PARTNER PRESENTATION AND INTEREST IN HORIZON EUROPE PARTICIPATION

Name of the organisation	NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT OF ISOTOPIC AND MOLECULAR TECHNOLOGIES - ITIM
Country	Romania
Type of organisation	NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT
Short description	With more than 70 years of tradition in research, ITIM is nowadays involved in a wide area of micro- and nanotehnologies. The main focus of our developements is on graphenes, nano/micro-porous materials, magnetic micro/nanogels, thin films, micro/nano-patterned surfaces, magnetic / semiconducting nanoparticles and clusters, novel polymers / copolymers and micro/nanocompozites based on them, or hybride nanosystems built on such platforms. The envisaged major practical applicability domains are: environement protection / depolution, health – including nanomedicine, energy and combating climate changes, nanoelectronics, safety and security, information and communication technology.
Laboratory/ Department	***Porous Materials and Carbon Nanostructure Research Group*** / Mass Spectrometry, Chromatography and Applied Physics Department (http://en.itim-cj.ro/research/research-teams/porous-materials-and-carbon-nanostructures/)
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Short description of Research Group involved

The *Porous materials and Carbon Nanostructures* team is involved in developing ***new materials*** with controlled nanostructure (shape, size, porosity) and their application in ***catalytic processes*** (thermo-, photo- and electro-catalysis). The targeted areas are of high interest in EU research & innovation strategy being all related to ***green energy*** and ***environment*** topics: ***hydrogen energy*** (hydrogen production and chemical storage), ***CO_2 abatement*** (CO_2 transformation in value added compounds), ***water treatment*** (organic pollutants photodegradation).

The group members have complementary qualifications (chemists, chemical engineers, physicists, technician) needed to perform the research activities of the whole chain of materials preparation, characterization, testing, developing laboratory scale methods and technologies.

Expertise.

The new materials and composites of interest for our group are:

(i) ***oxides with controlled porosity*** and their composites with metal nanoparticles (ordered mesoporous silica, mesoporous alumina, nanostructured titania);
(ii) ***metal organic frameworks (MOF)*** and MOF composites (MOF derived oxides, MOF-oxides-metal nanoparticles);
(iii) ***graphene oxide (GO)*** and ***reduced graphene oxide (rGO***);
(iv) ***3-D carbon nanostructures*** (ordered mesoporous carbon, 3-D graphene).

The group members have access to the most actual characterization techniques and equipment and also the necessary expertise to apply these methods to our materials. All the developed materials are ***fully characterized***: structural (XRD for composition and crystallinity, surface area and porosity, SEM/TEM for morphology, XPS for surface characterization, TGA for thermal stability) and functional characterization (reduction/oxidation of the surface, catalytic active centers).

The most important catalytic applications developed in our group are:

(i) ***CO_2 methanation*** for producing synthetic methane at laboratory scale through the reaction of CO_2 and H_2 catalyzed by Ni-MOF-oxides and Ni-SiO_2 catalysts
(ii) ***H_2 chemical storage*** in the cycle involving formic acid as liquid carrier catalyzed by Au(Pd)-rGO materials
(iii) ***Biogas*** transformation ***in syngas*** by combined H_2O and CO_2 reforming of methane catalyzed by Ni-oxide-Al_2O_3 with controlled porosity
(iv) ***Emerging contaminants photodegradation*** from water (e.g. ciprofloxacin, amoxicillin) catalyzed by metal (Au, Pt, Ni, Cu)-TiO_2-rGO materials

Involved persons. Short CV

Dr. Mihaela Diana Lazar (http://en.itim-cj.ro/portfolio/lazar-mihaela-diana/) received B.Sc. and Ph.D. degrees in chemistry from Babes-Bolyai University of Cluj Napoca. She is currently Senior Researcher at National Institute for Research and Development of Isotopic and Molecular Technologies – ITIM Cluj Napoca and leader of Porous Materials and Carbon Nanostructures research group. Her research interests are: environmental catalysis (CO_2 methanation, biogas valorization), green energy (hydrogen production and storage) and new materials for catalysis. She was the coordinator (PI) of 6 research projects obtained in national competitions and 2 in international ones. The results of Dr. Lazar research activity were published in 69 papers in ISI journals and 7 papers in ISI indexed proceedings (h index = 20). The results with practical applicability were protected by 5 national patents and 1 patent application. She received the Nicolae Teclu Prize of the Romanian Academy for the group of papers "heterogeneous catalysis for hydrogen energy: production and chemical storage" published in 2019. Dr. Lazar is the vice-president of the Romanian Catalysis Society and member of the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU), Chemistry Commission.

Dr. Maria Mihet (http://en.itim-cj.ro/portfolio/mihet-maria/) received Ph.D, M.Sc. and B.Sc. in Chemical Engineering from Babes-Bolyai University in Cluj-Napoca. She is currently Senior Researcher at the National Institute for Research and Development of Isotopic and Molecular Technologies – ITIM Cluj-Napoca and member of the *Porous Materials and Carbon Nanostructures research group*. Her research interests are: heterogeneous catalytic processes involving CO_2 and/or H_2; Hydrogen – production, chemical storage and utilization; metal-organic frameworks in catalysis; modeling and simulation of chemical processes; design of experiments (DoE). She was the coordinator (PI) of 2 research projects obtained in national competitions, while being member in the research teams of more than 15 projects (2 international ones). The research results of Dr. Mihet were published in over

30 papers in ISI journals (h index = 12), while results with practical applicability were protected by 1 national patent and 1 patent application.

Dr. Crina Socaci obtained her Ph.D. degree in 2004 at Babes Bolyai University in the field of organic chemistry. She has 57 publications with a Hirsch index of 19 and 936 citations (without self-citation, Web of Science). She received the Nicolae Teclu Prize (collectively) of the Romanian Academy 2016: *Graphene derivatives with catalytic and electrocatalytic properties*. She has been a *principal investigator for two national research projects* (PN II ID-2358 (2009-2011) and PNII-RU-TE-2014-4-0305 (2015-2017)), principal investigator for one international project funded by *the Norwegian Financial Mechanism 2014 -2021, under Project RO-NO-0616* and project responsible from INCDTIM (22.000 Euro) in an ATTRACT Third Party Project, funded by the European Union's Horizon 2020 Program. At the moment, her research interest includes the preparation, further functionalization and structural and functional characterization of graphene-based materials alone, or in combination with nanostructured titania for environmental applications – removal of emerging contaminants from water systems.

If you are interested in a particular call, please indicate the Reference of the call/ Topic of interest. Potential contribution.

Have you already participated in an EU funded project? If so, provide some references.

ATTRACT Third Party Project (funded by the European Union's Horizon 2020 Programme) - Carbon quantum dots/graphene hybrids with broad photoresponsivity – BANDPASS (2019-2020)