



Contacts:

Director: Prof. Marco Vincenti (marco.vincenti@unito.it)

Deputy Director for Research: Prof.ssa Cristina Prandi (cristina.prandi@unito.it)

Deputy Director for Teaching Programs: Prof. Piero Ugliengo (piero.ugliengo@unito.it)

Research proposals and current EU Projects

This document is divided into three sections, as follows:

1. UniTO Dept. of Chemistry: Research Proposals for materials, manufacturing and processing topics . 1
Development of Photocatalytic systems for purification/deodorization/disinfection of indoor and restricted environment atmospheres 1
Eco-friendly cyclodextrin nanosponges for cabin scenting and air purifying devices..... 2
Multivariate statistical methods and big data analysis for predictive maintenance in automotive production plants" 2
Metallic particles inside polymers to obtain electrical conductivity (Chemistry Dept.-University of Torino with Mechanical and Aerospace Engineering Dept. - Polytechnique of Torino) 3
2. UniTO Dept. of Chemistry: List of present EU projects (31/05/2019)..... 4
3. UniTO Dept. of Chemistry: Brief description of the current EU projects 5

1. UniTO Dept. of Chemistry: Research Proposals for materials, manufacturing and processing topics

Development of Photocatalytic systems for purification/deodorization/disinfection of indoor and restricted environment atmospheres

Contact persons: Prof. Valter Maurino (valter.maurino@unito.it, Ph:+39 011 670 5218),
Prof. Claudio Minero (claudio.minero@unito.it, Ph: +39 011 670 8449)

The photocatalysis and advanced redox technologies group of the Department of Chemistry at UNITO developed expertises in these fields since 1980 and was one of the pioneering groups in photocatalysis. This is a mild and environmental friendly technology able to completely destroy pollutants, odors and bacteria, allowing sanitization of restricted and indoor environments by using only light, air oxygen and a non toxic metal oxide as photocatalyst (e.g. TiO₂). Our group developed good expertizes in photocatalyst synthesis and optimization (Valter Maurino, Claudio Minero, Ezio Pelizzetti "Preparation of Firmly-Anchored Photocatalytically-Active Titanium Dioxide Coating Films with non-gelled organic-doped Precursors", EU patent °EP1205243 15/05/2002), as well as photoreactor design and testing for air purification and ambient sanitization (V. Maurino, C. Minero, F. Pellegrino, M. Zangirolami, System for lighting and measuring the photo-catalytic activity of the reactive surface of a material, European Patent EP 3 249 398 A1, Date of filing: 19.05.2017, date of publication: 29.11.2017. European Patent Office).

Technology development status: from concepts to prototyping. The small/medium/large prototypes, consisting in photodegradation reactors, can be optimized on request from the volume of a car interior (a few/tens of L/min of air with a power supply as low as 5-10W) to larger scale (single rooms or buildings).

**Department of Chemistry
University of Turin**





The Department



Establishment

The new Department was established in **2012** as a result of the recent innovation of the Italian University system.



Staff

The Department's STAFF includes about **250** professors, researchers, technicians and administrative employees. The doctorate students and post-doc researchers are about one half of the staff.

Students

Teaching activities at the Department of Chemistry involve about **2.000** students

Department of Chemistry & NIS

Department of Chemistry

Funded in 1894

- **120** permanent staff Professors, researchers technicians and administratives
- **250** members including PhD, Postdoc and fellows

Teaching (Bachelor):

- Chemistry & Chemical Technologies
- Material Science & Technology

Teaching (Master):

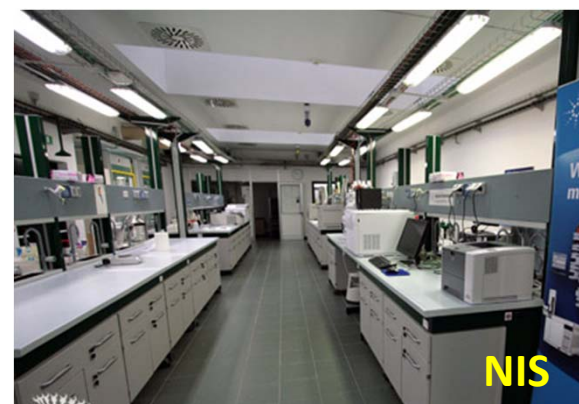
- Advanced Chemical Methods
- Environmental Chemistry
- Clinical, Forensic Chemistry and Doping control
- Industrial Chemistry
- Material Science

Phd School: Chemical and Material Science

NIS: Nanostructured Interfaces and Surfaces Center of excellence

Funded in 2003

70 researchers Chemistry, Physics, Pharmacy, Biology & Earth Science, initially funded by MIUR





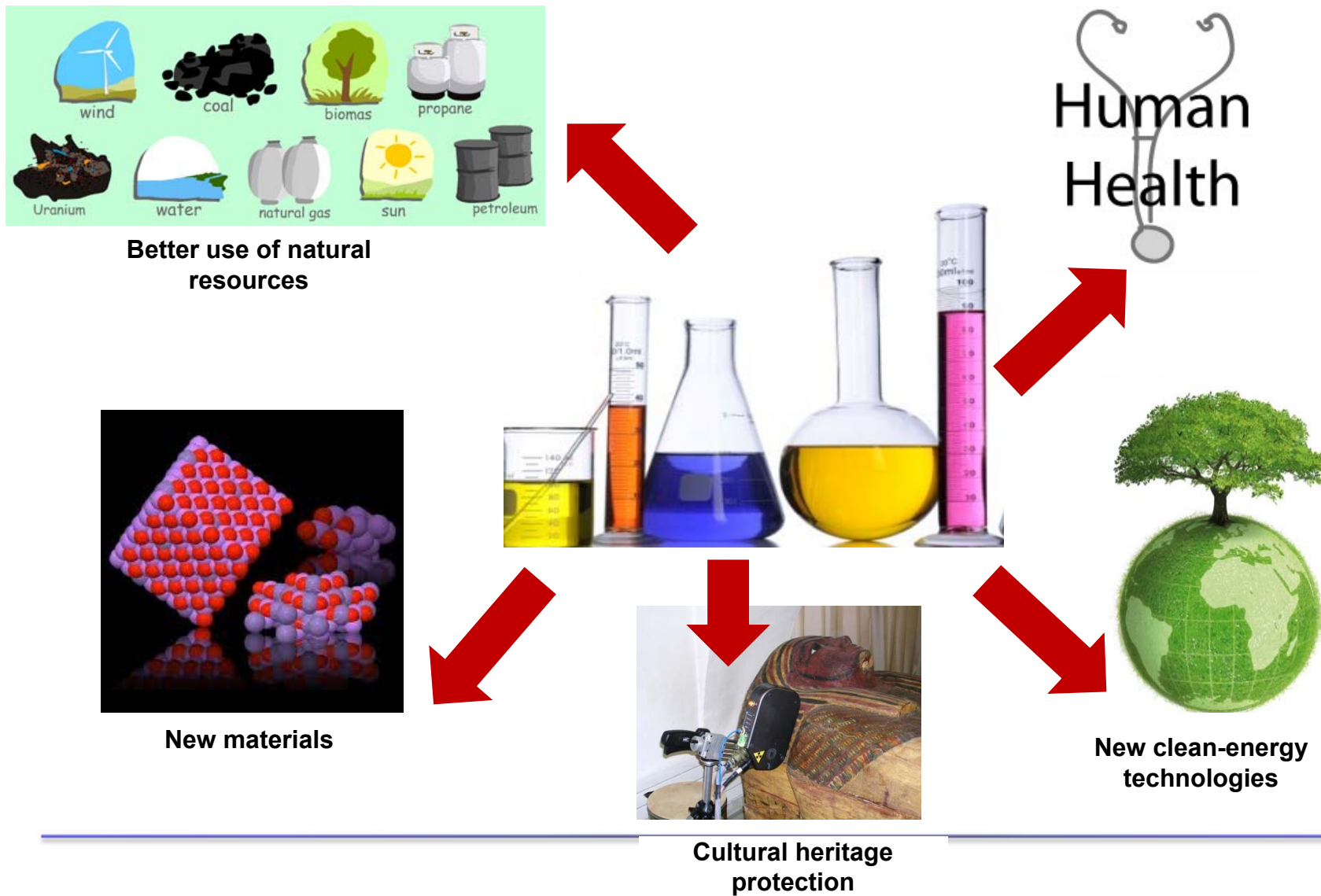
Our vision



- CHEMISTRY as a **CONNECTING DISCIPLINE**
- CHEMISTRY as a **GLOBAL SCIENCE** that transcends traditional boundaries between disciplines and industrial sectors
- CHEMISTRY as **PROMOTER OF THE TRANSITION** from linear to circular economy, making our city a more competitive and sustainable place to live
- CHEMISTRY as a discipline with high-valued **ECONOMIC BENEFITS** also beyond the chemical industry (e.g. increasing manufacturing productivity and products quality and safety, reducing industrial waste etc.)
- CHEMISTRY as a **KEY FACTOR** that transform our everyday **LIVES FOR THE BETTER** (e.g. human health, new clean-energy technologies etc.)

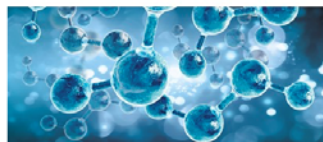


Our vision



Research at Department of Chemistry

<https://www.chimica-ricerca.unito.it/index.php/en>



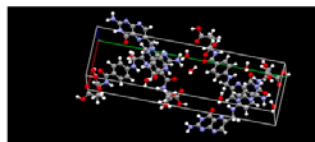
CHEMISTRY AND HEALTH

People's health and quality of life are the basis of an active and dynamic society. Knowledge of human metabolism, as well as development of new medicines, innovative...



ADVANCED MATERIALS

Our everyday life is strongly influenced by materials: transportation, recreation, clothing, health, food production, security. To discover, produce and characterise new materials...



COMPUTATIONAL CHEMISTRY

Using computational clusters and powerful programs, computational chemists can predict the motions, reactivity, aggregation and formation of complex molecules up to predict their...



CHEMISTRY AND ENVIRONMENT

Chemistry plays a central role not only in describing and understanding environmental processes, but also in allowing the achievement of a correct balance between human activities...



GREEN CHEMISTRY

Chemistry can and must provide knowledge and technologies for the sustainable management of resources and lifestyles. With a reversal of perspective, as a voracious consumer of raw...



CULTURAL HERITAGE

The study of the archaeological, historical and artistic heritage, as all the cross-disciplinary researches, generate a huge added value, both cultural and socio-economics. This is...



CHEMISTRY AND FOOD

Today food paradigmatically represents the complexity and interconnectedness of knowledges where themes such as health, education, culture and enhancing the excellence of local...



ENERGY

Clean, renewable, low cost and sustainable energy distribution to people all over the world is nowadays one of the most demanding challenges to mankind.

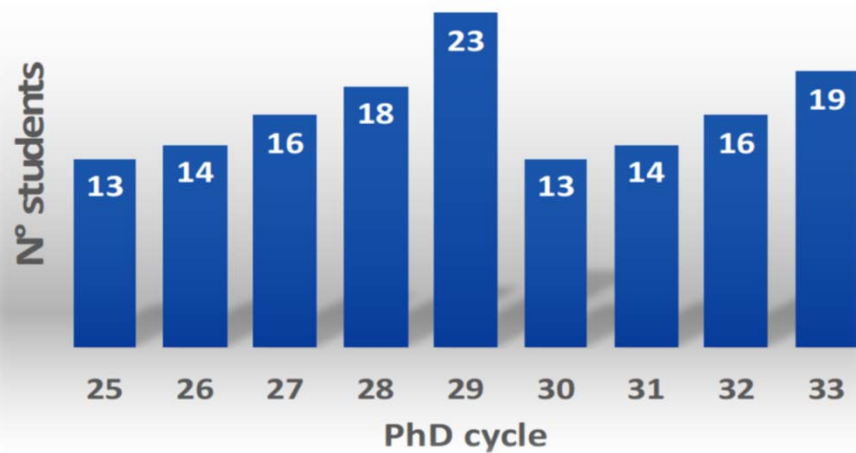
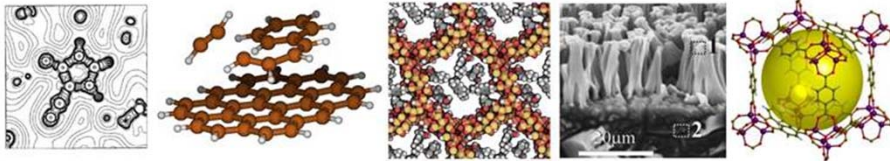


CHEMISTRY AND EDUCATION

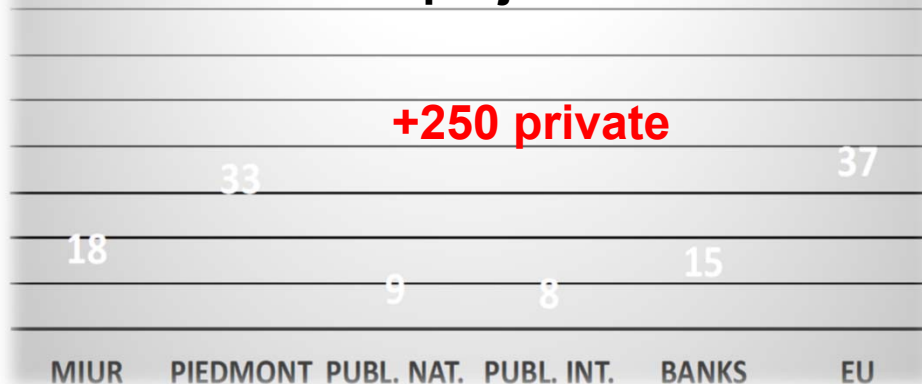
Scientific skills are fundamental for the culture itself, the self-care, sight on issues of great social, environmental and ethical relevance for all scientists, stakeholders and...

Department of Chemistry performance

PhD School of Chemical and Material Science



N° projects



Total # publications (Article & review)



Impact factor



Rised funds

Private Inter.	600 k€
EU	12 M€



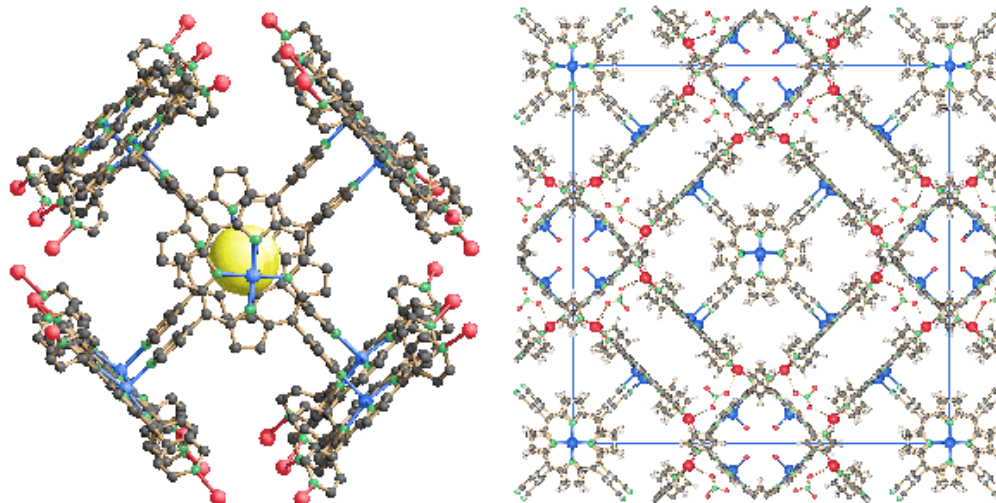
Research activities



Research funding: a total budget of around **8M€ per year** is managed by the Department (2017). Main funding sources are the private sector and EU.



Research activities



Main Research outputs:

- **NEW KNOWLEDGE** → high-ranking scientific publications
- **COMMERCIALIZING AND LICENSING TECHNOLOGIES** → strong and raising connection with international and local **INDUSTRIAL PARTNERS** as well as the participation in **HIGH-TECH OPEN LABS**



Industrial collaborations



The collaboration with industries in **2017** has reached an overall budget of about **2 M€**.



3 Spin-offs

More than 50 ongoing contracts

26 patent applications between 2010-2015 (4 patents per year on average)



Main partners

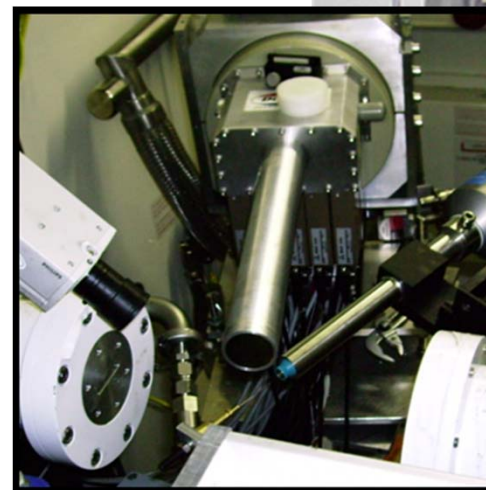




The Department of Chemistry and individual research groups collectively maintain a **MULTI-MILLION EUROS INVENTORY OF STATE-OF-THE-ART INSTRUMENTATION**

- Synthesis Facilities
- Vibrational and Electronic Spectroscopies
- Magnetic Resonance Spectroscopies
- X-ray diffraction
- Chromatography
- Mass spectroscopy
- Computational Facilities
- Teaching Laboratory Facilities

Recent joint acquisition (2016) of two
600 MHz NMR spectrometers

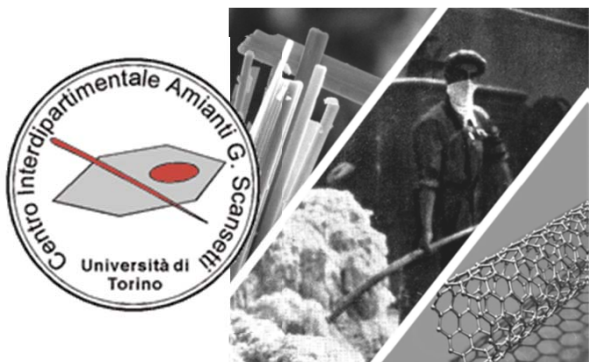




Interdip. centres



- **NIS - Nanostructured Interfaces and Surfaces Center of Excellence**



- **The Scansetti Center - Interdepartmental Center for the Study of Asbestos and Other Toxic Particulates**

- **CRISDI - Interdepartmental Center of Diffractometric Crystallography**





Interdip. centres



- **C3S - CENTRO DI COMPETENZA SUL CALCOLO SCIENTIFICO**



ICxT - Centro Interdipartimentale di innovazione dell'Università di Torino



Technological offer



For Cultural Heritage

For Life Sciences

For Agrochemical and Food



For Environment

For Energy

**For Advanced Materials and
Nanomaterials**



Teaching activities



Designed:

- to provide **basic education** in the plurality of chemical disciplines
- according to the **highest international standards**
- taking into account **regional societal and industrial needs** identified by local stakeholders
- to allow the **graduates employment in a variety of industries and services**



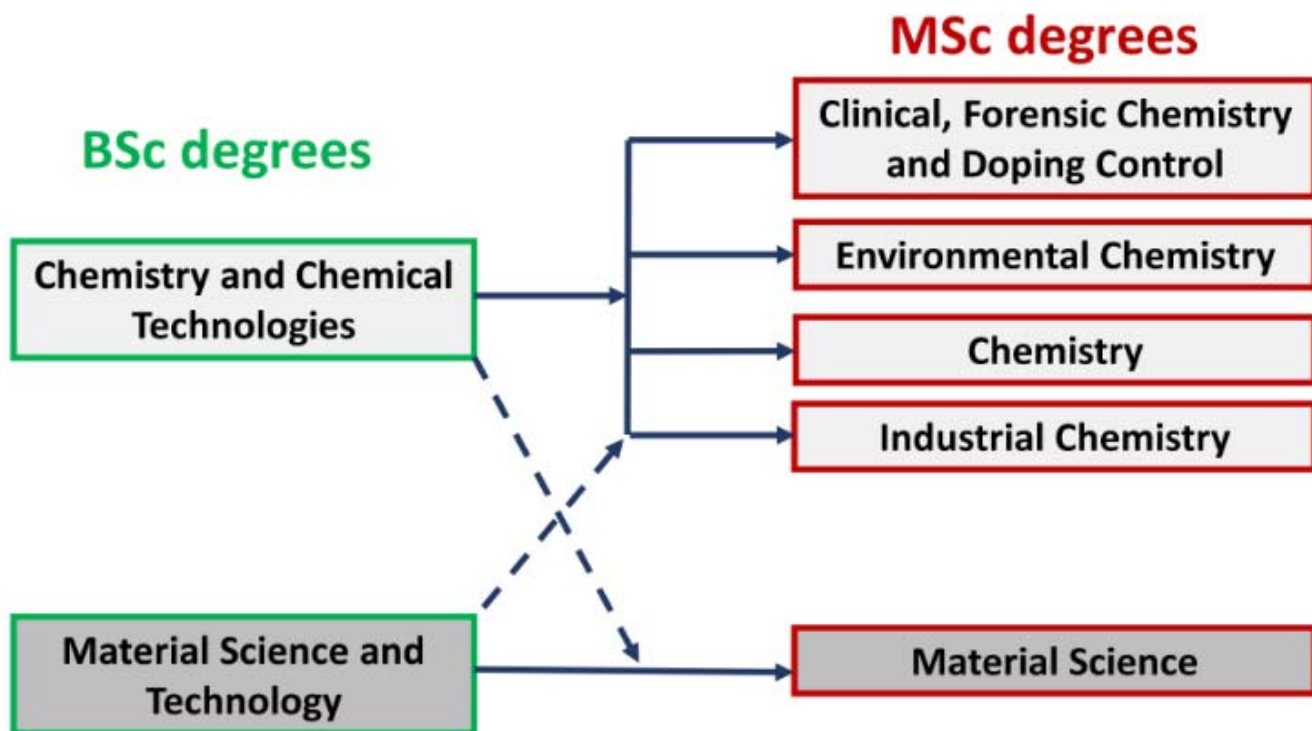
Teaching activities



- **Bachelor degrees:** 2 B.A. which provide students with the basic knowledge in inorganic, organic, physical, analytical, industrial, materials and biological chemistry from a theoretical to a practical point of view. The CHEMICAL IMPLICATIONS on the environment, the sustainable development, the “green chemistry” and the legislations related to chemical substances are also studied.
- **Master degrees:** 4 specialized M.A. in both chemical and materials sciences with the aim of providing students with an advanced background on designing innovative scientific and technological solutions in a variety of chemical products and processes + 1 educational Erasmus-Mundus program for the use of large scale facilities in Materials Science
- **PhD courses** to train creative and competent scientists in the field of chemical sciences and technologies, through the ANALYSIS AND STUDY OF SCIENTIFICALLY RELEVANT PROBLEMS both in fundamental and applied science.



Education degrees @ Department of Chemistry (2018)



European Credit Transfer and Accumulation System

	Lectures	Class Workshops	Laboratory	Internship/ Thesis
1 ECTS	8 h	12 h	16 h	25 h



Contacts



Dipartimento di Chimica

Via P. Giuria, 7 - 10125 Torino - Italy
Tel.: 0116707650 - Fax: 0116707855

Director

Prof. Marco Vincenti marco.vincenti@unito.it

Deputy Director for Research

Prof.ssa Cristina Prandi cristina.prandi@unito.it

Deputy Director for Teaching Programs

Prof. Piero Ugliengo piero.ugliengo@unito.it

Secretariat

direzione.chimica@unito.it

Public Relations

chimica.eventi@unito.it



LUGI CASALE
CHE GIORIOSAMENTE AFFERMO
COL SUO PROCESSO INDUSTRIALE DI SINTESE DELL'AMMONTAGNA
IL NOME D'ITALIA
PRESSO TUTTE LE NAZIONI DEL MONDO
E L'ALLIATO DI QUESTO ISTITUTO
N. 15321 — 1912-1927





Eco-friendly cyclodextrin nanosponges for cabin scenting and air purifying devices

Contact person: Prof. Francesco Trotta (francesco.trotta@unito.it, Ph:+39 011 670 7550)

Cyclodextrins are starch-derived cyclic oligosaccharides having an internal cavity that is able to form inclusion complexes with a wide series of hydrophobic and weakly hydrophilic compounds. By reacting cyclodextrins with suitable crosslinking agents, nanoporous polymeric networks, often called "Nanosponges", are obtained. Nanosponges are safe, sustainable and inexpensive materials, exhibiting superior and tunable complexation properties. Studies have shown that nanosponges can be used to encapsulate and slowly release compounds of interest, including perfumes and insect repellents [1]. Additionally, nanosponges can be dispersed among textile fibres or covalently bound to them. The nanosponge particles dispersed in textiles have been observed to endure several washing cycles [2]. In our laboratory, dextrin nanosponges are prepared with excellent reproducibility and high yields (above 90 %) even in large amounts (up to 1 kg per batch). To date, no industrial mass production of dextrin nanosponges has been started. However, a pilot-scale production is currently being planned in cooperation with small and medium-sized enterprises. The industrial price of dextrin nanosponges may range from 2 to 10 €/kg, depending on the type. Finally, specific typologies of dextrin nanosponges can also be used as precursors for the preparation of microporous carbons with a narrow pore size distribution (5-13 Å) and high surface area [3]. Air purifying devices that combine the ability of dextrin-based nanosponges to release fragrances and the microporous carbon capacity of sequestering unpleasant volatile compounds, are an example of a potential application of dextrin-based nanosponges in the automotive industry.

[1] R. Peila, P. Scordino, D. B. Shanko, F. Caldera, F. Trotta and A. Ferri, "Synthesis and characterization of β -cyclodextrin nanosponges for N,N-diethyl-meta-toluamide complexation and their application on polyester fabrics" *React Funct Polym.*, vol. 119, pp. 87-94, 2017.

[2] M. Mihailiasa, F. Caldera, J. Li, R. Peila, A. Ferri and F. Trotta, "Preparation of functionalized cotton fabrics by means of melatonin loaded β -cyclodextrin nanosponges" *Carbohydr Polym.*, vol. 142, pp. 24-30, 2016.

[3] M. Zanetti, A. Anceschi, G. Magnacca, G. Spezzati, F. Caldera, G. P. Rosi and F. Trotta, "Micro porous carbon spheres from cyclodextrin nanosponges" *Micropor Mesopor Mat*, vol. 235, pp. 178-184, 2016.

Multivariate statistical methods and big data analysis for predictive maintenance in automotive production plants"

Contact persons: Prof Marco Vincenti (marco.vincenti@unito.it, Ph: +39 011 670 5264) – Prof. Marcello Baricco (marcello.baricco@unito.it, +39 011 670 7569)

Mid- to highly-automated automotive production plants are equipped with a variety of sensor and control devices that regulate the production flow and provide warnings whenever a malfunctioning is likely to occur or a fault risk is spotted. When these sensors yield signals highlighting a critical operating condition they may either determine a stop in the production or not, with different consequences that may arise. Depending on the monitored parameter, these signals may either be binary (i.e., OK vs. not-OK) or produce a numerical value (for example, a temperature).

Shrewd interpretation of the variety of signals continuously produced by the whole set of assembly line sensors is used to anticipate possible major breakdown of the production plant and plan adequate maintenance of its parts more likely to collapse.



A large number of sensors generating signals at high frequency result in a huge amount of data that should be promptly interpreted on the basis of previous experience, in order to provide timely and reliable warnings about risky operating machinery. The “previous experience” is embedded into mathematical models that could either be deterministic or stochastic. Nowadays, the latter models are gaining increasing success and application as much as more refined techniques of machine learning are developed.

The models devoted to the predictive maintenance of automotive production plants that we developed use algorithms of big data analysis compatible with both binary outputs and continuous variables, but also data of mixed classes. Preliminary exploratory methods include various species of principal component analysis (traditional, logistic, sparse, etc.). These methods provide initial insight into the data structure and orient the choice of the subsequent and more sophisticated algorithms of classification, class modelling, and regression. In particular, partial least squares discriminant analysis proved suitable to distinguish minor warning events from serious alarms. Also numerous techniques of machine learning have been tested and proved effective in refining the models as long as more and more data are accumulated to increment the historical “experience”. These include support vector machines, logistic regressions, decision forest, combined with various Bayesian approaches. The final models achieved very high sensitivity and specificity scores. The statistical algorithms were developed on either R-, Matlab, and MS Azure software and are compatible with various operating systems and other software.

Metallic particles inside polymers to obtain electrical conductivity (Chemistry Dept.-University of Torino with Mechanical and Aerospace Engineering Dept. - Polytechnique of Torino)

Contact person: Dr. Valentina Brunella (valentina.brunella@unito.it;
Ph: +39 011 670 7546)

a. Electrically conductive adhesives

The use of adhesive bonding is widespread in automotive and aerospace industries. In many applications, long bond lines are needed in order to ensure mechanical performances and avoid small separation of the components such as dashboard, instrument panels, lateral fasciae. For these components, the bond lines could be used to transmit electrical signals. The aim of this activity is to make the adhesives electrically conductive by means of different typology of conductive particles or short fibres. The mechanical properties and the electrical conductivity will be used in order to understand whether the modified adhesives will respect the automotive requirements by the mechanical point of view. Furthermore, the cost of the particles will be evaluated in order to establish which of the selected filler/system is economically affordable.

b. Fast curing resins

In the last decades, the use of composite materials has been increased in automotive, aerospace and naval industries due to the strict safety regulations and fuel costs. Composite materials can reduce the weight (related to fuel costs) of the vehicles over 50% compared to metals. However, the fabrication of these materials can be complex and time-consuming. For some epoxy resins, for example, the curing time and post cure can be very long (even 16 hours) by using the traditional oven or autoclave systems.

The possibility to modify an epoxy resin that needs a curing time of 12 hours at room temperature and a post cure of 3 hours will be modified by mean of relatively small quantities of nanoparticles to make the resin sensitive to microwave. The mechanical behaviour of the modified materials cured with microwave systems will be studied and compared with the unmodified and the modified ones cured with the standard method. The reduction of the time cycles will be evaluated in order to understand if this methodology is economically affordable.



2. UniTO Dept. of Chemistry: List of present EU projects (31/05/2019)

PRESENT PROJECTS				
	Project name	Title	from to	webpage
1	H2020-MSCA-RISE 645551 - MAT4TREAT	Enhancing water quality by developing novel materials for organic pollutant removal in tertiary water treatments	31/12/14 30/6/19	https://cordis.europa.eu/project/rcn/194348/factsheet/en
2	H2020-EU.2.1.3. n. 760928 "BIORIMA"	BIOMaterial Risk Management	1/11/17 14/12/21	https://cordis.europa.eu/project/rcn/215980/factsheet/en
3	ERASMUS+ "CAPuS - " (Project n. 588082-EPP-1-2017-1-ITEPPKA2-KA)	Conservation of Art in Public Spaces	1/1/18 31/12/20	http://www.capusproject.eu/project-description/
4	H2020-MSCA-COFUND T4C	PhD Technology Driven Sciences: Technologies for Cultural Heritage (T4C)T4C Grant agreement ID: 754511	1/1/18 31/12/21	https://cordis.europa.eu/project/rcn/210003/factsheet/en
5	H2020 MGA-MSCA-RISE 778412- INDESMOF	International Network on Ionic Liquid Deep Eutectic Solvent Based Metal Organic Frameworks Mixed Matrix Membranes	1/3/18 28/2/22	https://cordis.europa.eu/project/rcn/213029/factsheet/en
6	"nPSize" - EMPIR 17NRM04	Improved traceability chain of nanoparticle size measurements	1/5/18 30/4/21	https://www.euramet.org/research-innovation/search-research-projects/details/?eurametCtcp_project_show%5Bproject%5D=1549
7	H2020-SCC-NBS . 776528 - proGReg	productive Green Infrastructure for post-industrial urban regeneration	1/5/18 30/4/22	https://cordis.europa.eu/project/rcn/216077/factsheet/en
8	H2020-CIRC n. 776816 - Project O	Project Ô: demonstration of planning and technology tools for a circular, integrated and symbiotic use of water	1/6/18 31/5/22	https://cordis.europa.eu/project/rcn/216088/factsheet/en
9	H2020-LC-SC3 n.826013 - IMPRESSIVE	ground-breaking tandem of transParent dye Sensitized and perovskite solar cells	1/1/19 31/12/21	https://cordis.europa.eu/project/rcn/221622/factsheet/en



10	H2020-JTI-FCH n.826352 H2020 - HYCARE	An innovative approach for renewable energy storage by a combination of hydrogen carriers and heat storage	4/12/18 31/12/21	https://cordis.europa.eu/project/rcn/221759/factsheet/en
11	H2020-MSCA-ITN n.813209 - PARACAT	Paramagnetic Species in Catalysis Research. A Unified Approach Towards Heterogeneous, Homogeneous and Enzyme Catalysis	31/12/18 31/12/22	https://cordis.europa.eu/project/rcn/218401/factsheet/en
12	H2020 (EIT-KIC) EIT Food	IValueFood	1/1/19 31/12/19	https://www.eitfood.eu/
14	H2020-MSCA-RISE n. 823826 - BE-ARCHAEO	BEyond ARCHAEOlogy: an advanced approach linking East to West through science, field archaeology, interactive museum experiences	1/2/19 31/1/23	https://cordis.europa.eu/project/rcn/220264/factsheet/en
15	H2020 n. 837733 - COZMOS	Efficient CO2 conversion over multisite Zeolite-Metal nanocatalysts to fuels and OlefinS	1/5/19 30/4/23	(coming soon)
16	H2020-MSCA-ITN n.811312 - ACO	AstroChemical Origins	1/5/19 30/4/23	https://cordis.europa.eu/project/rcn/220823/factsheet/en

3. UniTO Dept. of Chemistry: Brief description of the current EU projects



MAT4TREAT

Project ID: 645551

Funded under: [H2020-EU.1.3.3.](#) - Stimulating innovation by means of cross-fertilisation of knowledge

Enhancing water quality by developing novel materials for organic pollutant removal in tertiary water treatments

From 2015-01-01 to 2018-12-31, closed project | [MAT4TREAT Website](#)

Project details

Total cost: EUR 630 000	Topic(s): MSCA-RISE-2014 - Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE)
EU contribution: EUR 630 000	Call for proposal: H2020-MSCA-RISE-2014 See other projects for this call
Coordinated in: Italy	Funding scheme: MSCA-RISE - Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE)

Objective

The MAT4TREAT project consists in a consortium of 8 Universities, 5 of them European (UNITO, AAU, POLITO, UPV and UOI), and the other three from outside the EU (UNLP, McGill, SU), as well as two non academic institutions (ACEA and LQT). These groups are committed to work in the development of novel materials to be used in innovative integrated water tertiary treatments (to remove, for instance, Emerging Pollutants). This ambitious goal will be achieved by world leading research groups in the following fields: (i) graphene-based and other carbon-related materials, (ii) polymeric materials, (iii) oxidic ceramic materials, and (iv) hybrid inorganic-polymeric materials.

The new materials will be used as adsorbents, as photocatalysts and as active layers for the fabrication of membranes, and thus tested for the pollutant removal from model aqueous solutions as well as from real water samples.

Furthermore, approaches combining different materials and pollutant abatement technologies will be proposed and a demonstrative labbench apparatus for the integrated treatment of wastewaters will be built-up with the support of two European non academic institutions, which will directly participate to the project. Chemometric approach will be followed to optimize both materials production and experimental conditions for analytical purposes. Life Cycle Assessment of new materials and proposed technologies will be performed in order to evaluate their economic and environmental sustainability.

For the implementation of the program secondments of ESRs and ERs are scheduled (95 secondments for 142 person-months) together with a diffusion plan to report on the obtained results, not only to the scientific community, but also to stakeholders and non-specialized audience.

Coordinator

UNIVERSITA DEGLI STUDI DI TORINO Italy



HORIZON
2020

BIORIMA

Project ID: 760928 **Funded**

under:

[H2020-EU.2.1.3. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Advanced materials](#)

BIOMaterial Risk Management

From 2017-11-01 to 2021-10-31, ongoing project

Project details

Total cost: EUR 8 761 418,75	Topic(s): NMBP-12-2017 - Development of a reliable methodology for better risk management of engineered biomaterials in Advanced Therapy Medicinal Products and/or Medical Devices
EU contribution: EUR 7 999 981,25	Call for proposal: H2020-NMBP-2017-two-stage See other projects for this call
Coordinated in: United Kingdom	Funding scheme: RIA - Research and Innovation action

Objective

BIORIMA stands for Biomaterial Risk Management. BIORIMA aims to develop an integrated risk management (IRM) framework for nano-biomaterials (NBM) used in Advanced Therapeutic Medicinal Products (ATMP) and Medical Devices (MD). The BIORIMA RM framework is a structure upon which the validated tools and methods for materials, exposure, hazard and risk identification/assessment and management are allocated plus a rationale for selecting and using them to manage and reduce the risk for specific NBM used in ATMP and MD. Specifically, the IRM framework will consist of: (i) Risk Management strategies and systems, based on validated methodologies, tools, and guidance, for monitoring and reducing the risks together with methods for evaluating them; (ii) Validated methodologies and tools to identify the potential Exposure and Hazard posed by NBM to humans and the environment; (iii) A strategy for Intelligent Testing (ITS) and Tiered Risk Assessment for NBM used in ATMP and MD. BIORIMA workplan consists of 7 workpackages covering the major themes: Materials, Exposure, Hazard and Risk. BIORIMA will generate methods and tools for these themes for use in risk evaluation and reduction. The BIORIMA toolbox will consist of validated methods/tools for materials synthesis; reference materials bank; methods for human/environment exposure assessment and monitoring; (eco)-toxicology testing protocols; methods for prevention of accidental risks – massive release or explosion – A tiered risk assessment method for humans/environment; An intelligent testing strategy for NBM and risk reduction measures, including the safer-by-design approach. BIORIMA will deliver a web-based Decision Support System to help users, especially SME, evaluate the risk/benefit profile of their NBM products and help to shorten the time to market for NBM products.

Coordinator

INSTITUTE OF OCCUPATIONAL MEDICINE, EH14 4AP EDINBURGH, UK



HORIZON
2020

T4C

Project ID: 754511

Funded under: [H2020-EU.1.3.4. - Increasing structural impact by co-funding activities](#)

PhD Technology Driven Sciences: Technologies for Cultural Heritage

From 2018-01-01 to 2022-12-31, ongoing project

Project details

Total cost: EUR 2 825 280	Topic(s): MSCA-COFUND-2016 - Co-funding of regional, national and international programmes
EU contribution: EUR 1 412 640	Call for proposal: H2020-MSCA-COFUND-2016 See other projects for this call
Coordinated in: Italy	Funding scheme: MSCA-COFUND-DP - Doctoral programmes

Objective

T4C is a novel research and training doctoral programme in “Heritage Sciences” conceived by the University of Torino, (UNITO) with the financial support of the banking foundation Compagnia di San Paolo (CSP) and the scientific and training involvement of a 35 local, national and international partner organisations belonging to academic and non-academic sectors. Main aim of T4C is to build up the next generation of Cultural Heritage professionals, able to develop technological solutions and services for the restoration, the protection, the diagnostics and the valorization of cultural heritage and skilled with a complementary scientific training from socio-economic disciplines and humanities and soft skills. Target are early stage researchers with a scientific background in chemistry, physics, biotechnology, ICT, biology and related disciplines, undergoing a genuine mobility to Italy. T4C will last 60 months and will be implemented through 2 calls for applications, assigning a total of 18 transnational incoming fellowships. Fellows will be offered an independent and personalized scientific training choosing from two specific scientific domains: Digital Sciences and Conservation, within the specific panels of Digital Sciences, Physical Sciences, Basic and Natural Sciences, Environmental Sciences They will be enrolled in the T4C PhD programme and will be supervised by a joint supervision of academic and non-academic supervisors. Fellows will attend an exclusive training programme, encompassing basic training, scientific training through individual project implementation and interdisciplinary training, short term visits, secondment opportunities at non-academic premises, soft skills, dissemination and outreach activities. T4C intends also to capitalize on the experience of the already funded Cofund project (Train2Move) in managing international mobility programmes with national and international impact and in aligning national mechanisms to EU ones.

Coordinator

UNIVERSITA DEGLI STUDI DI TORINO

VIA GIUSEPPE VERDI 8 10124 TORINO

Italy

EU contribution: EUR 1 412 640



HORIZON
2020

INDESMOF

Project ID: 778412

Funded under: [H2020-EU.1.3.3. - Stimulating innovation by means of cross-fertilisation of knowledge](#)

International Network on Ionic Liquid Deep Eutectic Solvent Based Metal Organic Frameworks Mixed Matrix Membranes.

From 2018-03-01 to 2022-02-28, ongoing project

Project details

Total cost: EUR 774 000	Topic(s): MSCA-RISE-2017 - Research and Innovation Staff Exchange
EU contribution: EUR 774 000	Call for proposal: H2020-MSCA-RISE-2017 See other projects for this call
Coordinated in: Spain	Funding scheme: MSCA-RISE - Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE)

Objective

The main objective of INDESMOF Marie Curie RISE action is to establish a new and lasting research consortium to improve and exchange interdisciplinary and intersectoral knowledge on the design, synthesis, and characterization of advanced composite adsorbents for environmental remediation of heavy metal polluted water sources, able to provide high capacity and high selectivity filters for the industry. The main research core of INDESMOF is based on the nano-encapsulation of Deep Eutectic Solvents (DES) within the ordered porous structures of Metal Organic Frameworks (MOF), in order to obtain a highly porous MOF material, combined with the metal chelation and solvation specificity of DES. Incorporation of high-capacity highselectivity adsorbent materials within polymeric support is a crucial challenge faces in INDESMOF towards the real application of the MOF@DES materials in water filtering systems, indispensable for mining and industrial water environmental remediation technologies. Development and improvement of advanced filtering technologies requires the joint effort of a multidisciplinary researcher collective, involving the expertise of participants on different disciplines including physics, chemistry, environmental chemistry, materials and polymer science and engineering. Background knowledge and knowhow of INDESMOF's partners combine the complementarities and synergies needed to undertake an integrative and concerted effort through innovation and breakthrough actions towards the fabrication of advanced and specific filters for polluted water remediation. Results will be widely disseminated through publications, workshops, post-graduate courses to train new researchers, a dedicated webpage, and visits to companies working in the area. In that way, we will perform an important role in technology transfer in the design of highly active and selective adsorbents and their performance against real water polluted samples.

Coordinator

FUNDACION BCMATERIALS - BASQUE CENTRE FOR MATERIALS, APPLICATIONS AND Spain NANOSTRUCTURES
BARRIO SARIENA S/N



17NRM04 nPSize



Improved traceability chain of nanoparticle size measurements

Overview

Nanomaterials and nanotechnology are widely used today, but their use may expose humans and the environment to new health and sustainability risks. To control and minimise these risks, the European Commission has mandated European standardisation bodies to develop standardised methods that can reliably characterise manufactured nanomaterials. This project will develop methods, reference materials and modelling to improve the traceability chain, comparability and compatibility of nanoparticle size measurements to support standardisation within the framework of CEN/TC 352 “Nanotechnologies”, ISO/TC 229

‘Nanotechnologies’, ISO/TC 24/SC 4 ‘Particle characterization’ and ISO/TC 201/SC 9 ‘Scanning probe microscopy’.

Objectives

The overall goal of this project is to improve the traceability chain, comparability and compatibility for nanoparticle size measurements to support the standards development process within CEN/TC 352 and ISO/TC 229 and related groups. The specific objectives are:

1. To assess the performance and establish the traceability of existing nanoparticle sizing methods, such as SEM, TSEM, TEM, AFM and SAXS, in terms of their sensitivity to material, shape and quantity (number, volume or mass) for representative nanoparticulate materials (i.e. metals, oxides and polymers), including analysis of the effect of material and shape parameters on size and size distribution measurements, as well as the effect of conversion of the measured signal on the particle size distribution.

To develop validated nanoparticle reference materials with (i) non-spherical shapes, (ii) non-monodisperse size distributions and (iii) accurate concentrations. In addition, to use such nanoparticle reference materials to evaluate measurement uncertainties for nanoparticle quantity determination (expressed as number, volume, mass or intensity) and to establish their dependence on particle size.

Coordinator:

Vasile-Dan Hodoroaba, BAM

Tel: +49 30 8104-3144

E-mail: Dan.Hodoroaba@bam.de

Project website address: <https://www.bam.de/Content/DE/Projekte/laufend/nPSize/npsize.html>



proGReg

Project ID: 776528 Funded

under:

[H2020-EU.3.5.1.2. - Assess impacts, vulnerabilities and develop innovative cost-effective adaptation and risk prevention and management measures](#); [H2020-EU.3.5.1.3. - Support mitigation policies, including studies that focus on impact from other sectoral policies](#) ; [H2020-EU.3.5.2.1. - Further our understanding of biodiversity and the functioning of ecosystems, their interactions with social systems and their role in sustaining the economy and human well-being](#) ; [H2020-EU.3.5.2.2. - Developing integrated approaches to address water-related challenges and the transition to sustainable management and use of water resources and services](#) ;

productive Green Infrastructure for post-industrial urban regeneration

From 2018-06-01 to 2023-05-31, ongoing project

Project details

Total cost: EUR 10 907 916,73	Topic(s): SCC-02-2016-2017 - Demonstrating innovative nature-based solutions in cities
EU contribution: EUR 10 432 512,01	Call for proposal: H2020-SCC-NBS-2stage-2017 See other projects for this call
Coordinated in: Germany	Funding scheme: IA - Innovation action

Objective

For proGReg three front-runner cities (Dortmund (DE); Turin (IT); Zagreb (HR)) will create Living Labs in urban areas which face the challenge of post-industrial regeneration. These areas suffer from social and economic disadvantages, inequality and related crime and security problems. They lack quality greenspaces, have a negative impact on human health and wellbeing and are more vulnerable to the effects of climate change. Going beyond the current state-of-the-art with Green Infrastructure as a one-off state intervention, the proGReg Living Labs will develop NBS which are citizen owned and co-developed by state, market and civil society stakeholders. Innovation will take place on the technical level through the NBS deployments, on the social level through co-designing, co-creating and co-implementing NBS with local communities and on the economic level through combining NBS with market-ready business models. Four follower cities in Eastern and Southern Europe (Cascais PT, Cluj-Napoca RO, Piraeus GR, Zenica BA) will be co-steering the research process to assure replicability and adaptability to their local context resulting in urban plans for NBS deployment. The NBS to be tested i.a. include: regenerating industrial soils biotic compounds, creating community-based urban agriculture and aquaponics and making renatured river corridors accessible for local residents. Scientific assessment and monitoring results from the Living Labs will be made available on the EU NBS platforms OPPLA and THINKNATURE and will contribute to the European reference framework for NBS. Global impact will be achieved by a training programme for cooperative planning, implementation and management of NBS. It will be provided by partners from the cities, SMEs and universities involved. Training events will be organised in cooperation with the partner ICLEI. Massive Open Online Courses (MOOCs) will be distributed via EdX, the most renowned MOOCs platform worldwide.

Coordinator



HORIZON
2020

Project O

Project ID: 776816 Funded

under:

[H2020-EU.3.5.2.2. - Developing integrated approaches to address water-related challenges and the transition to sustainable management and use of water resources and services](#)

[H2020-EU.3.5.2.3. - Provide knowledge and tools for effective decision making and public engagement](#)

[H2020-EU.3.5.4. - Enabling the transition towards a green economy and society through eco-innovation](#)

Project Ô: demonstration of planning and technology tools for a circular, integrated and symbiotic use of water

From 2018-06-01 to 2022-05-31, ongoing project

Project details

<p>Total cost: EUR 10 692 937,68</p> <p>EU contribution: EUR 9 261 272,38</p> <p>Coordinated in: Italy</p>	<p>Topic(s): CIRC-02-2016-2017 - Water in the context of the circular economy</p> <p>Call for proposal: H2020-CIRC-2017TwoStage See other projects for this call</p> <p>Funding scheme: IA - Innovation action</p>
---	---

Objective

Project Ô intends to demonstrate approaches and technologies to drive an integrated and symbiotic use of water within a specific area, putting together the needs of different users and waste water producers, involving regulators, service providers, civil society, industry and agriculture. The project seeks to apply the pillars of integrated water management (IWM) as a model for “water planning” (akin to spatial planning) and to demonstrate low cost, modular technologies that can be easily retrofitted into any water management infrastructure at district/plant level, hence enabling even small communities and SMEs to implement virtuous practices. Technologies and planning instruments complement each other as the first make possible the second and the latter can provide as example or even prescribe the former (and similar technologies allowing virtuous water use practices). Indeed the technologies support the regulators in implementing policy instruments, as foreseen by IWM, for convincing stakeholders (like developers and industry) to implement water efficiency strategies and could include instruments for e.g. rewarding virtuous behaviours (for example: advantageous water tariffs), planning regulations that award planning consent more swiftly or even prescribe the use of water from alternative sources (including recycling). Project Ô has in summary the overall objective of providing stakeholders (everybody using or regulating the use of water in an area) with a toolkit that enables them to plan the use of and utilise the resource water whatever its history and provenance, obtaining significant energy savings in terms of avoided treatment of water and waste water and release of pressure (quantity abstracted and pollution released) over green water sources. This overall objective will be demonstrated in up to four sites each in different Countries of Europe and in Israel, involving industries, aquaculture and agriculture as well as local authorities of different sizes.

Coordinator



HORIZON
2020

IMPRESSIVE

Project ID: 826013

Funded under: [H2020-EU.3.3.2. - Low-cost, low-carbon energy supply](#)

[H2020-EU.3.3.3. - Alternative fuels and mobile energy](#)

[sources](#)

[H2020-EU.3.3.5. - New knowledge and technologies](#)

ground-breaking tandem of transparent dye sensitized and perovskite solar cells

From 2019-01-01 to 2021-12-31, ongoing project

Project details

Total cost: EUR 2 929 050,13	Topic(s): LC-SC3-RES-2-2018 - Disruptive innovation in clean energy technologies
EU contribution: EUR 2 929 050,13	Call for proposal: H2020-LC-SC3-2018-Joint-Actions-3 See other projects for this call
Coordinated in: France	Funding scheme: RIA - Research and Innovation action

Objective

IMPRESSIVE's main objective is to develop transparent photovoltaic (PV) cells converting selectively UV and NIR part of the light while excluding the visible range to reach colourless and fully transparent devices. To reach this ground-breaking objective, the approach is based on hybrid tandem UV-perovskite solar cell and NIR-dye-sensitized solar cell. This innovative technology, based on a under-filing patent and recent breakthrough in perovskite absorbers, is expected to meet the objectives of full transparency and 14% Power Conversion Efficiency with a lifetime over 25 years. The ability to achieve these objectives is ensured by the world leading expertise of the project partners: CNRS and UNITO developed materials for the first transparent DSSC, EPFL is leading the perovskite solar cell revolution, UTV realised the first PSC module and developed a pilot line production for Building Integrated DSSC, HG is the first company selling DSSC modules for BIPV, SMART has a deep experience in Life Cycle Assessment for photovoltaics, and EQY has huge experience in dissemination and exploitation of EU projects' results for strong market uptake. During the 3 years of the project, the consortium will develop the UV-PSC (WP2) and NIR-DSSC (WP3) before integrating them into a transparent tandem cell (WP4). The stability will be checked (WP5) before the upscaling of all components (WP6), leading to the creation of a 200 x 300 mm transparent PV module. The LCA of the products will be done along with a cost study and a roadmap for years following the project (WP7). To ensure a strong market uptake and disseminate the outstanding expected results, specific efforts will be made on communication and dissemination (WP8). During the whole project, IPR will be carefully managed and the business strategy will be elaborated, in relation with InnoEnergy (WP1) and efficient management of the project will be implemented by the coordinator CNRS (WP9).

Coordinator

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

France

RUE MICHEL ANGE 3 75794 PARIS France



HORIZON
2020

HyCARE

Project ID: 826352 **Funded**

under:

[H2020-EU.3.3.8.2. - Increase the energy efficiency of production of hydrogen mainly from water electrolysis and renewable sources while reducing operating and capital costs, so that the combined system of the hydrogen production and the conversion using the fuel cell system can compete with the alternatives for electricity production available on the market](#)

An innovative approach for renewable energy storage by a combination of hydrogen carriers and heat storage

From 2019-01-01 to 2021-12-31, ongoing project

Project details

Total cost: EUR 1 999 230	Topic(s): <u>FCH-02-5-2018 - Hydrogen carriers for stationary storage of excess renewable energy</u>
EU contribution: EUR 1 999 230	Call for proposal: H2020-JTI-FCH-2018-1 <u>See other projects for this call</u>
Coordinated in: Italy	Funding scheme: FCH2-RIA - Research and Innovation action

Objective

The main objective of the HyCARE project is the development of a prototype hydrogen storage tank with use of a solid-state hydrogen carrier on large scale. The tank will be based on an innovative concept, joining hydrogen and heat storage, in order to improve energy efficiency of the whole system. The developed tank will be installed in the site of ENGIE LAB CRIGEN, which is a research and operational expertise center dedicated to gas, new energy sources and emerging technologies. The center and its 350 staff are located at Plaine Saint-Denis and Alfortville in the Paris Region (F). In particular, the solid-state hydrogen tank will be installed in a Living Lab aimed to develop and explore innovative energy storage solutions. The developed tank will be joined with a PEM electrolyzer as hydrogen provider and a PEM fuel cell as hydrogen user. The following goals are planned in HyCARE:

- High quantity of stored hydrogen ≥ 50 kg
- Low pressure < 50 bar and low temperature $< 100^\circ\text{C}$
- Low foot print, comparable to liquid hydrogen storage
- Innovative design
- Hydrogen storage coupled with thermal energy storage
- Improved energy efficiency
- Integration with an electrolyser (EL) and a fuel cell (FC)
- Demonstration in real application
- Improved safety
- Techno-economical evaluation of the innovative solution
- Analysis of the environmental impact via Life Cycle Analysis (LCA)
- Exploitation of possible industrial applications

Coordinator

UNIVERSITA DEGLI STUDI DI TORINO Italy

EU contribution: EUR 271 800



HORIZON
2020

PARACAT

Project ID: 813209

Funded under: [H2020-EU.1.3.1. - Fostering new skills by means of excellent initial training of researchers](#)

Paramagnetic Species in Catalysis Research. A Unified Approach Towards Heterogeneous, Homogeneous and Enzyme Catalysis

From 2019-01-01 to 2022-12-31, ongoing project

Project details

Total cost: EUR 2 649 371,04	Topic(s): MSCA-ITN-2018 - Innovative Training Networks
EU contribution: EUR 2 649 371,04	Call for proposal: H2020-MSCA-ITN-2018 See other projects for this call
Coordinated in: Italy	Funding scheme: MSCA-ITN-EJD - European Joint Doctorates

Objective

PARACAT aims at educating a group of young researchers to implement methods for cutting edge research in the field of catalysis, comprehensively exploring for the first time the role of open-shell species, an innovative area at the intersections between chemistry, physics and biology. The programme puts strong emphasis on ethics and social reflections by combining the scientific expertise of (bio)chemists, (bio)physicists and industrial partners with the input of an ethicist to form a new generation of scientists capable to take up appropriate societal responsibilities as experts in their field. PARACAT is set up by a consortium formed by 5 academic beneficiaries flanked by 1 research institute, 3 industrial organizations and 2 academic institutions as partners, collaborating in the research and training activities to offer 10 early-stage-researchers the possibility of being awarded with double doctoral degrees in two different European countries. The overall PARACAT programme will address the role of paramagnetism in catalysis with a focus on a knowledge-based bottom-up approach, integrating homogeneous, heterogeneous and bio-catalysis with the objective of 1) designing new catalysts based on earth abundant and safe elements; 2) discovery of new and more sustainable reaction pathways for the activation of small molecules and selective oxidations by learning from nature; 3) enabling new routes for polymerization and de-polymerization reactions. The training programme overcomes barriers between traditional disciplines providing top level tuition on topics spanning from advanced spectroscopic methods, synthesis and property characterization, to quantum chemical modelling, and on a full set of complementary skills. The goal is therefore to build a chain of knowledge whereby fundamental understanding is translated into practical applications by the synergistic interaction between academic and industrial partners, in an ethical and social dimension.

Coordinator

UNIVERSITA DEGLI STUDI DI TORINO

Italy

VIA GIUSEPPE VERDI 8

EU contribution: EUR 522999,36

10124 TORINO

Italy



HORIZON
2020

BE-ARCHAEO

Project ID: 823826

Funded under: [H2020-EU.1.3.3. - Stimulating innovation by means of cross-fertilisation of knowledge](#)

BEyond ARCHAEOlogy: an advanced approach linking East to West through science, field archaeology, interactive museum experiences

From 2019-02-01 **to** 2023-01-31, ongoing project

Project details

<p>Total cost: EUR</p> <p>823 400</p> <p>EU contribution:</p> <p>EUR 708 400</p> <p>Coordinated in:</p> <p>Italy</p>	<p>Topic(s):</p> <p>MSCA-RISE-2018 - Research and Innovation Staff Exchange</p> <p>Call for proposal:</p> <p>H2020-MSCA-RISE-2018 See other projects for this call</p> <p>Funding scheme:</p> <p>MSCA-RISE - Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE)</p>
---	--

Objective

Although approaches combining archaeology and archaeometry in the investigation of past records are presently well established, recent technological advances, especially the new IT tools, push for a general update of the consolidated procedures. Researchers and professionals need to develop expertise and skills under new perspectives, to enable a new trans-disciplinary storytelling from the archaeological site to the museum display.

BE-ARCHAEO launches a trans-disciplinary approach in the investigation of past social experience registered at archaeological sites, where the involvement of IT experts within an on-the-field interplay between archaeologists and an exhaustive set of interlinked archaeometry experts will enable R&I and will expose the involved individuals to a truly interdisciplinary and transsectoral environment, thus improving their career perspectives significantly.

The participants, belonging to various domains of archaeology, archaeometry, museology and IT, will commit skills and instruments to the project for performing cutting-edge scientific investigations and for developing the most capturing interactive museum experiences. The Japanese partners will give the opportunity of developing the BE-ARCHAEO approach in a new area of archaeological excavation and will give access to their archaeological collections for investigations and analysis. Bidirectional knowledge transfer among the participants - set up on the tailored Japanese case-study - will lead to the development of cultural heritage professionals with a trans-disciplinary vision of the archaeological records; new procedures for integrated archaeology and archaeometry; new IT tools for storing/retrieving interdisciplinary data and for communicating to the general public the new knowledge stemming by combining archaeology and science.

Intersectoral interactions and connections with the stakeholders will keep the research tightly linked to the needs of the final users.

Coordinator

UNIVERSITA DEGLI STUDI DI TORINO
VIA GIUSEPPE VERDI 8

Italy

EU contribution: EUR 276 000



ACO

Project ID: 811312

Funded under: [H2020-EU.1.3.1. - Fostering new skills by means of excellent initial training of researchers](#)

AstroChemical Origins

From 2019-05-01 to 2023-04-30, ongoing project

Project details

<p>Total cost: EUR 4 138 452,54</p> <p>EU contribution: EUR 4 138 452,54</p> <p>Coordinated in: France</p>	<p>Topic(s): MSCA-ITN-2018 - Innovative Training Networks</p> <p>Call for proposal: H2020-MSCA-ITN-2018 See other projects for this call</p> <p>Funding scheme: MSCA-ITN-ETN - European Training Networks</p>
---	---

Objective

The project ACO (AstroChemical Origins) has two main objectives:

- 1) to unveil the early history of the Solar System, using the chemical composition of today forming Solar-like planetary systems and comparing it with that of the Solar System primitive bodies;
- 2) to train a new generation of researchers able to tackle this highly interdisciplinary problem, providing them with a wide range of transferable skills, including the ability to communicate Science to a large audience.

This will be obtained by setting up:

- (a) a coordinated network of PhD research projects which will be carried out by 17 ESRs under the supervision of members of the ACO Beneficiaries;
- (b) a structured secondment network, to expose ESRs to alternative research environments;
- (c) a significant exposure of ESRs to the non-academic sector, via PhD co-supervision, secondment, short visits and training from non-academic ACO Beneficiaries and Partners;
- (d) specific courses at the host institutions as well as network schools with specialized interdisciplinary and transferable skills courses;
- (e) international conferences open to the scientific community;
- (f) several activities to make ACO network and its science known to the general public.

In order to achieve the ACO objectives, the proposed network is constituted by fourteen Beneficiaries, whose four from the non-academic sector, plus seven Partner Organisations, whose six from the non-academic sector.

Each Participating Organization will provide a complementary expertise indispensable to achieve of the ACO objectives:

- (i) instrumental, observational, theoretical, computational, modeling, and experimental to reach the scientific goal and,
- (ii) on informatics, scientific presentation and management, for completing the wide-transferable training.

Coordinator

UNIVERSITE GRENOBLE ALPES

France

621, AVENUE CENTRALE

EU contribution: EUR 549

38401 SAINT MARTIN D'HERES

604,08

France