the communication and networking needs of the factories of the future (FoF) (or Industry 4.0) which rely on highly flexible process flows that are able to quickly change between various goods to be produced.Time critical processes will rely on timely delivered data from many sensors,and decisions have to be made fast and deployed to,e.g.,robots for execution in less than milliseconds.As such,the FoF will have more stringent requirements and challenges on wireless communications,such as massive deployment, massive multiple access,ultra-high reliability and low latency,convergence between networks.To answer these challenges,this project will join force with European and Taiwanese universities,research institutes and industrial partners to address the physical layer designs,medium access control (MAC) protocols,network architecture and applications for the FoF.



Principal Investigator

Hwang,Chao-Lung

National Taiwan University of
Science and Technology
Civil and Construction Engineering

Coordinator

Mr. Alessandro Largo/CETMA-Centro di Progettazione,
Design & Tecnologie dei Materiali (Italy)

Participants

1. Centro Di Progettazione, Design & Tecnologie Dei Materiali,It
   Stam Srl,It
   Sviluppo Tecnologie E Ricerca Per L'edilizia
   Sismicamente Sicura Ed Ecosostenibile Scarl,It
   Vortex Hydra S.R.L.,It
2. Acciona Infraestructuras S.A.,Es
3. Cbi Betonginstitutet Ab, Se
4. UK / cde Global Limited
   UK / creagh Concrete Products Limited
   UK / 貝爾法斯特女王大學
5. Fenix Tnt S.R.O., Cz
6. Roswag Architekten Gesellschaft Von Architekten Mbh,De
7. TAIWAN/NTU Of Science And Technology,Tw
8. Association Des Cites Et Des Regions Pour Le Recyclage Et La Gestion Durable Des Ressources,Be

Brief introduction

Professor Hwang,Chao-Long obtained a master's degree in construction management from 1978 to 1980 and a doctorate in engineering materials from 1980 to 1983 in the University of Illinois at Champagne-Urbana,USA.He teaches at the National Taiwan University of Science and Technology since 1983.In the past 37 years,he has been committed to promoting engineering materials education and counseling construction industries to improve construction technology and quality assurance,and has carried out many R&D projects.He has published hundreds of papers in famous academic journals including Sci and Ei cited articles,including Kaohsiung 85 stories Tung-Tex skyscape Tower and Pingtung Museum of Marine Biology & Aquarium.Landmark projects such as the Taipei 101 Financial Center and Wei-Wuying Metropolitan Parkhave made a significant contribution to enhancing Taiwan's position in international concrete technology. In particular, the new concept of “low cement paste usage and low CO2 emissions” for green high performance concrete and self-compactiong concrete has been extended to all parts of the world.He was awarded the outstanding Industry and Education Cooperation Award of the Ministry of Education,the American Institute of Concrete Award for Outstanding Honor Award and a number of domestic outstanding research awards.He was invited to give lectures to universities in the United States,mainland China and India.In 2006,he served as the chairman of the Concrete Engineering Committee of the Civil and Hydraulic Society.He will continue to learn from the achievements of the past,and combine the achievements of the past, combined with the production,official,academic and research circles to improve Taiwan's concrete technology and Work hard to create a beautiful project in the world. It is hoped that the concrete structure will not be destroyed for thousands of years,as a new indicator of cross century concrete engineering.2014 to 2017 participation in the FP7 SUSCON of EU International Cooperation Program, 2017-2020 participation in RE4 of the H2020 EU International Cooperation Program,converting waste construction and industrial & agricultural waste into green building materials to become a recycling economy product with energy saving and carbon reduction.

Project title

Reuse and Recycling of CDW Materials and Structures in Energy Efficient Prefabricated Element for Building Refurbishment and Construction (RE4)

Project number MOST 105-2923-E-011-003
MOST 106-2923-E-011-002
MOST 107-2923-E-011-001
MOST 108-2923-E-011-001

Duration 105/11/01-109/02/29

Programme Acronym
Clear5G

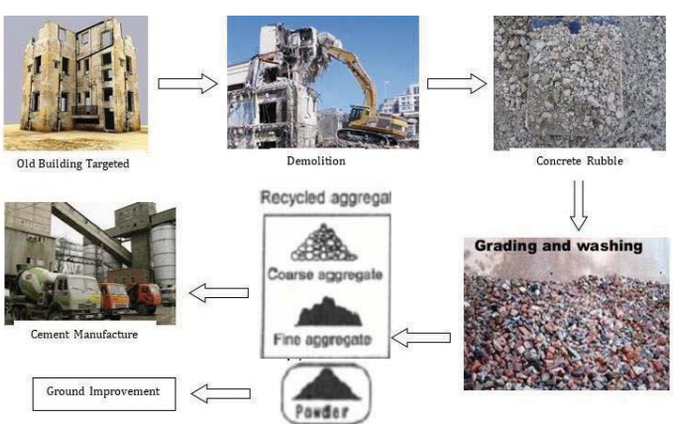
Topic
ICT-08-2017-5G PPP Convergent Technologies

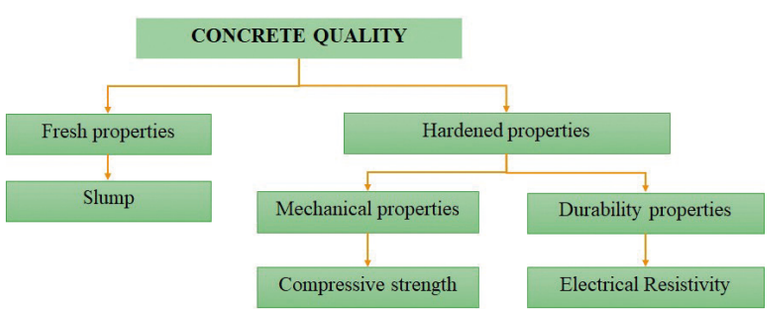
Programme
RIA - Research and Innovation action

Call for proposal
H2020-ICT-2016-2

Abstract

The primary aim of this project is to promote new technological solutions for the design and development of both structural and non-structural pre-fabricated elements with recycled construction demolish materials (CDW).The developed technology will aim at energy efficient new construction and refurbishment and minimize the environmental impacts.This project also considers the demonstration of suitable design concepts and building elements produced from CDW in an industrial environment. In this stage, the roles of National Taiwan University of Science and Technology group are the use of ICT technical analysis of big data, with the implementation of recycled CDW materials used in the structure, high-performance concrete (HPC),and controlled low-strength materials (CLSM) with the use of pre-SUS-CON geopolymer binder.





Principal Investigator

Ying-Dar Lin

National Chiao Tung University
Computer Science

Coordinator

Spain / University of Carlos III de Madrid

Participants

1. Taiwan / National Chiao Tung University
   Taiwan / Industrial Technology Research Institute
   Taiwan / ADLINK
   Spain / University of Carlos III de Madrid
2. Spain / Telcaria
3. Germany / InterDigital Communications Corp
4. Sweden / Ericsson Inc
   Sweden / Swedish Institute of Computer Science
5. Italy / Azcom Inc.
   Italy / Telecom Italy

Brief introduction

Ying-Dar Lin (ydlin@cs.nctu.edu.tw) is a Chair Professor of computer science at National Chiao Tung University (NCTU), Taiwan.He received his Ph.D. in computer science from the University of California at Los Angeles (UCLA) in 1993.He was a visiting scholar at Cisco Systems in San Jose during 2007–2008,CEO at Telecom Technology Center, Taiwan,during 2010-2011,and Vice President of National Applied Research Labs (NARLabs),Taiwan, during 2017-2018.Since 2002,he has been the founder and director of Network Benchmarking Lab (NBL,www.nbl.org.tw),which reviews network products with real traffic and automated tools, and has been an approved test lab of the Open Networking Foundation (ONF) since July 2014.He also cofounded L7 Networks Inc. in 2002,later acquired by D-Link Corp,and O'Prueba Inc.in 2018.His research interests include network security,wireless communications,and network softwarization.His work on multi-hop cellular was the first along this line, and has been cited over 1000 times and standardized into IEEE 802.11s,IEEE 802.15.5,IEEE 802.16j, and 3GPP LTE-Advanced.He is an IEEE Fellow (class of 2013),IEEE Distinguished Lecturer (2014–2017),ONF Research Associate,and received in 2017 Research Excellence Award and K.T.Li Breakthrough Award.He has served or is serving on the editorial boards of several IEEE journals and magazines,and is the Editor-in-Chief of IEEE Communications Surveys and Tutorials (COMST).He published a textbook,Computer Networks:An Open Source Approach (www.mhhe.com/lin),with Ren-Hung Hwang and Fred Baker (McGraw-Hill, 2011).

Project title

5G-CORAL

Project number 106-2218-E-009-018
107-2923-E-009-005

Duration 2017/08/01-2019/07/31

Programme Acronym
5G-CORAL

Topic
ICT-08-2017-5G PPP Convergent Technologies

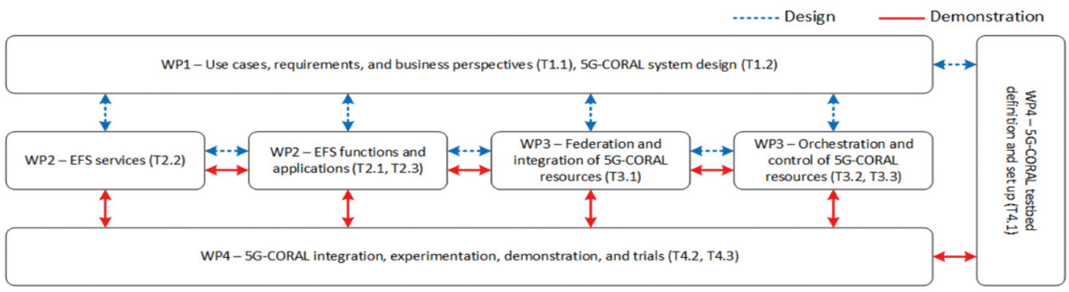
Programme
RIA - Research and Innovation action

Call for proposal
H2020-ICT-2016-2

Abstract

The 5G-CORAL project leverages on the pervasiveness of edge and fog computing in the Radio Access Network (RAN) to create a unique opportunity for access convergence. The proposed solution contemplates two major building blocks,namely (i) the Edge and Fog Computing System (EFS) subsuming all the edge and fog computing substrate offered as a shared hosting environment for virtualized functions,services,and applications;and (ii) the Orchestration and Control System (OCS) responsible for managing and controlling the EFS,including its interworking with other (non-EFS) domains (e.g.,transport and core networks,distant clouds,etc.).Through the 5G-CORAL solution, several Key Performance Indicators (KPIs) have been achieved,notably an ultra-low end-to-end latency in the order of milliseconds.NCTU will provide an integrated Mobile Edge Computing (MEC) system that allows different wireless technologies to access the base station and provide a low latency network by offloading services to Edge. So that these is more stringent for the delay and the services are closer to the user,to provide a high service quality.The virtualization of the user device is also the scope of the project.It means the user device is partially virtualized to Edge or Core to reduce the burden and cost of the user device.We also provide a new network routing which considers both network latency and server latency and discuss the security issue about the new system. NCTU leads WP5 to do the management of results and documents,as well as activities planning.We are responsible for promoting and demonstrating the 5G-CORAL program through various events.

5G-CORAL Project Architecture



Principal Investigator

Chi-Wei Tsai

National Taiwan University |
Department of Entomology

Coordinator

Italy / Consiglio Nazionale delle Ricerche

Participants

1. Italy / Consiglio Nazionale delle Ricerche
2. France / Centre International des Hautes Etudes Agronomiques Méditerranéennes
   France / Institut National de la Recherche Agronomique
3. Spain / Consejo Superior de Investigaciones Científicas
4. Germany / Julius Kühn-Institut
5. Portugal / Instituto Politécnico de Bragança
6. USA / University of California, Berkeley
7. Brazil / Agência Paulista de Tecnologia dos Agronegócios
8. UK / Natural Environment Research Council
9. Taiwan / National Taiwan University

29 institutes (14 countries) in total

Brief introduction

Chi-Wei Tsai,Associate Professor in the Department of Entomology at National Taiwan University,Ph.D. of the Department of Entomology at The Ohio State University.Research expertise is the interaction between insects and plant pathogens.

Project title

Xylella fastidiosa Active Containment Through a Multidisciplinary-Oriented Research Strategy

Project number 106-2923-B-002-005-MY3 **Duration** 2017/10/01-2021/03/30

Programme Acronym

XF ACTORS

Topic

SFS-09-2016-Spotlight on critical outbreak of pests: the case of Xylella fastidiosa

Programme

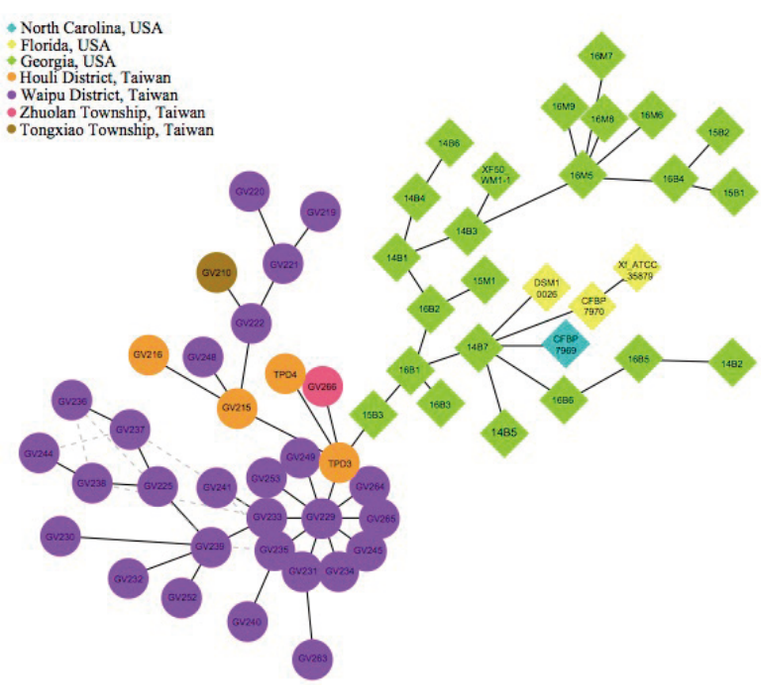
RIA - Research and Innovation action

Call for proposal

H2020-SFS-2016-3

Abstract

Xylella fastidiosa,a pathogen of Pierce's disease,relies on several leafhopper and froghopper species for its transmission.It infects many important economic crops (such as citrus,coffee,grapes,olives,etc.) and has caused very serious damages in the Americas and Europe.Pierce disease was first found in Taiwan in 2002,and it was the first field case of X.fastidiosa in Asia. Taiwanese strains of X.fastidiosa have 99-100% similarity with the strains of the United States.Two leafhoppers and a froghopper were identified as potential vectors of Pierce disease by transmission experiments.The research results in the past have focused on the confirmation of vectors,the ecology of the pathogen and vectors, and vector transmission,and it has not yet further investigated the interaction between pathogen and alternative host plants,pathogen and vectors. The objectives of the proposed research are to:(1) study the genetic diversity of X. fastidiosa through genome and population genetic structure analyses,(2)clarify the transmission characteristics of native vectors and the role of alternative host plants in the epidemic of Pierce's disease by transmission experiments,and (3) study the interaction between X.fastidiosa and native vectors through microscopic dissection experiments.It is hoped that the proposed research will provide a better understanding of the role of native vectors and alternative host plants in the epidemic of Pierce's disease,and further analyze the interrelationships among X.fastidiosa,vectors,and alternative host plants.Detailed knowledge of the interrelationship among these three components may help us develop novel strategies to protect crops from the infection of X.fastidiosa.



Principal Investigator

Kuang-Sheng Lee

National Yang Ming Chiao Tung University | Institute of Clinical Medicine

Coordinator

Italy / stituto Clinico Humanitas (ICH) IRCCS

Participants

1. Germany / Philipps-University Marburg (UMR)
2. Italy / Azienda Unit Sanitaria Locale di Reggio Emilia-IRCCS (AUSL-IRCCS)
3. Taiwan / National Yang Ming Chiao Tung University

Brief introduction

Professor Oscar Lee is an orthopedic surgeon and a faculty member in the Institute of Clinical Medicine, NYCU.His major research theme is plasticity and application of Mesenchymal stem cells (MSCs),in particular, the development of new application of MSCs to treat diseases that currently lack cures. Over the years,Professor Lee and his research team reported the successful isolation of multipotent MSCs from various human tissues and demonstrated their therapeutic potentials for various disease treatments.They also developed non-disruptive and label free approaches to detect the extent of maturation and mineralization level during osteogenic differentiation in real-time.Professor Lee devoted research efforts to the studies of micro-environmental cues and biophysical effects,such as matrix stiffness and shear stress, on stem cell physiology as well as to the development of bio-inspired materials for lineage-directed differentiation. In recent years,Professor Lee has also made great efforts studying the role of hMSCs in regulating hematopoietic stem cell fate and their therapeutic potential to treat lupus nephritis,spinocerebellar ataxia and diabetes in different animal models.Professor Lee has published more than 100 peer-reviewed articles in leading journals such as Cell, Nature Biology,Gastroenterology,Hepatology and Blood.

Project title

Profiling radioREsistant Differentiated thyroid Cancer : genes,immunity,cancer stem cells and epithelial-mesenchymal transition

Project number MOST 108-2923-B-010-002-MY3 **Duration** 2019/04/01-2023/09/30

Programme Acronym
PREDICt

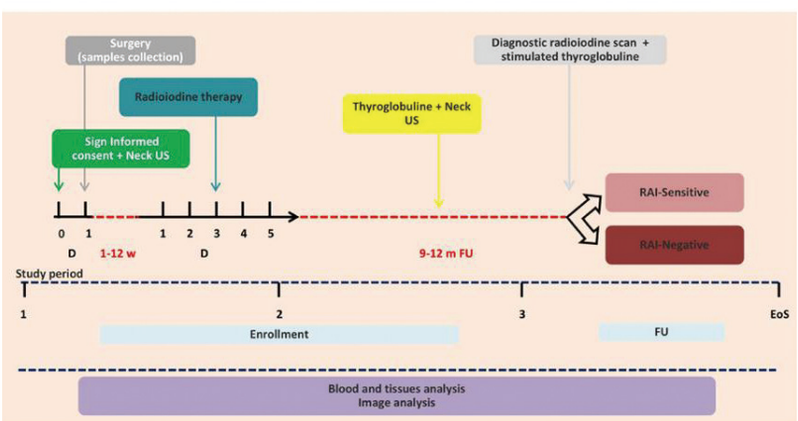
Topic
HCO-08-2014-ERA-NET:Aligning national/regional translational cancer research programmes and activities

Programme
ERA-TRANSCAN2

Call for proposal
H2020-HCO-2014

Abstract

Background and rationale: Radioiodine-refractory (RAI-R) differentiated thyroid cancer (DTC) is a challenging tumor and several mechanisms have been claimed for RAI-R. RAI-R DTC have peculiar assets that underline the resistance and differentiate these tumors from RAI-sensitive (RAI-S) ones.In this project, high risk DTC patients will be enrolled and followed in clinical practice. An equal number of RAI-R and RAI-S (radioiodine-sensitive) DTC patients,matched for histology age,sex, and tumor stage,will be analyzed.Genes,CSC,EMT and immunity profiles as well as biomarkers will be compared between RAI-R and RAI-S.The studt aims are (1) Genetic molecular and gene expression profiles of RAI-R and RAI-S will be investigated. The genetic, transcriptomic profiles and evaluate the role of cancer stem cells (CSCs),epithelial-mesenchymal transition (EMT) and immunity in RAI-R DTCwill be revealled;(2) Biomarker profiling of RAI-R and RAI-S DTC. miRNA and proteins will be tested as serum biomarkers. Images will be analyzed using radiomics and/or machine/deep learning approaches to test their prognostic roles.(3) Develop RAI-R DTC organoids.Tissue samples will be used to develop RAI-R DTC organoids that will be used to evaluate the mechanisms involved in RAI-R and to test drugs that may restore RAI sensitivity.Expected results and potential impact:Diverse molecular and genetic profiles as well as different biomarkers between RAI-R and RAI-S are expected. The identification of reliable biomarkers will impact on the management and treatment of high risk DTC patients for potentially improving healthcare costs as well as patients' quality of life.



Principal Investigator

Huan-Cheng Chang

Academia Sinica |
Institute of Atomic and Molecular Sciences

Coordinator

Taiwan / Academia Sinica

Participants

1. Taiwan / FND Biotech, Inc.
2. Germany / LaVision BioTech GmbH
   Germany / Hannover medical school
3. France / Ecole Normale Supérieure de Paris-Saclay
   France / Abbelight S.A.S.

Brief introduction

Prof. Huan-Cheng Chang's research interests are focused on applying the principles of physical chemistry to the development of new methods, tools, and technologies to solve problems of biological and medicinal significance. He pioneered the development of single bioparticle mass spectrometry and nanodiamond-based optical bioimaging. His current research activities are devoted to the development and applications of surface-functionalized fluorescent nanodiamonds as diagnostic, imaging, sensing, and therapeutic tools.

Project title

NanoMedicine-EuroNanoMed III (ENM III)-JTC2018

Project number 108-2923-B-001-001-MY3 **Duration** 2019/04/01-2021/12/31

Programme Acronym

MoDiaNo (Coordinator)

Topic

NanoMedicine-EuroNanoMed III (ENM III)-JTC2018

Programme

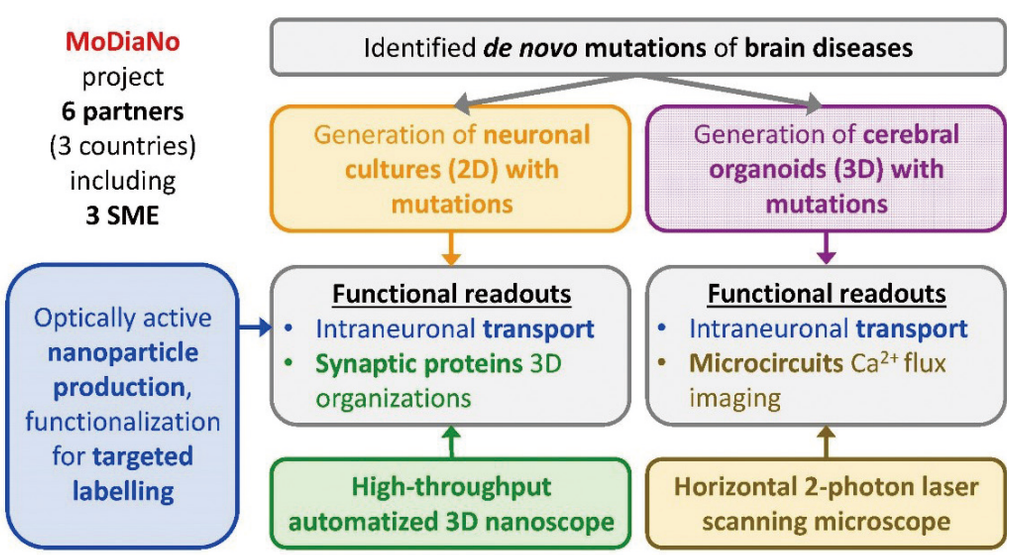
ENM III

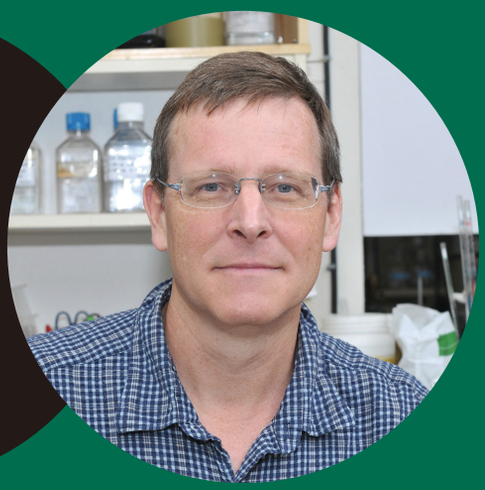
Call for proposal

H2020-ENM III-2018

Abstract

Advances in genome sequencing technologies have facilitated the detection of de novo mutations,but the validation of their functional impact remains a challenge.This project aims to (i) develop nanotechnology-based screens of the functional impacts of pre-identified brain disease point mutations and (ii) engineer into human embryonic stem cells,from which 2D neuronal cultures and 3D cerebral organoids will be derived.Our screens will rely on (i) quantification of intraneuronal transport in these 2D and 3D cultures by tracking optically active nanoparticles with very high stability,(ii) imaging of key dendritic spine proteins and actins with an automatized 3D nanoscope,and (iii) monitoring neuronal microcircuit activities in order to assess synaptic consequences of the mutations.These complementary readouts are expected to generate molecular diagnosis of de novo mutations suitable for personalized medicine.





Principal Investigator

Steve Roffler

Academia Sinica | IBMS

Coordinator

France / University of Lyon 1

Participants

1. Taiwan / Academia Sinica,IBMS
2. Italy / Istituto Oncologico Veneto IOV-IRCCS
3. France / Netris Pharma

Brief introduction

1.Antibody engineering:We are engineering and investigating bispecific antibodies to deliver nanomedicines into cancer cells for improved anticancer selectivity and efficacy.
2.Nanomedicine:New approaches to stably load and retain hydrophobic drugs in liposomal nanocarriers are under development.
3.Directed molecular evolution:We have developed powerful screening methodology to perform directed molecular evolution of human enzymes.We are employing this technology to improve the properties of proteins to treat genetic diseases and for antibody-directed enzyme prodrug therapy.
4.Prodrug therapy:Anticancer prodrugs that are selectively activated in the tumor microenvironment are under investigation to improve the selectivity and therapeutic efficacy of cancer treatment. The mechanisms of selective prodrug activation and strategies to improve selectivity are under investigation.
5.Anti-PEG antibodies:We have developed antibodies to assay PEGylated drugs in human serum and are extending these studies to investigating the impact of pre-existing and induced anti-PEG antibodies on the therapeutic efficacy of PEGylated medicines.

Project title

PEG engagers to target breast cancer

Project number 109-2923-B-001-002-MY3 **Duration** 2020/04/01-2023/03/31

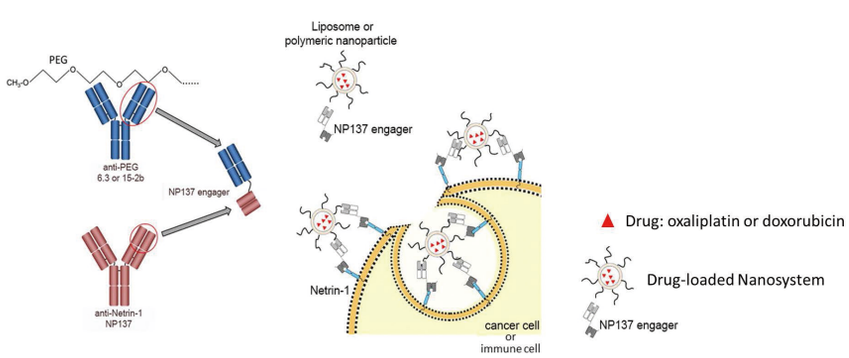
Programme Acronym
EURONANOMED III

Topic
Targeting breast tumors with anti-Netrin-1 nanocarriers as a promoter of immunity

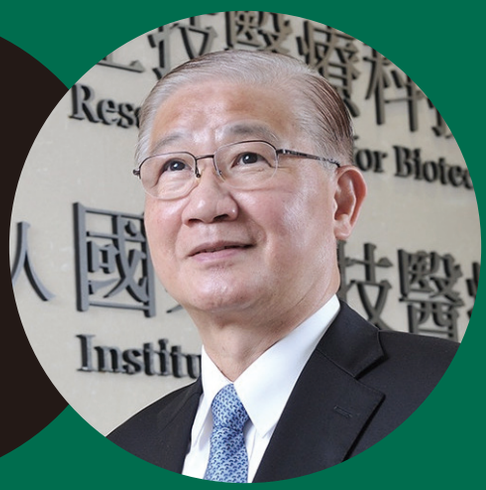
Programme
10th Joint Transnational Call (JTC)

Call for proposal
EURONANOMED2019-135

Abstract



Immunotherapy with checkpoint inhibitors is currently revolutionizing cancer treatment in the clinic, but only a fraction of patients respond. Triple negative breast cancer is an extremely aggressive subtype that in most cases is not responsive to immunotherapy.There is thus an urgent need for new treatments to cure this disease. To escape cell death,cancer cells secrete survival factors like Netrin-1.We took advantage of an anti-Netrin-1 antibody (NP137),now tested in a phase I clinical trial (first-in-man-first-in-class;NP137,clinicaltrial.gov:NCT02977195) to develop a new combinatorial nano-approach to improve the standard of care used in the clinic. In our NanoNET project,NP137 antibody will be linked through engineered engagers to chemotherapy-loaded polyethylene glycol (PEG)ylated nanocarriers (NP137-NanoNets) to specifically target the tumor microenvironment.The drug released will induce apoptosis in tumor cells and potentially in immunosuppressive cells,inducing immune reactivity to improve the effects of checkpoint inhibitors.The objectives of the project are (1) design and produce bispecific PEG-engagers who will be generated by genetically fusing the NP137 antibody against Netrin-1 to anti-PEG antibodies.The NP137-engagers created will bind nanocarriers containing PEG to selectively target them and release the drug (2) to validate these molecules for specificity and bio-distribution,(3) to test the combination of NP137-NanoNets/checkpoint inhibitors in vivo in immunocompetent mice,and (4) to investigate the underlying mechanisms on the immune system and determine the immune population implicated in the anticancer response.



Principal Investigator

Pan-Chyr Yang

NTU

Coordinator

Taiwan / NTU

Brief introduction

Professor,Department of Internal Medicine,College of Medicine,National Taiwan University
Academician,Academia Sinica

Project title

Patient-derived models for intratumour functional heterogeneity and its implications for personalized medicine – BeFIT

Project number 105-2923-B-002-003-MY3 **Duration** 2016/04/01-2019/03/30

Programme Acronym
BeFIT

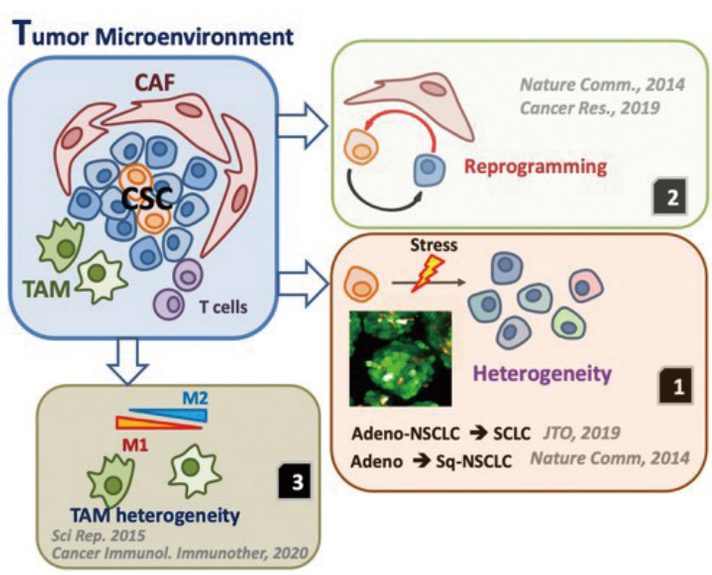
Topic
ERA-NET on Translational Cancer Research (TRANSCAN) Joint Transnational Call for Proposals 2014 (JTC 2014) co-funded by the European Commission/DG Research and Innovation on:"Translational research on human tumour heterogeneity to overcome recurrence and resistance to therapy"

Programme
ERA-TRANSCAN2

Call for proposal
TRANSCAN Joint Transnational Call for Proposals 2014 (JTC 2014)

Abstract

This "BeFIT" project focuses on the heterogeneity within intra-patient heterogeneity,which could be major driving force for the cancer stemness,drug-resistance and metastasis. We believe that functional heterogeneity plays the role for the adaptation of the tumor under dynamic and stressful micro-environmental conditions and/or changing its malignant and survival potential under therapeutic stress.Based on this,our groups both have tried to developed the patient-derived xenograft (PDX) model on studying the inter-/intra-tumoral heterogeneity and tumor evolution;also,Taiwan's team work with Dr.Patrick's team (French) and Italy group on developing and studying the heterogeneity of cancer cells in the CSCs/CAFs co-culture system under different environmental stresses,including hypoxia and acidic condition.We have identified several important key regulators of cancer stemness, drug resistance,and immune checkpoint regulators that are significantly modulated in tumor heterogeneity and evolution under the stress conditionings and could be benefit for the anti-cancer precision medicine in the coming future.



Principal Investigator

Kai-Yi Chen

National Taiwan University |
Department of Agronomy

Coordinator

France / Institut National Polytechnique de Toulouse

Participants

1. France / Institut National Polytechnique de Toulouse
   France / Institut National de la Recherche Agronomique
   France / SAS Rougeline
2. UK / John Innes Centre
   UK / Royal Holloway and Bedford New College
   UK / Norfolk Plant Sciences Ltd.
3. Germany / Max Planck Gesellschaft zur Foerderung der Wissenschaften e.V.
   Germany / European Research and Project Office GmbH
4. Spain / Agencia Estatal Consejo Superior de Investigaciones Científicas
   Spain / Enza Zaden Centro de Investigación Sociedad Limitada
   Spain / Fundación Cajamar Comunidad Valenciana
5. Italy / Università degli studi di Napoli Federico II
   Italy / Alma Seges Soc. Cop.
   Italy / Institute of Sciences of Food Production
6. Taiwan / AVRDC - The World Vegetable Center
   Taiwan / National Taiwan University
7. Argentina / Universidad de Buenos Aires
8. Bulgaria / Maritsa Vegetable Crops Research Institute

Brief introduction

Dr. Kai-Yi Chen received his Ph.D. from the Graduate Field of Plant Breeding and Genetics,Cornell University,USA.His expertise uses DNA marker technology to dissect genetic components of phenotypic traits and genetic diversity of germplasm. His recent research focuses on the dissection of heat-tolerant traits in tomato and the investigation of genetic resources and diversity for tomato cultivars and currant tomatoes from the national genebank.

Project title

Gene expression profiling at anther developmental stages of tomato under high temperature conditions

Project number 105-2923-B-002-005-MY4 **Duration** 2016/03/01-2020/02/29

Programme Acronym
TomGEM

Topic
SFS-05-2015-Strategies for crop productivity, stability and quality

Programme
RIA - Research and Innovation action

Call for proposal
H2020-SFS-2015-2

Abstract

This project is part of WP2 in TomGEM,and aims to identify genetic factors conferring pollen viability and sufficient pollen number under heat stress in tomato.We measured tomato pollen traits and the gene expression profile of floral buds in each of the recombinant inbred lines at 30/25°C day/night temperature to conduct QTL (quantitative traits locus) analysis.The result showed that one QTL for pollen number was located on chromosome 11 and two QTLs for keeping pollen activity under heat stress was on chromosome 3 and 10,respectively.We also identified DNA markers closely linked to these major QTLs,which can be used as a selection tool to breed heat-tolerant tomato.

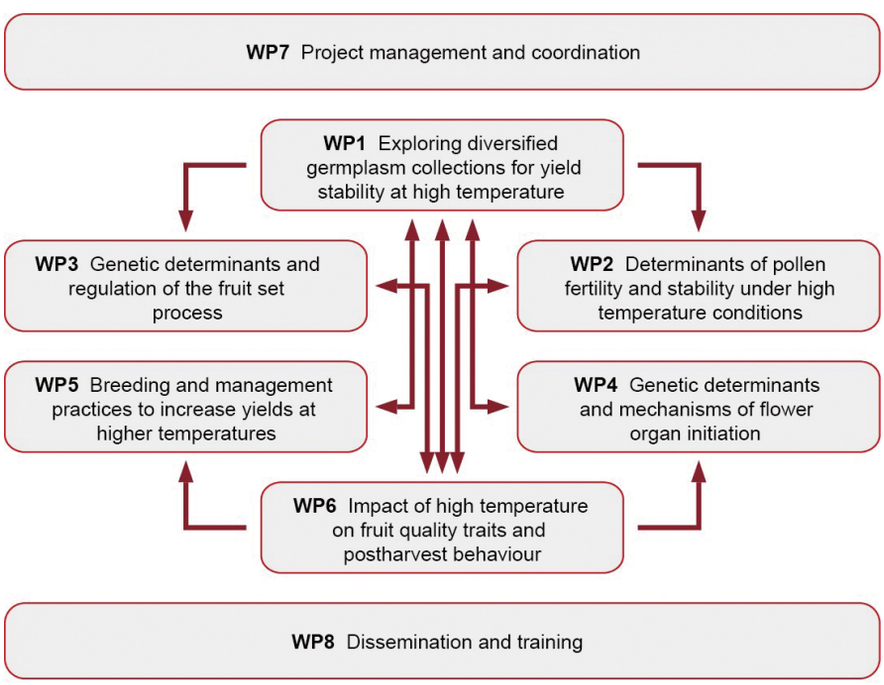
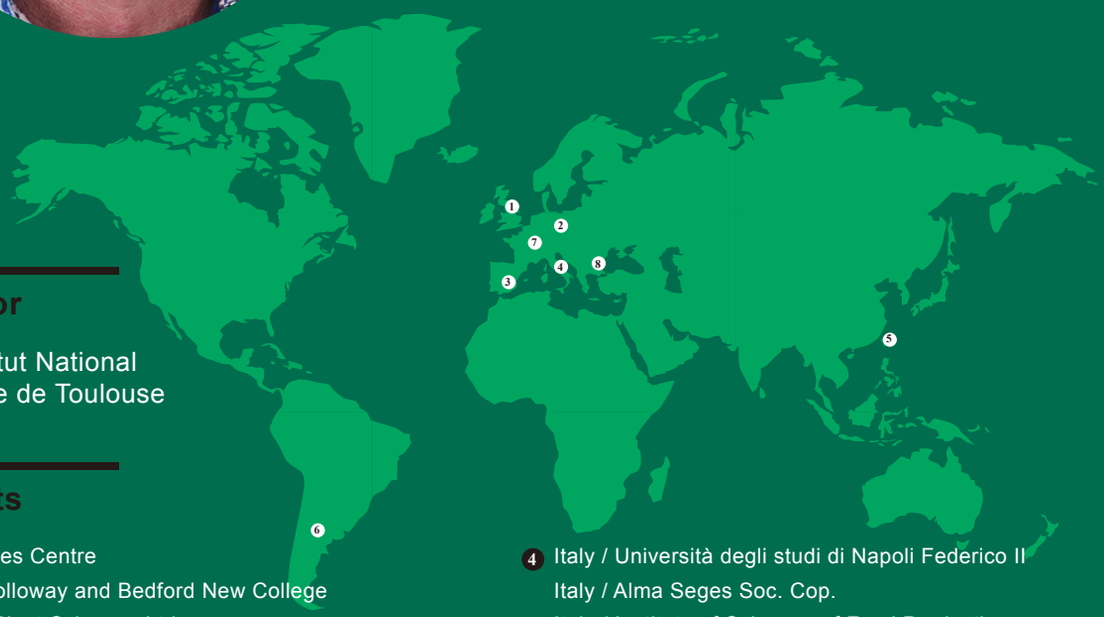


Diagram of **TomGEM** describing the interconnection between WPs

Principal Investigator

Dr.Peter Hanson

World Vegetable Center



Coordinator

France / Institut National Polytechnique de Toulouse

Participants

1. UK / John Innes Centre
   UK / Royal Holloway and Bedford New College
   UK / Norfolk Plant Sciences Ltd.
2. Germany / Max Planck Gesellschaft zur Foerderung der Wissenschaften e.V.
   Germany / European Research and Project Office GmbH
3. Spain / Agencia Estatal Consejo Superior de Investigaciones Científicas
   Spain / Enza Zaden Centro de Investigación Sociedad Limitada
   Spain / Fundación Cajamar Comunidad Valenciana
4. Italy / Università degli studi di Napoli Federico II
   Italy / Alma Seges Soc. Cop.
   Italy / Institute of Sciences of Food Production
5. Taiwan / AVRDC - The World Vegetable Center
   Taiwan / National Taiwan University
6. Argentina / Universidad de Buenos Aires
7. France / Institut National Polytechnique de Toulouse
   France / Institut National de la Recherche Agronomique
   France / SAS Rougeline
8. Bulgaria / Maritsa Vegetable Crops Research Institute

Brief introduction

Peter Hanson has been the tomato breeder at the World Vegetable Center since 1993,Theme Leader for Breeding from 2007-2018,and the Global Plant Breeding Lead Scientist since 2018.His tomato breeding program targets development of tropically-adapted tomato lines for use by public and private sectors.Major areas of research include multiple disease resistance, especially tomato yellow leaf curl disease,bacterial wilt, late blight, and heat tolerance in tomato.Before joining WorldVeg he was a bean breeder for two years at the International Center for Tropical Agriculture (CIAT) in Cali Colombia and served for two years as senior lecturer in the Agronomy Department at Egerton University, Njoro Kenya.He received his B.A. (History) and B.S. (Agronomy) degrees from the University of Minnesota,USA and his M.S. and Ph.D. in Plant Breeding from the University of Illinois Champaign-Urbana,USA.

Project title

A holistic approach towards the design of new tomato varieties and management practices to improve yield and quality in the face of climate change

Project number MOST 105-2923-B-125-001-MY4 **Duration** 2016/07/01-2020/03/31

Programme Acronym
TomGEM

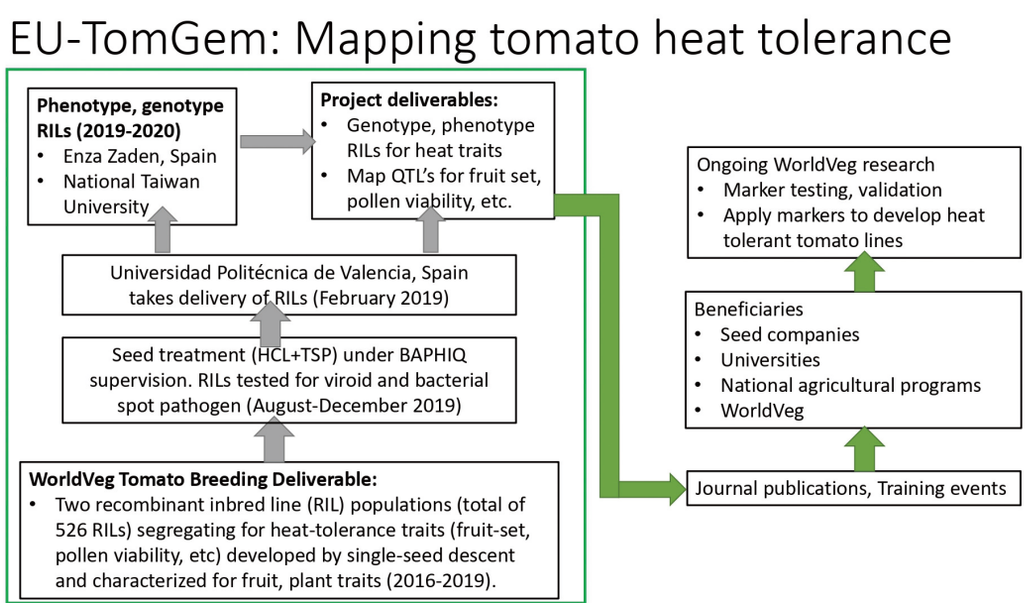
Topic
SFS-05-2015-Strategies for crop productivity,stability and quality

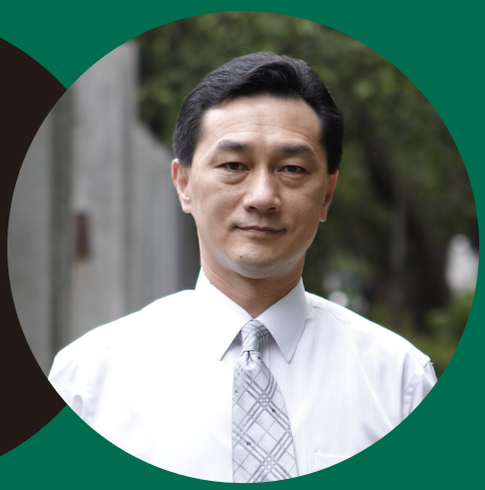
Programme
RIA-Research and Innovation action

Call for proposal
H2020-SFS-2015-2

Abstract

This MOST project comprises activity 1 under Work Package 5 (Deliverable 5.1) of the EU H2020 project TomGem.Deliverable 5.1 generated recombinant inbred line (RIL) populations suitable for mapping heat tolerance traits in tomato by TomGem collaborators at NTU and Valencia Spain. RILs were characterized in the field for segregating plant and fruit traits and a database of RIL characteristics was prepared. Seeds of two RIL populations and parents (total of 527) were successfully delivered to the Spanish collaborator (Antonio Monforte) before the Deliverable 5.1 due date of 28 February 2019.In 2019 summer,two NTU students evaluated heat traits of a third RIL population (CLN 4220 F6) in the field and under a plastic house. After QTL analysis,marker SL3.0ch10_07281097 was significantly associated with pollen viability in the plastic house. Eight CLN4220 F6 RILs displayed good fruit set with good fruit qualities and will be used in breeding.





Principal Investigator

Pei-Jen Lou

National Taiwan University |
Otolaryngology Department

Coordinator

Italy / Fondazione IRCCS Istituto Nazionale Tumori

Participants

1. France / Center Georges Francois Leclerc
2. Spain / Center for Applied Medical Research
3. Taiwan / National Taiwan University
4. Poland / Poznan University of Medical Sciences The Greater Poland Cancer Centre

Brief introduction

Prof. Lou is a joint Professor of the Department of Otolaryngology and the Graduate Institute of Anatomy and Cell Biology, National Taiwan University.Prof. Lou is the President of the Taiwan Head and Neck Society.He is also an honorary senior research fellow at the National Medical Laser Centre,University College London,UK. Prof.Lou's major interest is the diagnosis and treatment of head and neck cancers, and has authored over 150 indexed publications. He is in charge of the Taiwan Head and Neck Cancer Consortium, and is the Principle Investigator of the Taiwan Head and Neck Cancer Biosignature project. Prof.Lou is actively involved in head and neck cancer related clinical studies,and is devoted to developing novel diagnostic/therapeutic tools for head and neck cancers.

Project title

Immunology and immunotherapy of cancer: strengthening the translational aspects

Project number MOST 106-2923-B-002-003-MY3 **Duration** 2016/04/01-2020/03/31

Programme Acronym
Microther

Topic
HCO-08-2014-ERA-NET: Aligning national/regional translational cancer research programmes and activities

Programme
ERA-TRANSCAN2

Call for proposal
H2020-HCO-2014

Abstract

Background–Immunotherapy with immune checkpoint blockers (ICB) is effective against several malignancies,but only a fraction of patients achieve clinical benefit.Identification of innate resistance mechanisms is crucial to improve the rate of response.
Hypothesis–Assessment and preclinical targeting of main immunosuppressive mechanisms in the tumor microenvironment (TM) may lead to more effective immunotherapeutic combinations.
Aims–Aim 1:A retrospective biomolecular characterization of immunosuppressive cells and matricellular proteins in TM of 4 tumors (triple negative breast cancer,TNBC;head and neck,HNSCC;melanoma and colorectal cancer,CRC).The immunosuppressive TM will be evaluated even in pre-&post-chemotherapy (CT) lesions from patients receiving neoadjuvant therapy;Aim 2:To exploit mouse models for testing synergistic antitumor activity of ICB combined with drugs targeting the immunosuppressive TM.Combinations will be based on results from Aim 1 as well as on available off-the-shelf drugs known to target the TM; Aim 3:To design phase Ib clinical study in TNBC,HNSCC,melanoma and CRC assessing activity of ICB associated with microenvironment modulators chosen according to results of Aim 1 and 2.
Methods-TM will be analyzed by IHC,multiparametric fluorescence-based digital pathology analysis,flow cytometry in freshly isolated surgical specimens,qPCR on FFPE tissues and interrogation of gene expression data.Models based on transplantable and spontaneous tumors will be used to test the activity of radiotherapy and drugs known to target immunosuppressive cells and matricellular proteins. According to the preclinical data,phase Ib study will be designed in order to verify the safety of combo approaches.
Expected results–Preclinical and early clinical results supporting the development of advanced immunotherapy approaches based on concurrent targeting of immune checkpoints and of relevant immunosuppressive mechanisms.

Principal Investigator

Chih-Hsin Cheng

National Taiwan University |
School of Forestry and Resource Conservation

Coordinator

Canada / University of British Columbia

Participants

1. Taiwan / National Synchrotron Radiation Research Center
2. Brazil / SP Pesquisa Technologia LTDA

Brief introduction

Dr.Chih-Hsin Cheng is a soil biogeochemist and focus on soil physiochemical properties and carbon and nutrient cycles in the agro-and forest ecosystems. His research includes (1) natural and anthropogenic influences on carbon stocks and carbon cycle; (2) characterization of black carbon and soil organic matter and their roles in stabilization of organic carbon;(3) assessment of carbon sequestration in afforestation/reforestation;(4) emission of CO2 in forest ecosystems

Research interests:Environmental chemistry;Global carbon cycle on the persistent organic matter;Soil carbon sequestration; Renewable biomass and bioenergy:

Techniques:Synchrotron-based soft X-ray analysis,FTIR,NMR,and soil respiration

Project title

Immunology and immunotherapy of cancer: strengthening the translational aspects

Project number 106-2923-B-002-002-MY3 **Duration** 2017/05/01-2020/07/30

Programme Acronym

AgWIT: Agricultural Water Innovations in the Tropics

Programme

ERA-NET COFUND WATERWORKS2015

Call for proposal

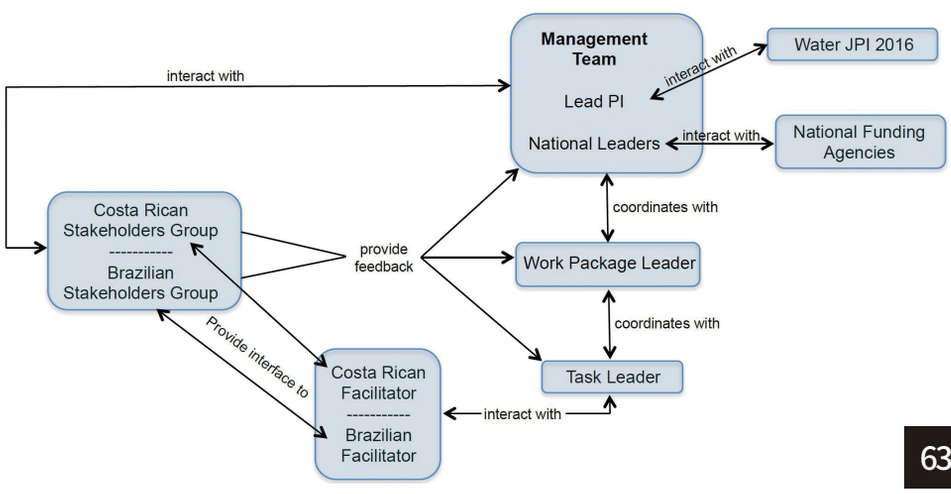
ERA-NET COFUND WATERWORKS2015

Topic

Sub-topic 1b of Challenge 1: Increasing the efficiency and resilience of water uses
Sub-topic-3.a: “Development of new approaches and models for integrated management and governance of resources”
Sub-topic-3.c.: “Participatory approaches and barriers assessment for better implementation of policies and breakthrough knowledge uptake”.

Abstract

Through the cooperation of many countries,the main purpose of this project is to understand how different types of biochar can improve the water use efficiency of crops in tropical agricultural production systems.The experimental sites are located in Brazil (rainfed agriculture) and Costa Rica (irrigated agriculture).Through the field crop photosynthesis and water content measurement, CO2/H2O flux tower measurement, unmanned aerial vehicle (UAV) aerial illumination spectrum analysis and stable isotope analysis, the relationship between carbon cycle and water cycle and carbon,water and nutrients in crop production are studied.In order to understand the effects of different feedstocks and carbonization temperature biochar on crop water use efficiency,the basic properties of biochar and modern technology spectral analysis will be carried out,especially for solid-state NMR and synchrotron radiation sources and laboratory incubation in Taiwan.In addition, in order to understand the water absorption of biochar,we have developed a new biochar ceramsite medium, which is not only beautiful,but also can be applied to roof cultivation,soil improvement, fish and vegetable symbiotic medium system and planting tree hole filling.



Principal Investigator

Shih-Hsun Hsu

National Taiwan University |
Department of Agricultural Economics

Coordinator

The Netherlands / Wageningen University

Participants

1. Netherlands / LEI-WUR
   Netherlands / WU
2. Germany / UBO
3. France / INRA
   France / ANSES
4. Belgium / CEPS
   Belgium / ILSI-EU
   Belgium / JRC
5. UK / UOXF
6. Austria / IIASA
7. Czechia / SZU
8. Italy / CRA
9. Denmark / DTU
10. Sweden / SP
11. Taiwan / NTU
12. Finland / LUKE

Brief introduction

Dr.Shih-Hsun Hsu is Professor,Department of Agricultural Economics,National Taiwan University.Dr. Hsu graduated from Texas A&M University,USA,1991.He was selected as Research Fellow,Global Trade Analysis Project (GTAP),Purdue University,USA,2003.He was serving as Member of the Editorial Advisory Board,Journal of Agricultural Economics, International Association of Agricultural Economists (IAAE),1998-2003.He was the founding President,Taiwan Association of Input-Output Studies (TAIOS).He was Chair,Department of Agricultural Economics,National Taiwan University,2005-2011 and member of Board of Directors,International Cooperation Development Fund (ICDF),Taiwan,R.O.C.His research interests include International Trade,Food and Nutrition Security,Agricultural Development and Policy,Applied General Equilibrium Analysis,Resource and Environmental Economics.

Project title

Metrics,Models and Foresight for European SUStainable Food And Nutrition Security

Project number 105-2923-H-002-002-MY3 **Duration** 105/07/01-108/03/31

Programme Acronym
SUSFANS

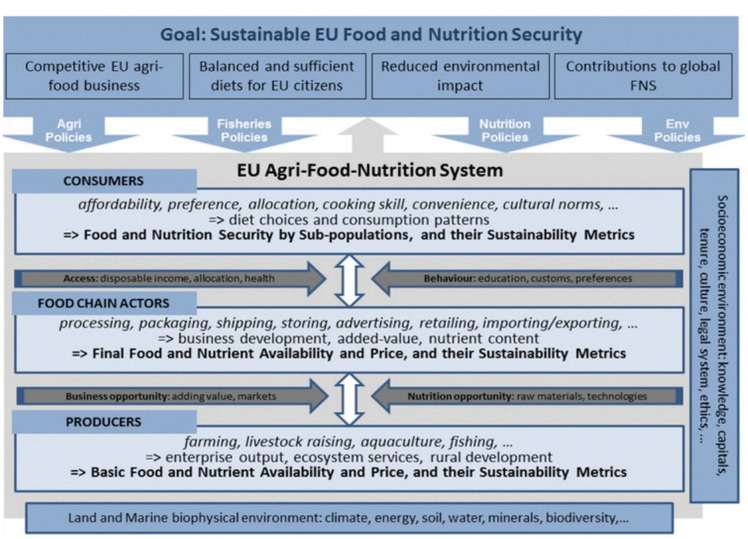
Topic
SFS-19-2014:Sustainable food and nutrition security through evidence based EU agro-food policy

Programme
633692-SUSFANS

Call for proposal
H2020-SFS-19-2014

Abstract

Strengthening food and nutrition security (FNS) in the EU requires a move towards a diet that supports sustainable food consumption and production. To gauge the policy reforms needed for this major societal challenge, the SUSFANS-consortium will identify how food production and nutritional health in the EU can be aligned. The multidisciplinary research agenda of SUSFANS will build the conceptual framework, the evidence base and analytical tools for underpinning EU-wide food policies with respect to their impact on consumer diet and their implications for nutrition and public health, the environment, the competitiveness of the EU agri-food sectors, and global FNS.



Based on a conceptual model of the food chain and its stakeholders, SUSFANS will develop suitable metrics and identify major drivers for sustainable FNS, integrate data and modelling,and develop foresight for European sustainable FNS.Central asset is a coherent toolbox which integrates two complementary strands of state-of-the-art quantitative analysis:(i) micro-level modelling of nutrient intakes,habitual dietary patterns and preferences of individual consumers,and (ii) macro-level modelling of food demand and supply in the context of economic,environmental and demographic changes on various time-scales and for multiple sub-regions.The tools will bridge the current gap between policy analysis on the EU agri-food sector and the nutrition-health sector.
Case studies and scenarios based on stakeholder input from consumers, food industry, farmers/fishermen, government and the scientific community,are instrumental in achieving this goal. The project will provide a comprehensive set of tools for assessing sustainable FNS in Europe,centered around the implications of the current diet for the sustainability of production and consumption in the EU,and the options for the EU agri-food sector (including fisheries and aquaculture) to improve future diets in the near future (up to 5 years) and in the long run (one or more decades ahead).