



Chairs@UPPA

2021



Nine years ago, UPPA launched a distinctive initiative with the creation of research and education chairs. Several aims were pursued:

- to invest into significant scientific projects in accordance with the strategy of the university
- to create a task force dedicated to these specific research objectives
- to tighten the relationships with private and public partners, placing them within a five-years horizon instead of the traditional three-years partnership format
- to provide an increased visibility, thereby promoting the outreach of upcoming results and strengthening our international network.

Over the 2011-2017 period, five senior chairs have been created, sponsored by private partners and local authorities, in the fields of engineering, management and cultural policy.

With E2S UPPA, this framework has been significantly expanded. New chair formats have been launched, in addition to the existing format directed at established researchers: junior chairs for young promising researchers and part time international chairs hosting researchers with a very high international visibility have been created. The objective is to drastically increase the scientific power of E2S UPPA and, at the same time, to embed – at the very starting point of the chair – research and education as the scientific team build up around a chair should also have educational responsibilities within the flagship programmes of E2S UPPA.

This leaflet gathers the chairs that are active as of the end of 2021. In addition to the five already existing ones, since the beginning of E2S UPPA thirteen junior chairs, ten senior chairs and six international chairs have been created. Seventeen new faculty members have been hired.

Over 70 doctoral fellowship and more than 100 one-year post-doctoral fellowships have been, or will be, offered in the coming years within these chairs, covering a wide variety of scientific topics in line with the ambitions and missions of E2S UPPA.

This unprecedented effort was made possible due to a wide participation of private and public partners. Their decisive input is acknowledged in the description of each specific chair.

Each project results from the convergence between scientific issues, stakeholders' needs and above all the interest in the mutualisation of concerns and efforts. Our experience shows that it has been beneficial to everyone.

The Energy Environment Solutions (E2S) I-SITE project gathers a consortium composed of the Université de Pau et des Pays de l'Adour (UPPA), a multidisciplinary university, two national research organisations, INRAE (French National Institute for Agricultural Research) and Inria (French national research institute for the digital sciences), and recently the CNRS (French National Centre for Scientific Research). **This partnership is referred to as « Academic and Institutional Consortium » in this document.**

28 Chairs

11 Junior Chair

11 Senior Chair with partnerships

6 International Guest Chair

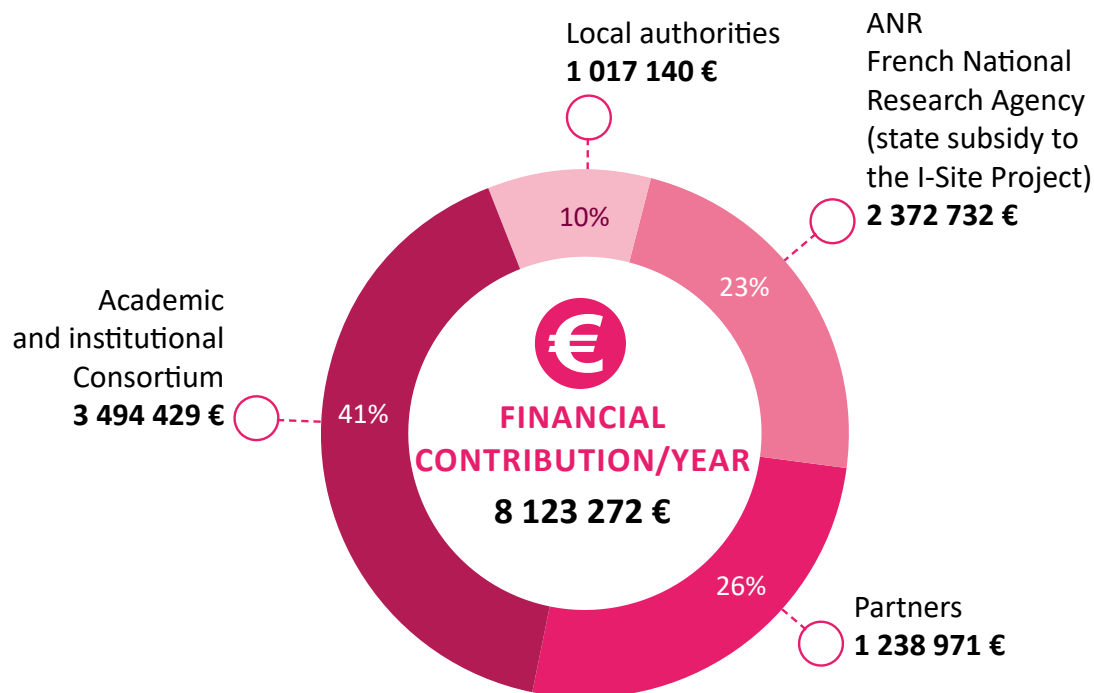


TEAMS

Permanent employees : **70**

PhD : **59**

Post doctorate : **107**



DISCIPLINES (ERC Panels)

PHYSICAL SCIENCES AND ENGINEERING

| | | |
|------------|----------|---|
| PE1 | 1 chair | Mathematical foundations |
| PE3 | 1 chairs | Condensed Matter Physics |
| PE4 | 3 chairs | Physical and analytical chemical sciences |
| PE5 | 5 chairs | Materials and synthesis |
| PE6 | 1 chair | Computer science and informatics |
| PE7 | 3 chairs | Systems and communication engineering |
| PE8 | 4 chairs | Products and processes engineering |
| PE10 | 2 chairs | Earth system science |
| PE8 / PE10 | 2 chairs | Products and processes engineering / Earth system science |

SOCIAL SCIENCES AND HUMANITIES

| | | |
|-----|----------|--|
| SH2 | 3 chairs | Institutions, values and beliefs and behaviour |
|-----|----------|--|

LIFE SCIENCES

| | | |
|----------|---------|--|
| LS3 | 1 chair | Cellular and Developmental Biology |
| LS8/PE10 | 1 chair | Ecology, Evolution and Environmental Biology |
| LS9 | 1 chair | Applied Life Sciences, Biotechnology, and Molecular and Biosystems Engineering |

Summary

JUNIOR CHAIR

| | | |
|---|--------------------|----------|
| ◊ Amino acid metabolism in rainbow trout | Florian Beaumatin | P. 10-11 |
| ◊ DiStuRB - Structural Diagenesis of carbonates | Nicolas Beaudouin | P. 12-13 |
| ◊ AWESOME - Manufacturing of new generation sustainable and thermoplastic composites | Anaïs Barasinski | P. 14-15 |
| ◊ BOIS - Biobased materials | Eduardo Robles | P. 16-17 |
| ◊ S2P2 - Solid State Pulsed Power S2P2 | Anton Gusev | P. 18 |
| ◊ THERMapp - Transferring Heat Energy from Rock Matrix: assessing, partitioning, predicting | Lucas Pimienta | P. 19 |
| ◊ DYEY - Dynamics of energy vulnerability | Lise Desvallées | P. 20 |
| ◊ HYDE - Impact of hydrogen storage (pure or mixed) on deep aquifers | Salaheddine Chabab | P. 21 |
| ◊ Manta Zym: Marine materials: Biochemistry / Enzymology | Yi Zhang | P. 22 |
| ◊ ConstrucTerr' - Design and use of low carbon footprint materials for sustainable construction | Fionn McGregor | P. 23 |
| ◊ Roads and Sustainable Infrastructures | Rudy Bui | P. 24 |

SENIOR CHAIR

| | | |
|---|--------------------------|----------|
| ◊ CO2ES - CO ₂ Enhanced Storage | Fabrizio Croccolo | P. 26-27 |
| ◊ TEEN - Territories in energy and environmental transitions | Xavier Arnould de Sartre | P. 28-29 |
| ◊ MANTA - Marine Materials Development of bio-inspired and sustainable (bio) materials to lower the marine environmental impact | Susana Fernandes | P. 30-31 |
| ◊ HPC-Waves - High Performance Computing of Waves | Volker Roeber | P. 32-33 |
| ◊ OpenCEMS - Distributed Energy System Data Management | Richard Chbeir | P. 34-35 |
| ◊ ECOTOX - Ecotoxicology of chemical contaminants in inland waters in the context of global change | Séverine Le Faucheur | P. 36-37 |
| ◊ MOVE - Mobility evolution towards sustainable | Louis de fontenelle | P. 38-39 |
| ◊ Architecture and urban physics | Benoît Beckers | P. 40 |
| ◊ EFICIENCE - Function and innovative material integration, diagnostic of health state for Power Electronics' modules | Paul-Étienne Vidal | P. 41 |
| ◊ ORHYON - Micro-Organisms and Reactivity of Hydrogen in underground | Anthony Ranchou-Peyruse | P. 42 |
| ◊ ORIGAMI - Origin of gas and migration | Anne Battani | P. 43 |

INTERNATIONAL GUEST CHAIR

| | | |
|--|------------------|----------|
| Mathematics and statistics | Kerrie Mengersen | P. 46-47 |
| PULPA - Pulsed Power Science Technology and Applications | Bucur Novac | P. 48-49 |
| Developing New Energy Conversion Platforms using Boron-Nitrogen Heterocycles | Shih-Yuan Liu | P. 50-51 |
| InterMat - Interface Matters in Solution Processed Inorganic/ Organic Thin Film Solar Cells for Bio-inspired Solar Fuels Generation | Emilio Palomares | P. 52-53 |
| Untargeted Molecular-level Analysis of Complex Systems: An opportunity to learn from sample complexity | Ryan Rodgers | P. 54-55 |
| Accelerated Development of Alloy Materials for Energy Technologies | Andrew Gellman | P. 56-57 |



Junior Chairs

Junior chairs are directed towards young promising researchers, typically with a research experience of 1-4 years after their Ph.D. The call for applicants is opened and widely publicised internationally.

These chairs can be jointly financed by one (or more) community(ies) and / or one (or more) private partner(s). In this case, the scientific project is set up in concert with the various partners to address their issues of interest.

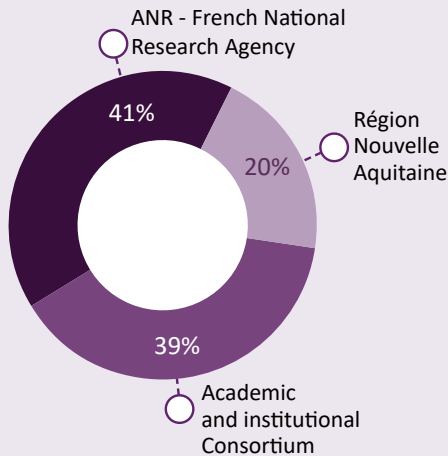
Recipients are offered a five-year tenure track position and a starting package with a doctoral fellowship, five one-year post-doctoral fellowships and support for direct costs.

Chair holders are expected to reach a level allowing them to successfully apply to ERC starting grant.



Amino acid metabolism in rainbow trout

€ FINANCIAL CONTRIBUTION/YEAR



📅 KEY DATES

- Chair kick-off: April 2018
- Duration: 5 years

👥 TEAM COMPOSITION

- Permanent employees: 2
- PhD: 1
- Post-doctoral fellows: 5

📍 LOCALISATION: Saint Pée sur Nivelle

- Joint research unit UPPA/INRAE - Nutrition, metabolism and aquaculture (MIRA - NuMéA)

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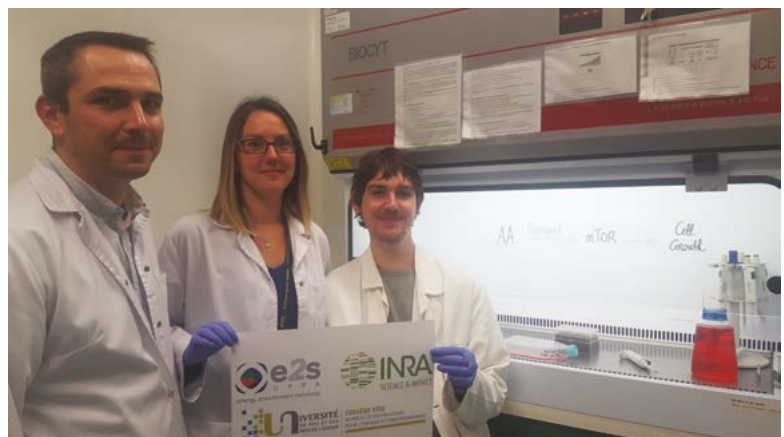


Florian BEAUMATIN

During my thesis, I studied autophagy, a cell survival process stimulated by starvation. During my post-doctoral contract I studied how cells detect the presence of nutrients through the activation of a key enzyme called mTOR, also known to regulate autophagy.

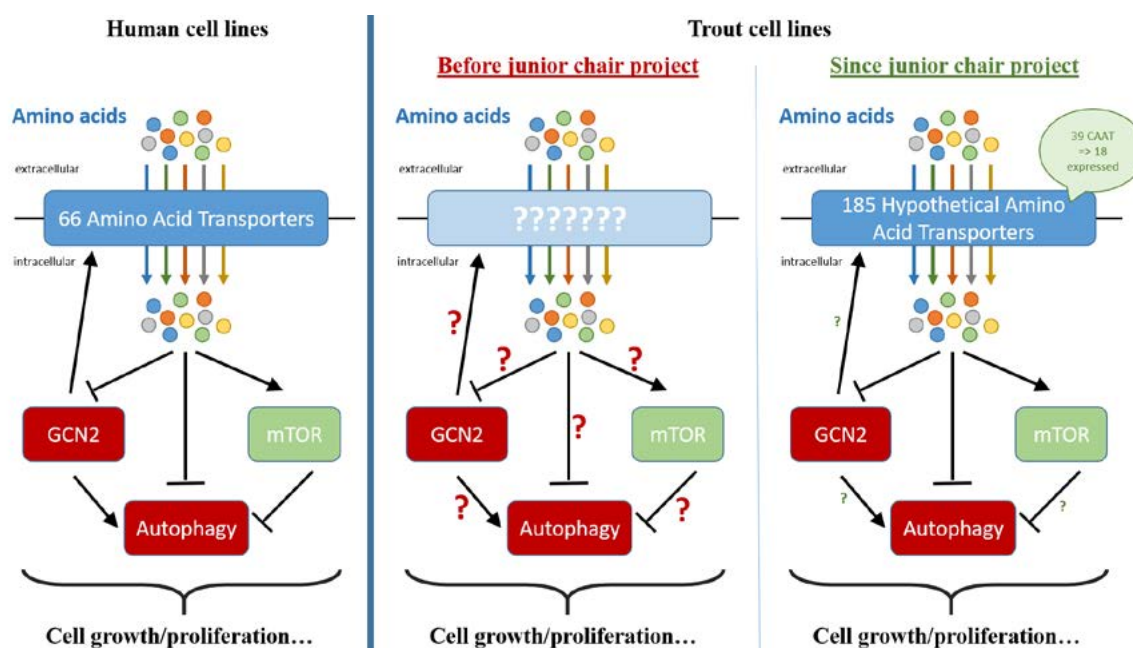
🔍 PRESENTATION

The expansion of aquaculture, in combination with limited availability and high prices of fishmeal, has prompted feed producers to include more plant proteins in the aquaculture feeds. However, replacement of fishmeal with plant proteins is often limited by the level of some amino acids (AA) in the alternative plant protein sources. While supplementation of agricultural crop sources with synthetic AA have been shown to optimize the nutritional value of those diets, this strategy only allows a partial rescue of fish growth. Based on previous results, we hypothesize that 1) supplemented AA are not efficiently absorbed by fish and 2) the regulators of a key protein complex, called mTORC1, show differences, compared to mammals, that could affect its activation by AA. Therefore, through the study of AA transporters and mTOR regulators in trout, this pioneer project aims to elucidate the molecular mechanisms responsible for this growth retardation as well as to formulate new diets that suit trout growth and the use of plant-based diets.





Summary scheme of junior chair project achievements



ACHIEVEMENTS

- Cell lines have long been used in research to determine the molecular mechanisms regulated by amino acids (AA). Thus, in humans, more than 66 AA transporters (AAT) have been identified and studied, in particular for their ability to regulate catabolic (GCN2, Autophagy...) and anabolic (mTOR...) pathways related to cell growth and proliferation. Surprisingly, despite their availabilities, trout cell lines have never been used to answer nutritional questions in the field of aquaculture. Since the beginning of this Chair, we identified 185 genes encoding AAT genes in trout genome that we began to study for their expressions and regulations, with a particular focus on cationic AAT. In addition, our studies allowed us to highlight the AA regulation of the GCN2, autophagy and mTOR pathways in rainbow trout cell lines. So far, our results not only validate the use of trout cell lines as a model for studying AA metabolic pathways, but they also open up a new molecular and cellular research theme to address issues specifically related to trout nutrition in aquaculture.
- Results obtained so far allowed us to receive the financial supports from INRAE, from the European program Aquaexcel3 (Horizon Europe), the Evonik company and from the ANR, through the "JCJC grant".



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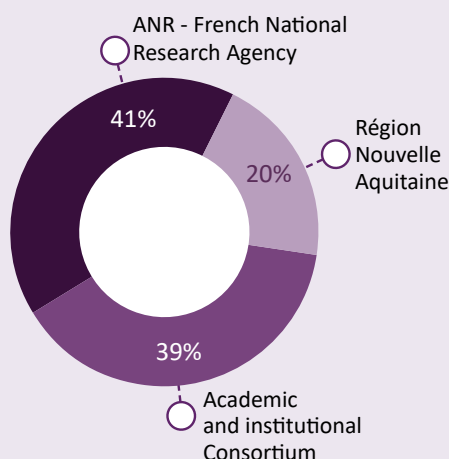
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DiStuRB

Structural diagenesis of carbonates

€ FINANCIAL CONTRIBUTION/YEAR



🏰 KEY DATES

- Chair kick-off: April 2018
- Duration: 5 years

👥 TEAM COMPOSITION

- Permanent employees: 4
- PhD: 1
- Post-doctoral fellows: 5

📍 LOCALISATION: Pau

- Joint research unit UPPA/TotalEnergies/CNRS - Laboratory for complex fluids and their reservoirs (IPRA - LFCR)

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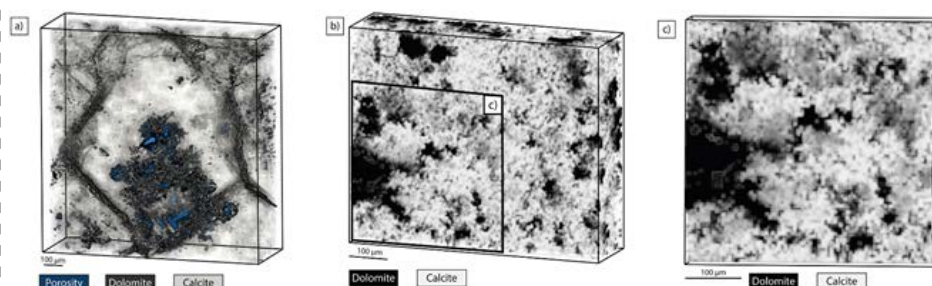


**Nicolas
BEAUDOUIN**

I am a geologist specialized in brittle deformation and fluid-rock interactions in sedimentary rocks. Following on a PhD (Université Paris VI), I joined the University of Glasgow over a 5-years period, at first in the EU project FlowTrans, then in a national project.

🔍 PRESENTATION

Energy transition from fossil resources to clean ones requires to optimize existing resources, and to enhance the process of storage and cycling. Such progress involves a better understanding of how reservoir rock evolves. This chair revolves around developing quantitative tools for processes that impact petrophysical and chemical properties of carbonates during or after it deforms. By confronting laboratory experiments to natural cases observation, we study the patterns that appear to be linked to carbonate transformation, whether chemical (replacement) or mechanical (fracture, pressure-solution). The goal is to better understand the complex feedbacks between deformation under stress and fluid-mediated chemical transformation in carbonates.



3D view by Xray microtomography of how a rock transforms under hydrothermal condition in nature: a) dolomitization of a calcite crystal assemblage, with dolomite (in black) replacing calcite (in grey) from the borders of each crystals, developing porosity (in blue) to allow fluid to migrate and to replace the core of the host crystal. b) more advanced stage of the transformation, where dolomite tree-like channels (in black) develops from already replaced rock and then isolates small grains of calcite (zoom on c).



ACHIEVEMENTS

- Use of U-Pb datation method to refine fold-related fracture history and timing of deformation in several examples.
- Validation in a number of natural case of the only proxy for assessing burial history of sedimentary reservoirs free from assumption on thermal history.
- Co-organization of scientific sessions at the EGU General Assembly 2018 and 2019 (Vienna)
- Nominated associate editor for Journal of Marine and Petroleum Geology
- Private and public funding increased the size of the team, adding one post doctoral researcher and 2 PhD students.



BIBLIOGRAPHY

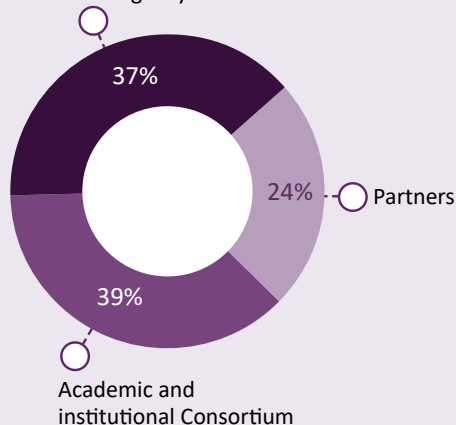
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AWESOME - Manufacturing of new generation sustainable and thermoplastic composites

FINANCIAL CONTRIBUTION/YEAR

ANR - French National Research Agency



PARTNERS

- Arkema - Arkema Innovative Chemistry
- Canoe - Centre Technologique Aquitain des Matériaux Avancés et des Composites



KEY DATES

- Chair kick-off: September 2019
- Duration : 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 1
- Post-doctoral fellows: 5



LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



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Anaïs BARASINSKI

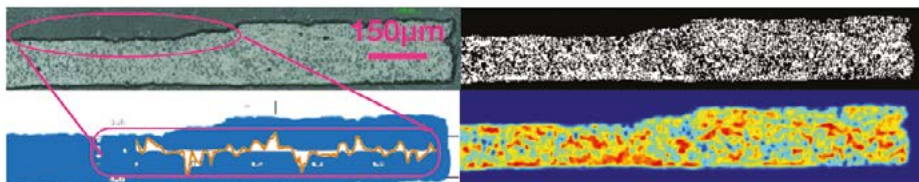
Expert in advanced manufacturing for composite materials, Anaïs Barasinski received her PhD in 2012 from Ecole Centrale Nantes. She graduated in 2007 from Ecole Normale Supérieure de Cachan, where she was laureate of a French Agregation in Mechanical Engineering. Her main area of interest are composite materials, multi-scaled physics, surfaces, modelling, advanced simulation and dialogue between models and experiments.



PRESENTATION

The development of thermoplastic composite materials and their processing is an environmental challenge for the years to come. Indeed, they offer an incredible ratio of mechanical performance to density. Moreover, they can very easily be endowed with particular properties, multiple functionalities, and even gradient properties in a wide range of areas. Finally, they are potentially recyclable which makes them suitable candidates for the future in the fields of energy and mobility.

This Chair offers a unique framework by bringing together quality partners with broad and varied skills in regard to the multi-disciplinary approaches required. Each partner is equipped with innovative and complementary technological platforms and characterizations techniques, going from the matter at its molecular scale, to the constraints of high production rates. The activities of the Chair are based on modelling, engineering, simulation and data analysis, to face an advanced and smart applications that focuses on better exploiting the possibilities offered by composite materials and, in this sense, breaking with what is currently being produced.



Analyses d'images sur matériau pré-imprégné - Image analysis on prepreg material



ACHIEVEMENTS

- During this 1st year, one research engineer (Alaa K) has joined the team, and a PhD (Rebecca B) started recently.
- First tentative thermoplastic composites tanks were made by tape winding by the Arkema / CANOE team at the Lacq platform.
- Image Analysis Tool were set up for Pre-impregnated Tapes Characterization.
- A special Issue of the *International Journal of Material Forming* with topic: "Process Modeling and their Effects of manufacturing on the mechanical performance of composites" has been co-edited. <https://rdcu.be/cebfn>
- A Mini-Symposia has been organized at WCCM-ECCOMAS2020 : <https://virtual.wccm-eccomas2020.org>
- In Nov 20, Anaïs Barasinski has successfully defended her HDR* entitled "A short journey around surfaces and interfaces and some of their consequences in the everyday composites forming process life" .



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* HDR is a French accreditation / degree required for researchers to be entitled to supervise - alone - PhD research and to run for positions of full professors in universities.



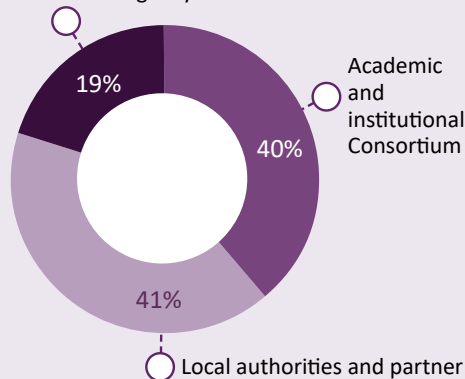
BOIS

Biobased materials



FINANCIAL CONTRIBUTION/YEAR

ANR - French National Research Agency



PARTNERS

- CD 40 - Conseil départemental des Landes



KEY DATES

- Chair kick-off: October 2019
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 1
- Post-doctoral fellows: 5



LOCALISATION: Mont-de-Marsan

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



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Eduardo ROBLES

With a previous formation as a Mechanical Engineer, Eduardo Robles got a Ph.D. at the University of the Basque Country UVP/EHU in Renewable Materials Engineering. He focuses his research on clean-transformation of biomass and coproducts of the agroindustry.

He obtained the Cum Laude and International Doctorate mentions, as well as the extraordinary doctorate prize from UPV/EHU. He has published over 20 scientific articles and book chapters and has presented his work in over 30 international conferences.



PRESENTATION

These days, the need for new eco-friendly materials and processes for the industry is more than ever of actuality. The main goal of the Chaire Bois is the valorization of the biomass and coproducts of the industry of the Landes region, especially the forest and the agricultural sector.

This valorization will help the industry to minimize the undervalued coproducts by offering them new applications, introducing new transformation processes with green chemistry methods, and moving forward to a green economy.





ACHIEVEMENTS

- During the first year, the Chair got funded projects at departmental level (CD40, thesis on bio-based resins), and regional (RNA, thesis on bio-based adhesives): It also has obtained international partnerships (two PHC selected and a cross-border project with the UPV/EHU). The Chair has also consolidated industrial links with major players in its field (Api'Up, upcycling; ApplicEtains, patines; Labadie, sawmill).
- The Chair team currently consists of two permanent staff, the Chair laureate and a postdoctoral fellow as well as four doctoral students: two in co-supervision (IPREM, France), one in French full supervision (IPREM, France) and one in co-supervision at the University of the Basque Country UPV/EHU (additional external fundings obtained over the last year).



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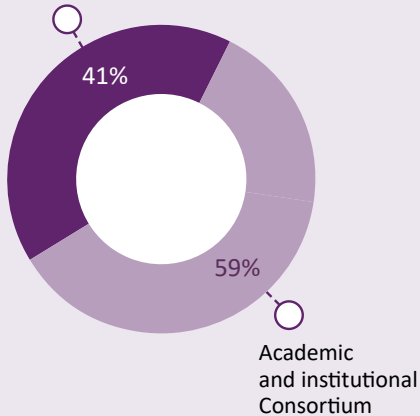
S2P2

Solid State Pulsed Power



FINANCIAL CONTRIBUTION/YEAR

ANR - French National Research Agency



KEY DATES

- Chair kick-off: November 2020
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 1
- Post-doctoral fellows: 5



LOCALISATION: Pau

- UPPA's research unit - Laboratory for applied sciences in mechanics and electrical engineering (IPRA - SIAME)



LEADER

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Anton Gusev

Anton Gusev obtained his PhD in 2019, from the Institute of Electrophysics (Russia), where he had been staying since 2008. He then continued his career as a postdoc at the University of Pau (France). After 10 years of experience in semiconductor pulsed power domain, he has many prestigious international awards.

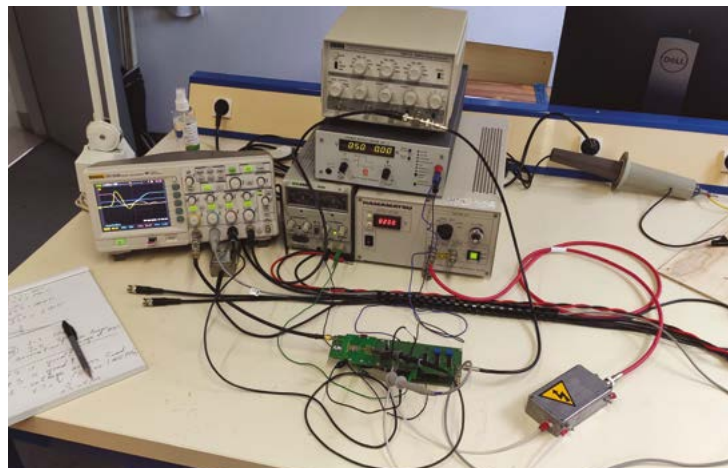


PRESENTATION

Pulsed power generator (PPG) produces the high-power electromagnetic pulses by a slow accumulation of energy, following by a rapid release. A typical pulse duration lies in the nanosecond range. Due to the extremely high peak power, PPGs are widely used in various scientific research.

PPGs based on the gas-filled switches have low average power and short lifetime. Recent advances in semiconductor physics bring new solid-state devices, which makes PPGs more compact and reliable. With the increase in lifetime and average power, PPGs become more and more attractive for industrial applications.

The Solid State Pulsed Power (S2P2) chair makes research on semiconductor switches suitable for PPGs. The focus is on impact-ionization devices, semiconductor opening switches and wide band gap semiconductors such as GaAs. A fundamental study of semiconductor physics is conducted in collaboration with international research centres, whereas industrial partners support applied research.

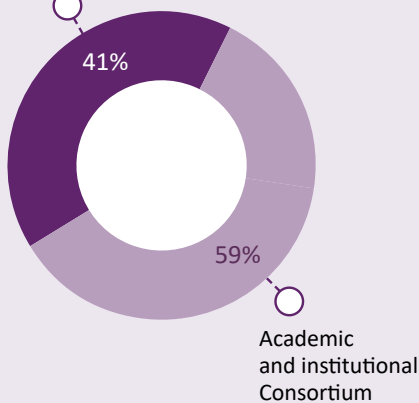




THERMapp - Transferring Heat Energy from Rock Matrix : assessing, partitioning, predicting

FINANCIAL CONTRIBUTION/YEAR

ANR - French National Research Agency



KEY DATES

- Chair kick-off: November 2020
- Duration: 5 years

TEAM COMPOSITION

- Permanent employees: 2
- PhD: 1
- Post-doctoral fellows: 5

LOCALISATION: Pau

- Joint research unit UPPA/TOTAL/CNRS - Laboratory for complex fluids and their reservoirs (IPRA - LFCR)

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Lucas Pimienta

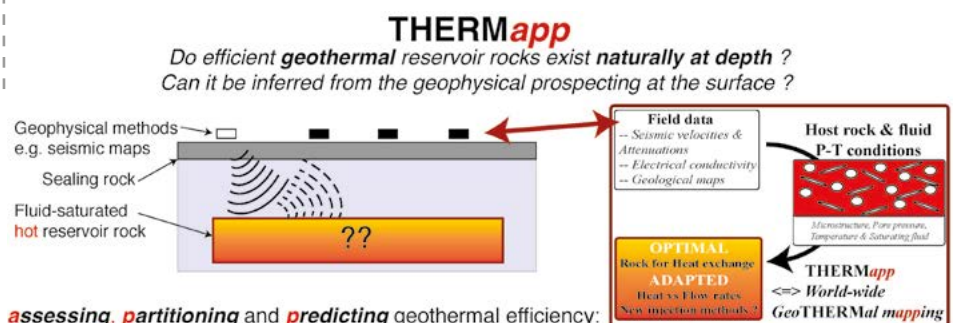
I obtained an Eng.D. from EOST (Strasbourg) and a Ph.D. from ENS (Paris) in geophysics. I specialise on the understanding of rocks physical properties, with a particular interest toward geo-engineering applications such as geothermal energy or CO₂ geological storage.

PRESENTATION

Under the assumption that there are only few natural geothermal systems perfect for power-plants installations, many developments for efficient geothermal energy involve creating in deep hot crustal rocks fracture networks for enhanced fluid flow: the Enhanced Geothermal Systems (EGS). However, by creating large stresses and fracturing the media, this method could induce tremors and earthquakes in some cases. Moreover, albeit ascertaining the high temperature and hydraulic conductivity conditions, EGS methods might not allow for the most efficient geothermal energy production.

While its results are equally adapted to monitoring purposes for EGS, THERMapp aims to provide an alternative approach answering the questions:

- Might host reservoir rocks for efficient geothermal potential naturally exist?
- Is there a reservoir-dependent production procedure to follow for long-term integrities?
- If so, can we predict both of these?



assessing, partitioning and predicting geothermal efficiency:

- (Q1) What rules **heat exchange** and can it be **predicted**?
- (Q2) Does **enhanced** production affect geothermal reservoir **integrities** ?
- (Q3) Can it be physically predicted **across the scales** ?



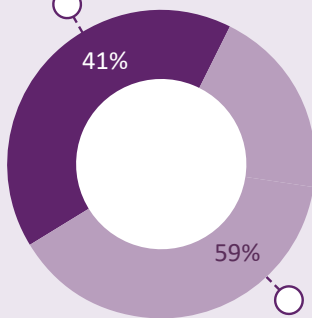
DYEV

Dynamics of energy vulnerability



FINANCIAL CONTRIBUTION/YEAR

ANR - French National Research Agency



Academic and institutional Consortium



KEY DATES

- Chair kick-off: March 2021
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 1
- Post-doctoral fellows: 5



LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Laboratory energy and environmental transitions (TREE)



LEADER

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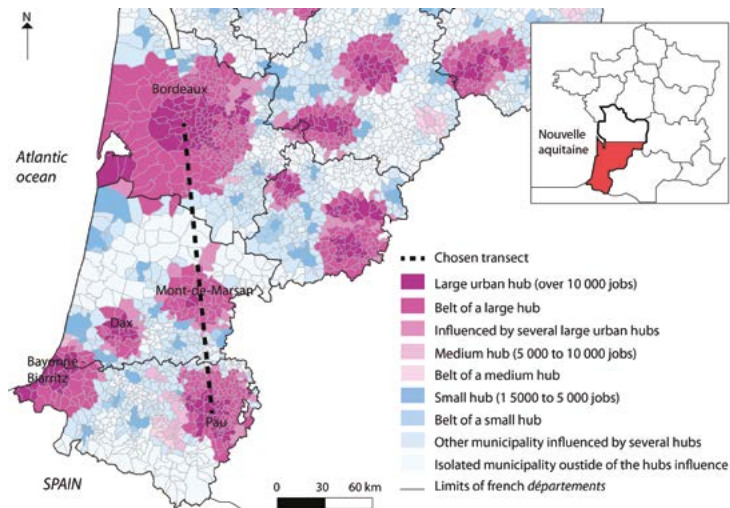
Lise Desvallées

I am a geographer specialized on the social dimensions of energy transition. My PhD is an Urban political ecology approach of energy vulnerability focusing on its emergence, experience and politicization. My Post-doc addresses the social acceptability of low-carbon innovations from an Oil&Gas major.



PRESENTATION

The Junior Chair analyses the dynamics of energy vulnerability, i.e. how households struggle to achieve basic transportation and domestic needs, and sets them in the context of energy transition policies. The research program adopts a spatial approach of the problem, taking as a case study an “energy transect” drawn across the urban, suburban and rural landscapes of Southwestern France from Pau to Bordeaux. The methodology combines evaluation of policies and local collective mobilizations on energy rights with a study of everyday consumption practices, the latter mobilizing both a spatial analysis and qualitative household surveys. On one side, our research enables a better understanding of the social impacts of energy transition strategies on vulnerable households. On the other side, by mobilizing the inputs of a steering committee including administration stakeholders, it aims at evaluating the social-oriented energy transition potential across French municipalities.

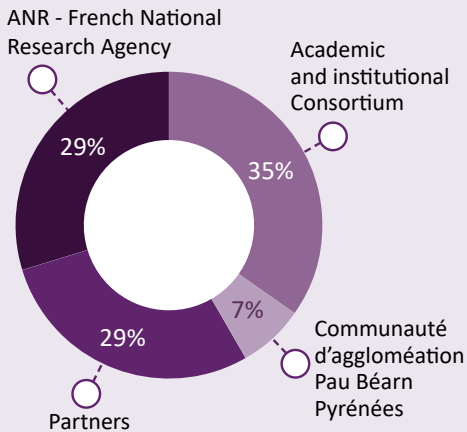




HYDR

Impact of hydrogen storage (pure or mixed) on deep aquifers

FINANCIAL CONTRIBUTION/YEAR



PARTNERS

- ProSim

KEY DATES

- Chair kick-off: March 2021
- Duration: 5 years

TEAM COMPOSITION

- Permanent employees: 2
- PhD: 1
- Post-doctoral fellows: 2

LOCALISATION: Pau

- Joint research unit UPPA/TotalEnergies/CNRS - Laboratory for complex fluids and their reservoirs (IPRA - LATEP)

LEADER

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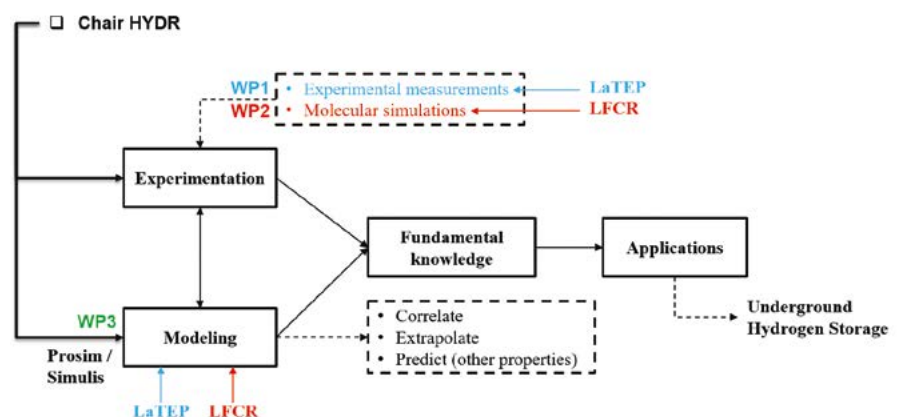


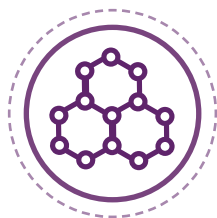
Salaheddine CHABAB

With an academic background oriented towards chemical and process engineering, Salaheddine Chabab obtained his PhD at Mines ParisTech on the thermodynamic aspect of underground gas storage. During his PhD, he developed a thermophysical calculation software, published 5 scientific papers and 2 book chapters and presented his work in several international communications. After obtaining a mobility grant, he was a visiting scholar at the HW University, and was also able to benefit from the expertise of several renowned labs in DTU and Ensta Paris.

PRESENTATION

Hydrogen (H₂) is considered a valuable renewable energy carrier that offers promising prospects for energy transition and decarbonization. Combining power-to-gas and underground hydrogen storage offers an excellent solution to the intermittency of wind and solar systems. To meet large-scale, long-term energy demand fluctuations, storage in geological porous media remains the most geographically available and appropriate solution, with the largest storage volumes. However, the most crucial issue to be investigated is the mobility of H₂ in this type of geological environment. Thus, one of the objectives of this Chair is to address the lack of information on the mobility of H₂ during its storage (pure or mixed) in deep saline aquifers, and more specifically to study its dissolution and diffusion in the formation water. The study will be based on experimental measurements, molecular simulations and thermodynamic modeling and will provide predictive models to be implemented in the Prosim software.





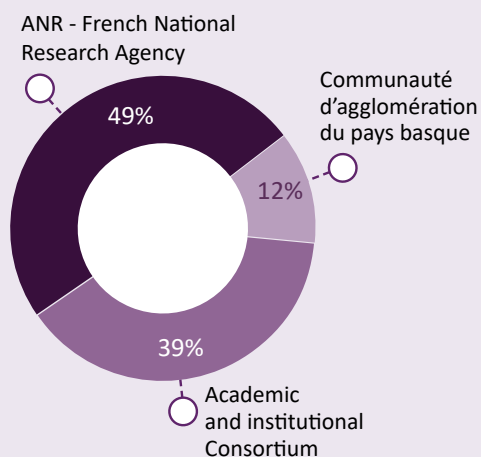
MANTAzyme

MARiNe MaTeriAls:

Biochemistry / Enzymology



FINANCIAL CONTRIBUTION/YEAR



KEY DATES

- Chair kick-off: March 2021
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 1
- Post-doctoral fellows: 5



LOCALISATION: Anglet/Pau

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



LEADER

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**Yi
ZHANG**

Yi Zhang received her BSc & MSc at Ocean University of China, and PhD & postdoctoral training at McGill University, Canada. She was a Commonwealth Blue Charter Fellow. She published 30 papers and 5 book chapters in the areas of enzymology, agricultural biochemistry, and biological sciences.



PRESENTATION

The junior chair MANTAzyme is a branch of the established chair of research E2S UPPA MANTA – MARiNe maTeriAls. MANTAzyme aims at strengthening the expertise of MANTA research group in biochemistry and enzymology applied to the sustainable recovery and functionalization of bio(macro) molecules, as well as the development of biomimetic materials.

Nature abounds in enzymes that can be used as alternative catalysts to the chemical ones traditionally used in synthetic organic chemistry. Indeed, discovered from both experimental and bioinformatics approaches, these novel enzymes are gaining increasing interest for their great diversity, high sensitivities and specificities. Also, their natural origin and abundance suggest a better sustainability and may help in the transition to greener chemistry.

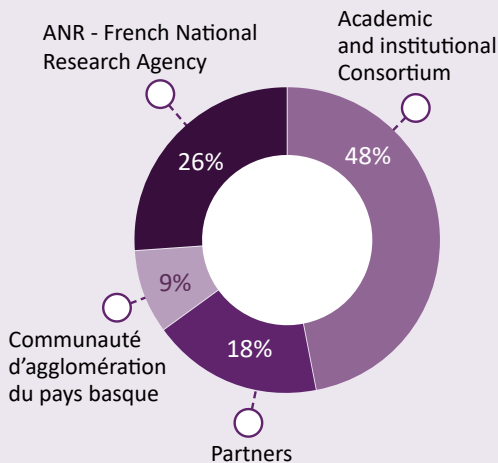
The research objectives of MANTAzyme are as follows:

- Study of the structure–function relationships and catalysis mechanisms of the selected enzymes to understand how they degrade and/or synthesize biomolecules (active molecules and biopolymers) recovered from marine biomass.
- Use of these enzymes to synthesize and functionalize novel (bio)materials following a biomimetic approach.
- Evaluation of the impact of these novel (bio)materials on human & ecosystems health.



ConstrucTerr'- Design and use of low carbon footprint materials for sustainable construction

€ FINANCIAL CONTRIBUTION/YEAR



🤝 PARTNERS

- Materr'up

📅 KEY DATES

- Chair kick-off: July 2021
- Duration: 5 years

👥 TEAM COMPOSITION

- Permanent employees: 2
- PhD: 2
- Post-doctoral fellows: 2

📍 LOCALISATION: Anglet

- UPPA's research unit - Laboratory for applied sciences in mechanics and electrical engineering (IPRA - SIAME)

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Fionn McGREGOR

Fionn McGregor realized a PhD on the moisture buffering of unfired earth masonry at the University of Bath in the UK. He then worked for 5 years in France at the ENTPE, in Lyon. His main interest lies on natural building materials such as raw earth and biobased aggregates.

🔍 PRESENTATION

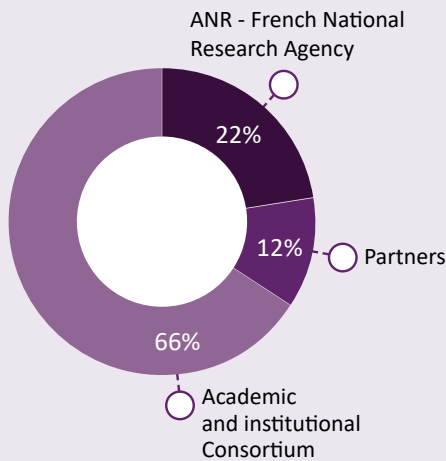
The building sector is facing major challenges to reduce its global environmental impact. To address those challenges the Chair ConstrucTerr' aims at providing solutions to help the building industry to shift towards low carbon footprint materials. Clay rich raw earth is used since centuries to construct buildings, as this material is abundantly and often locally available, it therefore presents considerable environmental advantages.

Together with the partners of the chair, sustainable innovative solutions are developed to improve and extend the use of raw earth based materials. The research conducted in the chair among others, looks at microstructural properties of the material, its multiphysical behavior and how this may impact indoor comfort, in regards of summer comfort and indoor air quality.



Roads and Sustainable Infrastructures

€ FINANCIAL CONTRIBUTION/YEAR



🤝 PARTNERS

- Fondation ISA BTP
- FNTF - Fédération Nationale des Travaux Publics
- INP - Bordeaux - Nouvelle Aquitaine

📅 KEY DATES

- Chair kick-off: March 2021
- Duration: 5 years

👥 TEAM COMPOSITION

- Permanent employees: 3
- Post-doctoral fellows: 4

📍 LOCALISATION: Anglet

- UPPA's research unit - Multidisciplinary Institute for Applied Research

@ LEADER

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Rudy BUI

Rudy Bui has a PhD in Civil Engineering from the University of Toulouse (France). His career as a researcher and lecturer at the INSA of Toulouse and at the ENTPE brought him to work on innovative teaching methods. He also developed transdisciplinary courses related to the energy transition.

🔍 PRESENTATION

The Chair "Roads and Sustainable Infrastructures" participates to the development of the ISA BTP school in Civil Engineering. It aims at opening the training programme "Roads & Networks" on the last two years of the engineering courses.

This project is strongly supported by Civil Engineering companies through the "ISA BTP Foundation" and the "National Federation of Civil Engineering", and will propose a training that matches the companies' needs. This translates into the opening of a branch in Bordeaux, an apprenticeship training, and the integration of companies' engineers to the teaching staff.

To answer the energy and environmental issues, the training program "Roads & Networks" will focus on various main teachings, such as the sustainable land use planning or the research and innovation in Civil Engineering.



Senior Chairs

Senior chairs are directed towards well recognised mid-career scientists, typically with an experience of 5-15 years after their Ph.D. Faculty members of E2S UPPA can apply, but new faculty members can be recruited too. In this case, they are offered a five-year tenure track appointment.

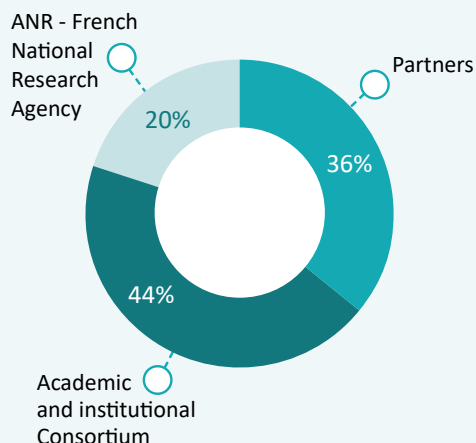
Senior chairs should involve public or/and private partnerships allowing for shared support with E2S UPPA. Within each chair, scientific projects are addressed by a group composed of three doctoral students and two to four permanent researchers. Additional money is also provided for direct costs.



CO2ES

CO₂ Enhanced Storage

€ FINANCIAL CONTRIBUTION/YEAR



PARTNERS

- BRGM - Bureau de Recherches Géologiques et Minières
- CNES - Centre National d'Etudes Spaciales
- TotalEnergies E&P Recherche et Développement SAS



KEY DATES

- Chair kick-off: September 2018
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 3
- PhD: 5
- Post-doctoral fellows: 2



LOCALISATION: Anglet

- Joint research unit UPPA/TotalEnergies/CNRS - Laboratory for complex fluids and their reservoirs (IPRA - LFCR)



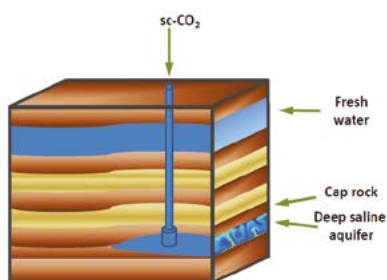
LEADER

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Fabrizio CROCCOLO

Expert in non-equilibrium thermodynamics, optical techniques and microgravity experiments, Fabrizio Croccolo got a PhD in Milan, in 2006, and came to Anglet in 2009. After completing his Marie-Curie Fellowship in Fribourg (CH) in 2012, he came back to UPPA and developed an experimental activity related to transport properties of complex fluids.



PRESENTATION

Global warming is one of the major concerns of humankind and scientists are alerting the community to the need of actions to limit the greenhouse gas emissions to the atmosphere.

Carbon capture, utilization and storage (CCUS) is aiming at reducing CO₂ concentration in the atmosphere and CO₂ storage is a promising action towards this goal. Various mechanisms contribute to CO₂ storage in a reservoir as a function of time.

The CO2ES Industrial Chair focuses on CO₂ storage by dissolution in deep aquifers to understand how fast and efficient it is in relation to gravitational instability and other unconsidered effects.

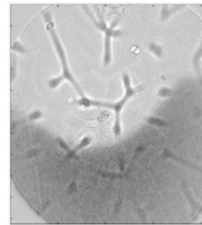
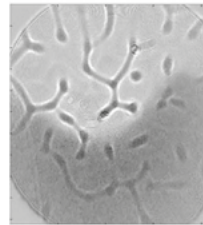
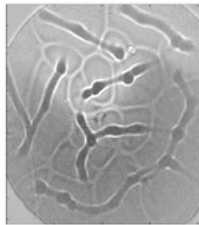
CO2ES improves our understanding of the CO₂ trapping and transport processes involved in CO₂ geological storage in order to design more efficient and safer large-scale projects.

Those research activities are developed through 2 postdoctoral and 5 PhD students in close collaboration with the Industrial and institutional partners as well as international researchers.





CO₂ dissolution
in water at
p = 2 Mpa
observed by
Shadowgraphy
from the side
2D configuration



CO₂ dissolution
in water at
p = 2 Mpa
observed by
Shadowgraphy
from above
3D configuration



ACHIEVEMENTS

- A fully operational high pressure convective cell has been designed and built at the Anglet laboratory of UPPA and measurements have been performed at reservoir conditions by injecting CO₂ onto a layer of salted water in the pressure range from 0.1 to 10 MPa. The resulting convective patterns can be investigated by means of optical techniques in full 3D configurations.
- An experimental setup has been tested during a parabolic flight in order to understand the impact of gravity on the convective dissolution of two miscible fluids.



BIBLIOGRAPHY

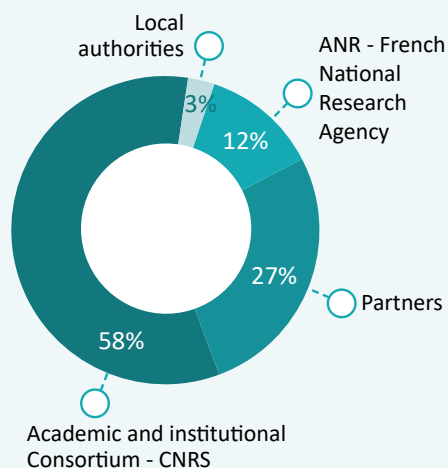
Overall, the chair already published 15 refereed papers among which:

- **Inclined convection in a layer of liquid water with poorly conducting boundaries** - Phys. Rev. Research 2, 033481(2020) - S. Castellini, M. Carpineti, F. Croccolo, and A. Vailati
- **Spreading of infections on random graphs: A percolation-type model for COVID-19** - Chaos, Solitons and Fractals 139, 110077 (2020) - F. Croccolo and H.E. Roman
- **Cylindrical flowing-junction cell for investigating miscible fluids** - Rev. Sci. Instrum. 90, 085109 (2019) - D. Brogioli, F. Croccolo, and A. Vailat



TEEN - Territories in energy and environmental transitions

€ FINANCIAL CONTRIBUTION/YEAR



PARTNERS

- CAPBP - Communauté d'Agglomération Pau Béarn Pyrénées
- CACG - La Compagnie d'Aménagement des Coteaux de Gascogne
- TotalEnergies E&P Recherche et Développement SAS



KEY DATES

- Chair kick-off: September 2018
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 3
- PhD: 4
- Post-doctoral fellows: 3



LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Laboratory energy and environmental transitions (TREE)



LEADER

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Xavier ARNAULD DE SARTRE

Xavier Arnauld de Sartre is a geographer, Director of Research at the CNRS (CNRS bronze medal in 2008). His researches focus on the transformations of modernity due to global changes. He coordinated various industrial or academic projects, has served in many national scientific or institutional committees, authored 37 publications in international peer-reviewed journals, 3 books, and edited 9 publications.



PRESENTATION

TEEN Chair aims at developing pathways to solve some of the current energy transition problems. Indeed, even if the current context suffers from strong uncertainties and even if we do not know yet where the transition will lead our societies to, we do know that territories are about to play a major part in the implementation of transitions allowing to link global and local scales. Nevertheless, this objective is confronted to a strong political, technical and institutional obduracy and to the many socio-technical controversies surrounding transition technologies. Our objective, directed to stakeholders, is to give them support to infuse their actions with territorial meaning, in order to make them think their ongoing projects as responding both to global and local stakes.



ACHIEVEMENTS

- Studies on debates around energy transition technologies: geological storage of CO2 and off shore wind turbines.
- Organisation of a seminar cycle, with the Chair's partners and on the themes of the Chair (theories of transitions, socio-technical controversies, the politicization of transitions and local development).
- Conferences focused on social acceptability.
- Participation in a seminar on epistemic communities, focused on the relations between Men and their environment.
- Research on the transformations of an organization while facing challenges related to global changes.
- Research on local adaptation plans to climate change in medium-sized French cities.



BIBLIOGRAPHY

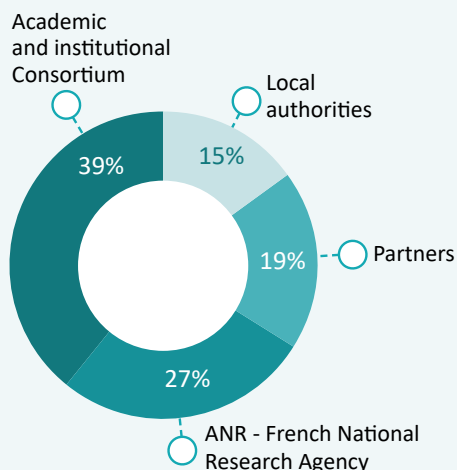
- **How ecosystem services and agroecology are greening French agriculture through its reterritorialization**, *Ecology and Society*, **24**, 2. Xavier ARNAULD DE SARTRE, Marion CHARBONNEAU, Orianne CHARRIER, Orianne, 2019 - <https://doi.org/10.5751/ES-10711-240202>
- **Formes et logiques émergentes de la transition agroécologique**, In Christine Bouisset et Sandrine Vaucelle (Dir.), *Transition et reconfigurations des spatialités*, Bruxelles, Peter Lang - ARNAULD DE SARTRE, Xavier ; CHARBONNEAU, Marion ; CHARRIER, Orianne. 2020,
- **Recomposer le rôle des sociétés d'aménagement régional au nom des transitions. Expérimentations par la Compagnie d'aménagement des Coteaux de Gascogne sur une nouvelle façon de développer les territoires ruraux**, In Christine Bouisset et Sandrine Vaucelle (Dir.), *Transition et reconfigurations des spatialités*, Bruxelles, Peter Lang - CARRAUSSE, Romain ; ARNAULD DE SARTRE, Xavier. 2020,



MANTA - Marine Materials

Development of bio-inspired and sustainable (bio)materials to lower the marine environmental impact

FINANCIAL CONTRIBUTION/YEAR



Susana FERNANDES

Susana Fernandes is Associate Professor at UPPA (after 2 years at KTH, Sweden, as a Marie Curie IE Fellow) where she has set up the chair MANTA. She is also Guest Researcher at Uppsala University, SE.

She has 12 years of research experience in polymeric materials from renewable resources and blue biotechnology, reached in recognized academic laboratories in 4 European countries. She has disseminated her work via over 57 articles and book chapters and over 60 conference and media appearances. To make it all possible, she has also won several prestigious awards and fellowships.



PARTNERS

- Biarritz Lab - Laboratoires de Biarritz
- CAPB - Communauté d'Agglomération Pays Basque
- Ceebios
- CIDPMEM 64-40 - Comité Interdépartemental des Pêches Maritimes et des Elevages Marins
- LEES - Laboratoire d'Etudes en Entropie Sous-marine
- RNA - Région Nouvelle Aquitaine
- Scale



KEY DATES

- Chair kick-off: December 2018
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 4
- PhD: 4
- Post-doctoral fellows: 2



LOCALISATION: Anglet/Pau

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



LEADER

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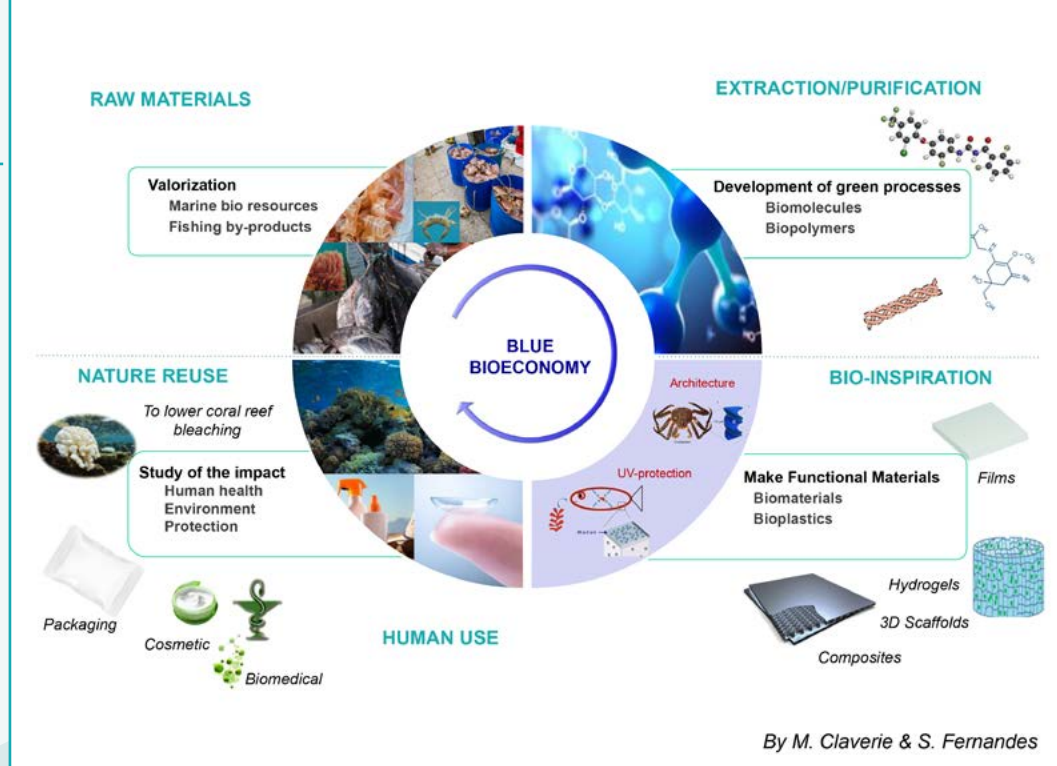


PRESENTATION

The research flow of MANTA is on the exploration of marine compounds, materials and biomimetics to face current societal problematic related to human health and marine environment degradation.

Oceans are an extraordinary and unexploited sustainable source of natural compounds with specific and very appealing physicochemical, structural and biological properties. Although very promising, a considerable amount of these compounds are still scarcely exploited. In this context, MANTA focuses on blue and red biotechnologies for the development of (bio)materials exploiting both marine origin materials and marine biomimetic approaches. We are establishing methodologies for the extraction of small molecules and biopolymers from marine by-products aiming for their processing as multi-functional porous structures, films, hydrogels and composite materials for cosmetic, biomedical and packaging applications. The impact of these (bio) materials and/or their metabolites on human health and on aquatic ecosystems is also addressed.





ACHIEVEMENTS

- Through these two years, the chair has been actively represented within international scientific congresses (FARNET 2018, BIOPOL 2019, Rendez-vous de Concarneau 2019, ICM 2020, etc), as well as several science outreach events (Biomim'expo 2019, Forum Changer D'ère, Forum "L'Océan Notre Avenir" during the G7 in Biarritz, Algae Summit 2020, Biomim'week 2020, etc). In the fall of 2020, in collaboration with Ceebios, ACPB and Région NA, we have organized a cycle of 4 webinars about 'Biomimétisme Marin'.
- The MANTA chair got greater: its research team counts nowadays a total of 12 full-time members, and two more partners joined it, the enterprise Scale and the Ceebios. Its research projects thus multiplied and diversified with, notably, 5 PhD theses in progress (among which one is co-supervised with the UPV).
- The chair is also pointing towards a transdisciplinary horizon with the convergence of fundamental and social sciences. The objectives of this field broadening will be to evaluate the social impacts of innovations inspired from the sea, to study the ethical rules underlying the exploration and extraction of marine bioresources and to measure the potential of marine biomimetics in the current socio-ecological transition at different space/time scales. While the collaboration with Ceebios will be decisive to initiate the project, the chair will also surround itself with social sciences' experts, with a particular interest for the Ocean, to make this research project grow.



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From MANTA collaborations:

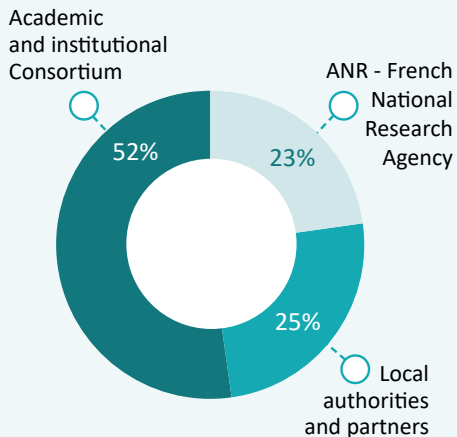
- Untargeted analysis for mycosporines and mycosporine-like amino-acids by hydrophilic interaction liquid chromatography (HILIC) - Electrospray Orbitrap MS²/MS³** Antioxydants 2020, 9(12), 1185 - Maroussia Parailoux, Simon Godin, Susana C. M. Fernandes, Ryszard Lobinski,
- Adipose-derived mesenchymal stem cell chondrospheroids cultured in hypoxia and a 3D porous chitosan/chitin nanocrystal scaffold as a platform for cartilage tissue engineering.** International Journal of Molecular Sciences, 2020, 21, 1004 - V. Zubillaga, A. Alonso-Varona, S.C.M. Fernandes, A.M. Salaberria, T. Palomares,



HPC Waves

High Performance Computing of Waves

FINANCIAL CONTRIBUTION/YEAR



PARTNERS

- CAPB - Communauté d'Agglomération Pays Basque
- RNA - Région Nouvelle Aquitaine



KEY DATES

- Chair kick-off: January 2019
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 3
- PhD: 3
- Post-doctoral fellow: 1



LOCALISATION: Anglet

- UPPA's research unit - Laboratory for applied sciences in mechanics and electrical engineering (IPRA - SIAME)



LEADER

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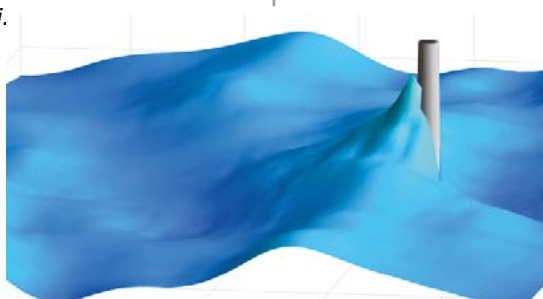
Volker ROEBER

Volker Roeber is specialized in numerical modelling of nearshore waves. He received his PhD in Ocean Engineering from the University of Hawaii. He was Assistant Professor at Tohoku University, Japan, where he worked on wave-driven catastrophic events. He is also an Affiliate Graduate Faculty member in the Department of Oceanography at the University of Hawaii.

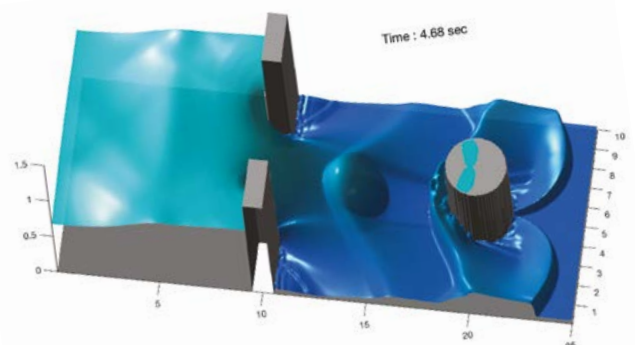


PRESENTATION

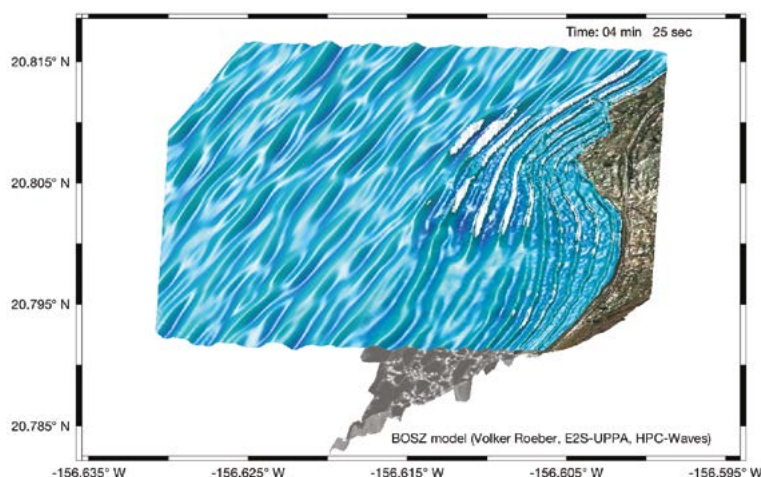
Coastal communities have been facing on-going problems associated with large ocean swell waves, which result in coastal flooding, hazardous currents, infrastructure damage, and erosion. On the positive side, energetic waves can make a vital contribution to marine renewable energy (MRE) systems. To understand the hazards on one side and the potential for marine energy on the other, quantitative assessment is necessary. The chair focuses on the theoretical and numerical development of nearshore wave models with attention to high performance computing. We are improving both accuracy and speed of numerical wave models to obtain a representative and complete description of coastal wave processes including generation, propagation, and run-up, as well as the waves' impact on structures and their potential for MRE extraction. This work is complemented by field and laboratory studies. In close collaboration with governmental and private agencies for coastal zone management in the Basque country, the chair helps to find integrated solutions for mitigation of wave-driven coastal hazards and investigate local MRE applications.



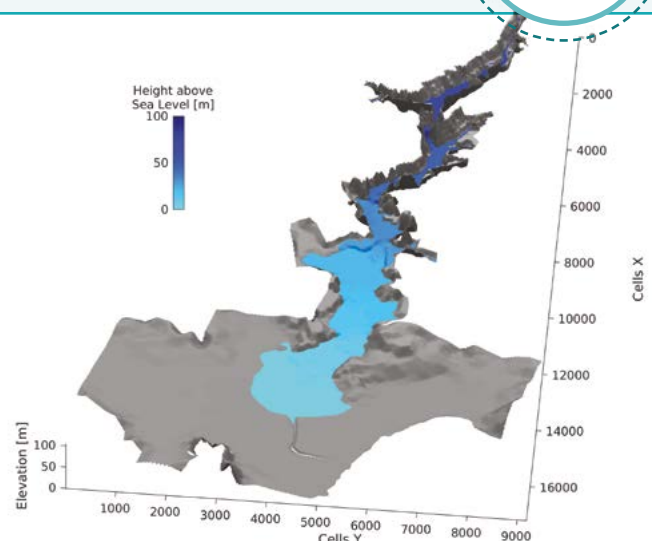
Snapshot of computed wave impact on the La Jument lighthouse (Bretagne)



Dambreak example computed by the new HPC-Waves GPGPU model



Typical nearshore wave field with refraction, shoaling, and wave breaking as computed by the BOSZ model, a phase-resolving Boussinesq-type model developed by the chaire.



Malpasset dambreak computed by the new HPC-Waves GPGPU model



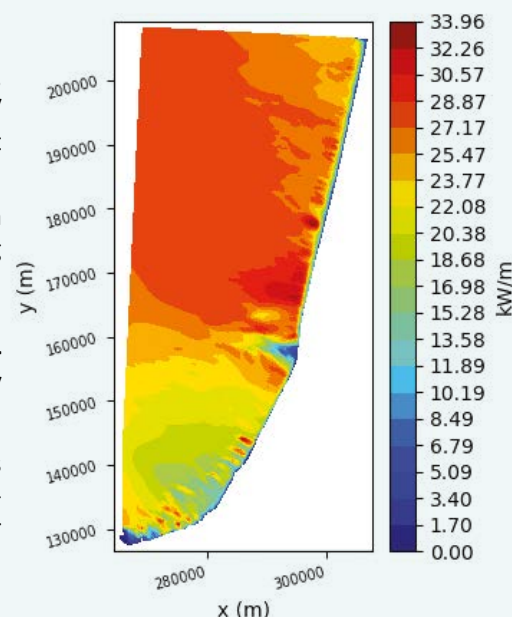
ACHIEVEMENTS

- We have already developed the foundation for a new suite of numerical models, which can compute nearshore waves in an accurate but also very fast way utilizing the potential of GPUs (graphic cards). This numerical framework is being continuously extended to improve the computations of water waves in the coastal zone with special focus on the Côte Basque. The numerical models developed are presently incorporated into wave runup forecasting systems for Grande Plage (Biarritz) and West Maui (Hawaii) and have lead to a better understanding of the fundamental processes, which contribute to wave runup dynamics.
- The team has also completed a high-resolution wave hindcast analysis with respect to a potential installation of a Wave Energy Converter (WEC) along the Côte Basque.
- The chaire has teamed up with researchers and engineers from Rivage Pro Tech (SUEZ group) and AZTI Tecnalia (Spain) to collaborate in multilateral research efforts, a laboratoire commun Rivage Pro Tech is also officially an external partner of the chaire.
- The chaire contributed to the Best Student Paper awarded at the Coastal Structures conference 2019 in Hannover, Germany.



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- **Tsunami impact on a detached breakwater insights from two numerical models.** Journal of Waterway, Port, Coastal and Ocean Engineering, 147 (2). doi.org/10.1061/(ASCE)WW.1943-5460.0000622 - Morichon D., Roeber V., Martin-Medina M., Bellafont F., Abadie S. (2021).
- **Estimation of Irregular Wave Runup on Intermediate and Reflective Beaches Using a Phase-Resolving Numerical Model.** Special Issue Observation, Analysis, and Modeling of Nearshore Dynamics, Journal of Marine Science and Engineering, 8(12), 993. doi.org/10.3390/jmse8120993 - Pinault J., Morichon D., Roeber V. (2020).
- **Wave Energy Assessment in the South Aquitaine Nearshore Zone from a 44-Year Hindcast.** Journal of Marine Sciences and Engineering, 8(3), 199; doi.org/10.3390/jmse8030199 - Lastiri X., Abadie S., Maron P., Delpey M., Liria P., Mader J., Roeber V. (2020).
- **Improving Wave Run-up Forecasts – Benefits from Phase-resolving Models.** Proceedings of the 5th conference on Coastal Structure, 752-761. doi.org/10.18451/978-3-939230-64-9_075 - Roeber V., Pinault J., Morichon D., Abadie S., Azouri A., Guiles M., Luther D.S., Delpey M., Danglade N. (2019).



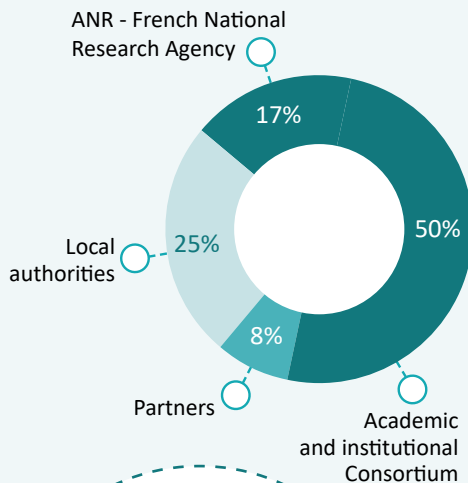
Mean wave energy computed from a 44-year hindcast along the Côte Basque in the Bay of Biscay.



OpenCEMS - Distributed Energy System Data Management



FINANCIAL CONTRIBUTION/YEAR



PARTNERS

- RNA - Région Nouvelle Aquitaine
- CAPB - Communauté d'agglomération du pays basque
- Bertin - BERTIN Technologies
- Elqano



KEY DATES

- Chair kick-off: June 2019
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 3
- PhD: 2
- Post-doctoral fellows: 5



LOCALISATION: Anglet

- UPPA's research unit - Laboratory of computer science (LIUPPA)



LEADER

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Richard CHBEIR

Richard Chbeir is currently a Full Professor in the Computer Science Department at the UPPA and the head of the LIUPPA lab. His current research includes data management, information retrieval, data semantics, access control, and digital ecosystems. He is also the Chairman of the French Chapter ACM SIGAPP.



PRESENTATION

The DESDM chair intends to provide concrete solutions to the collection of massive data in a connected environment and/or electrical network. Hereafter are the different objectives of the chair:

- Scientific purpose:** Design, implement and deploy software solutions on both a small and large scale in order to better collect/aggregate data, produce information, discover new knowledge and automate decision-making (partly or completely).
- Training:** Share good practices. The chair is a place for reflection, sharing and training, where awareness can be raised.
- Transfer:** Helping companies and local authorities to solve their problems by offering them advice and solutions, particularly in relation with data.
- Strategic:** Develop an open software platform capable of both scaling up and optimizing the functioning of its connected environments.



Khoulood Salameh



Elio Mansour



Sabri Allani



Philippe Aniorté



Philippe Arnould



Taoufik Yeferny



Joe Tekli



Lara Kallab



Salma Sassi



Anis Tissaoui



Zahy Shamy



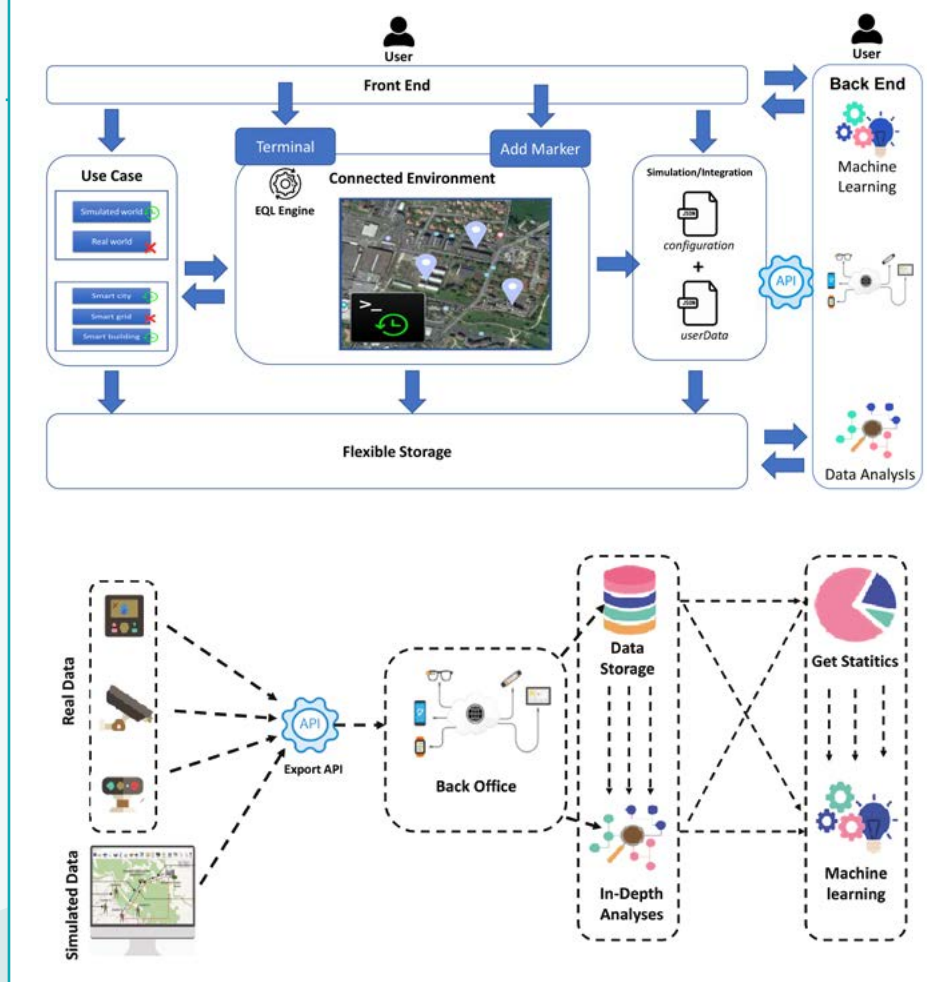
Karam Bou Chaaya



Faisal Shahzad



Elie Chicha



ACHIEVEMENTS

- OpenCEMS chair has won two awards since it started last year:
 - March 2020: the CapEnergie label with the Bertin company around a simulation project called ENERSQUID.
 - June 2020: the attachment of the OpenCEMS chair to the IRIXYS center of excellence
- The Elqano company, based on Izarbel - Bidart, joined the chair's consortium in April 2020.

Most of this work has been developed and integrated into the OpenCEMS platform available online (<https://opencems.fr/>). The platform offers two operating modes: real and simulation

BIBLIOGRAPHY

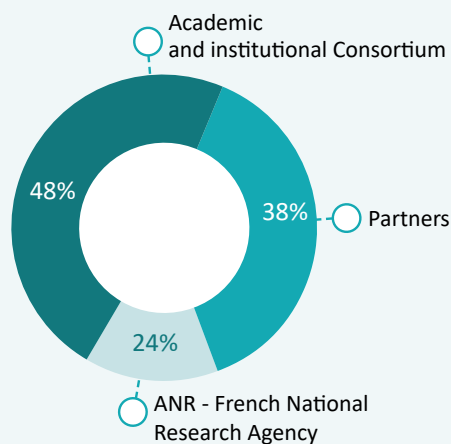
- MSSN-Onto: An ontology-based approach for flexible event processing in Multimedia Sensor Networks.** Future Gener. Comput. Syst. 108: 1140-1158 (2020)- Chinnapong Angsuchotmetee, Richard Chbeir, Yudith Cardinale
- Generic metadata representation framework for social-based event detection, description, and linkage.** Knowl. Based Syst. 188 (2020) - Minale Ashagrie Abebe, Joe Tekli, Fekade Getahun, Richard Chbeir, Gilbert Tekli
- Probabilistic Topic Models for Enriching Ontology from Texts.** SN Comput. Sci. 1(6): 336 (2020) - Anis Tissaoui, Salma Sassi, Richard Chbeir
- A Weighted Feature-Based Image Quality Assessment Framework in Real-Time.** Trans. Large Scale Data Knowl. Centered Syst. 45: 85-108 (2020) - Zahi Al Chami, Chady Abou Jaoude, Bechara al Bouna, Richard Chbeir
- Towards a smarter directional data aggregation in VANETs.** World Wide Web 23(4): 2303-2322 (2020) - Sabri Allani, Taoufik Yeferny, Richard Chbeir, Sadok Ben Yahia
- MEDES '20: 12th International Conference on Management of Digital EcoSystems,** Virtual Event, United Arab Emirates, 2-4 November, 2020. ACM 2020, ISBN 978-1-4503-8115-4 - Richard Chbeir, Yannis Manolopoulos, Ernesto Damiani, Djamal Benslimane, Ladjel Bellatreche, Tadeusz Morzy
- WIMS 2020: The 10th International Conference on Web Intelligence, Mining and Semantics,** Biarritz, France, June 30 - July 3, 2020. ACM 2020, ISBN 978-1-4503-7542-9 - Richard Chbeir, Yannis Manolopoulos, Rajendra Akerkar, Jolanta Mizera-Pietraszko
- Transactions on Large-Scale Data- and Knowledge-Centered Systems XLV - Special Issue on Data Management and Knowledge Extraction in Digital Ecosystems.** Lecture Notes in Computer Science 12390, Springer 2020, ISBN 978-3-662-62307-7 - Abdelkader Hameurlain, A Min Tjoa, Richard Chbeir, Yannis Manolopoulos, Hiroshi Ishikawa, Sergio Ilarri, Apostolos Papadopoulos



Ecotox - Ecotoxicology of chemical contaminants in inland waters in the context of global change



FINANCIAL CONTRIBUTION/YEAR



PARTNERS

- TotalEnergies E&P Recherche et Développement SAS
- Rio Tinto



KEY DATES

- Chair kick-off: September 2019
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 11
- PhD: 3
- Post-doctoral fellow: 1
- Research assistant : 1



LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



LEADER

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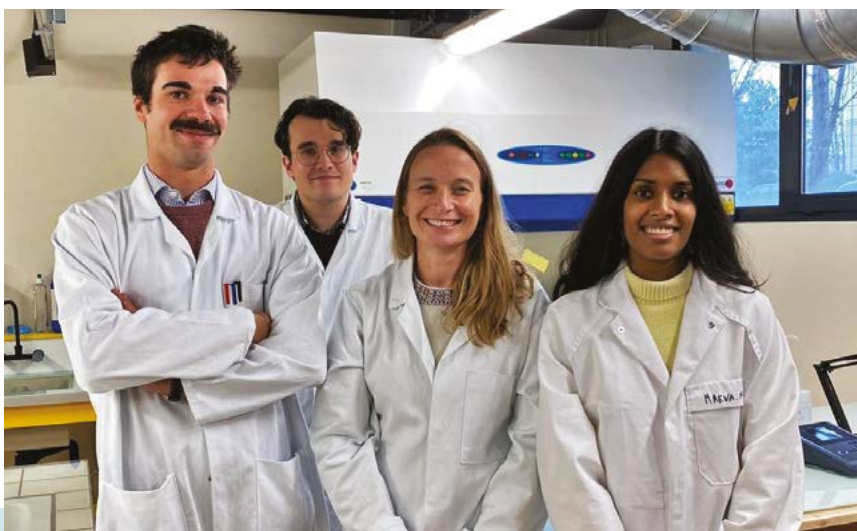
Séverine LE FAUCHEUR

Séverine Le Faucheur is an aquatic biogeochemist and ecotoxicologist specialized in metal-microorganisms. She received her PhD from ETH Zürich (Switzerland) in 2005 and was a postdoctoral fellow at INRS-ETE (Canada) between 2006-2011. Before arriving in September 2019 at UPPA, she was a senior researcher and teaching assistant at the University of Geneva (Switzerland). Besides being the Ecotox Chair holder, she currently also is an adjunct professor at INRS-ETE. With her positions as committee member of the SETAC Metals Interest Group and as editor for Environmental Science and Pollution Research journal (Springer), Séverine is very active within the scientific community.



PRESENTATION

The planet is currently experiencing significant global changes related to human activities which leads to the deterioration of the quality of continental waters. Temporal hydrological variability, the presence of complex mixtures of contaminants in water or the impact of contaminants on the global ecosystem functioning are examples of problematics that have been poorly addressed in environmental risk assessment. The present research partnership Chair, in collaboration with Total and Rio Tinto, focuses on filling these gaps with the development of fundamental knowledge and practical tools to assess water quality. That research is based on the use of artificial rivers located in PERL at Lacq and state-of-the art analytical techniques available at IPREM. Three main themes are examined, i.e., the bioavailability and impacts of contaminant mixture towards aquatic organisms, the use of biominerals as bioindicators of contaminant exposure and the assessment of ecogenomics as biomonitoring tool.





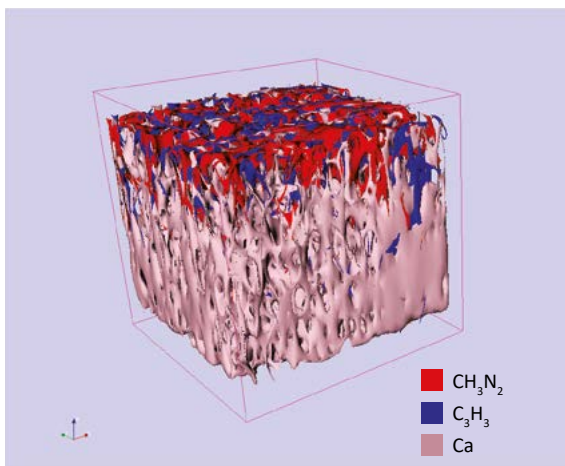
ACHIEVEMENTS

- This year, the chair Ecotox launched several projects involving 15 researchers from IPREM and 8 scientists from Total and Rio Tinto.
- Recruitment of 2 doctoral students, 1 study engineer, 3 students in Master 2 and 1 student in Master 1
- Installation of the ecotoxicology laboratory at IPREM
- HDR defense for S. Le Faucheur
- Collaboration with INRS-ETE (Canada) and University of New Brunswick (Canada)



BIBLIOGRAPHY

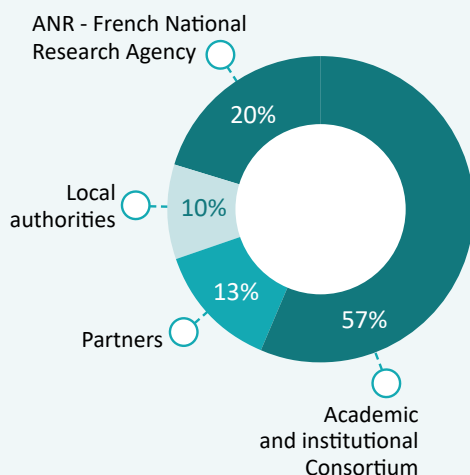
- **Development of quantitative ion-character activity relationship models to address the lack of toxicological data for technology-critical elements.** Environmental Toxicology and Chemistry (2020) In press - Le Faucheur S., Mertens J., Van Genderen E., Boullemant A., Fortin C. and Campbell P.G.C.





MOVE - Mobility evolution towards sustainable development

FINANCIAL CONTRIBUTION/YEAR



Louis DE FONTENELLE

After a one-year post-doctorate at Terega (a natural gas transmission and storage company), Louis de Fontenelle joined the Pau Public Law Laboratory. He is currently co-director of the research programme into energy law, and coordinator of the "Pau Energy Law" public-private consortium. Since September 2016, he has published numerous articles on energy law. He regularly organizes scientific exhibitions related to energy transition and speaks at national and European conferences on this issue. He is the chief scientific officer on two multidisciplinary projects and the scientific director of the website "Energie en lumière".



PARTNERS

- CAPB - Communauté d'agglomération du pays basque
- CCLO - Communauté de communes Lacq-Orthez
- CAPBP - Communauté d'agglomération Pau Béarn Pyrénées
- SMPBA - Syndicat des Mobilités Pays Basque - Adour
- SDEPA - Syndicat d'Énergie des Pyrénées-Atlantiques
- Enedis
- Terega
- EDF
- CR - Commission de régulation de l'énergie



KEY DATES

- Chair kick-off: January 2020
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 3
- Post-doctoral fellows: 5



LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Laboratory energy and environmental transitions (TREE)



LEADER

- louis.defontenelle@univ-pau.fr



PRESENTATION

The MOVE project relies first and foremost on the creation of a legal research cluster dedicated to studying the interactions between the energy transition and mobility through the lens of sustainable development. The reflections will focus as much on urgent issues as on concerns for the near or more distant future (legal forward studies).

Considering the societal impact of this topic, an applied research methodology will be used. The scientific objectives have been defined as closely as possible to the questions raised by the public and private stakeholders involved in sustainable mobility. The research will be conducted in close connection with the actions and experiments involved in their actual projects.

Beyond this legal approach, the societal challenges that need to be studied demand a global understanding of the various issues involved in developing sustainable mobility, whether they are related to technological progress, social transformation, or the evolution that such a trajectory implies. In this respect, the legal expertise developed within the MOVE chair is made available for research carried out in other fields with the aim of anticipating potential hurdles and obstacles or, on the contrary, identifying opportunities related to the normative framework of reference. Common research topics have been defined or are in the process of being defined with the E2S RAISE and ENSUITE HUBs.



ACHIEVEMENTS

- Since its launch in February 2020, six interviews have been conducted with the sponsors of the MOVE Chair. These exchanges have allowed to identify the first legal issues to be addressed in the context of research work on sustainable mobility.
- Alice Moulène, the project engineer in charge of coordinating the activities of the Chair has been recruited and took up her position on October 1st, 2020.
- The thematic committees bringing together the partners on each of the chair's five areas of focus were brought together at the end of the year, and the research actions they proposed were validated by the steering committee. Two thesis recruitments are underway, on energy networks and sustainable mobility, and on the diversification of the activities of companies in the energy sector.
- Three postdoctoral students will also be recruited in 2021, in order to deal with issues relating to networks, territorial ecosystems, and legal and ethical issues of AI in terms of mobility.



Alice Moulène



BIBLIOGRAPHY

Report

- **Making good use of self-service regulation: the case of electric scooters** - Terra Nova, June 2020 (co-authored with G. Dezobry and C. Staropoli)

Publication

- **Energy communities: the time for transposition.** In Clean energy package, finally the energy transition? Énergie en Lumière - Lexis Nexis, July 9th, 2020

Lecture at a conference

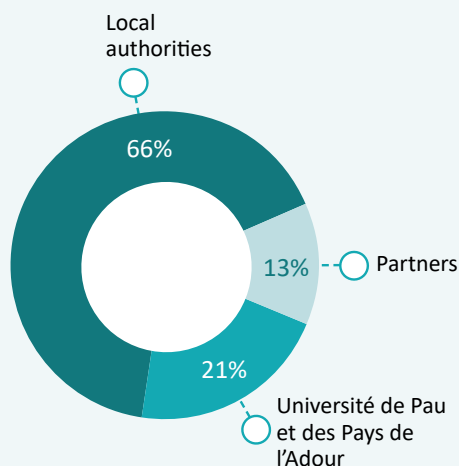
- **Energy Communities in the European Union** - 1st Annual Conference Global Energy Transition Law and Policy, webinar, April 17th, 2020, University of Houston - Law Center.



Architecture and urban physics



FINANCIAL CONTRIBUTION/YEAR



PARTNERS

- CAPB - Communauté d'Agglomération Pays Basque
- Nobatek/INEF4 an energetic transition institut
- RNA - Région Nouvelle Aquitaine



KEY DATES

- Chair kick-off: January 2017
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 1
- PhD: 3
- Post-doctoral fellows: 3



LOCALISATION: Anglet

- UPPA's research unit - Multidisciplinary Institute for Applied Research



LEADER

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Benoît BECKERS

Benoît Beckers has a background in Physical Engineering, and a doctorate from the architecture school of the Polytechnical University of Catalogna. Before joining the UPPA, he directed a research team in the «Urban systems engineering» department of the Technological University of Compiègne.



PRESENTATION

Benoît Beckers holds the chair in "Architecture and Urban Physics" located at ISA BTP in Anglet. The UPPA, the technology center Nobatek/INEF4, the New Aquitaine region and the Communauté d'Agglomération Pays Basque came together to create a "joint laboratory" hosting this chair.

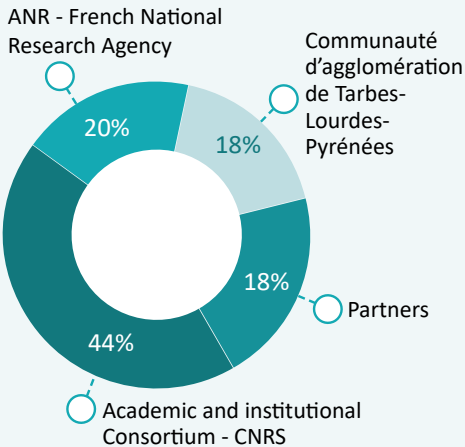
When half of humanity lives in cities, the theories and models that we have built so far no longer apply as they do not take into account the urban dimension. Talking about sustainable construction while encouraging urban sprawl is meaningless. We need to move up to a larger scale, to change our point of view, especially by using physics and the digital tools that we now have at hands.

The goal of this chair is to design innovative digital models that take into account not only the architectural dimension, but also data on human motion, accoustics, sunlight... Urban physics requires an interdisciplinary approach! The new chair relies on both the capabilities of the SIAME laboratory (Engineering Science Applied to Mechanics and Electrical Engineering) and the experience and expertise of Nobatek in sustainable construction.



EFICIENCE - Function and innovative material integration, diagnostic of health state for Power Electronics' modules

FINANCIAL CONTRIBUTION/YEAR



PARTNERS

- ENIT - Ecole Nationale d'Ingénieurs de Tarbes
- SAFRAN
- Deep Concept



KEY DATES

- Chair kick-off: July 2020
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 3
- Post-doctoral fellows: 2



LOCALISATION: Tarbes

- ENIT



LEADER

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Paul-Étienne VIDAL

Paul-Etienne Vidal received the Ph.D. degree from the Institut National Polytechnique de Toulouse, France, in 2004. He received the Habilitation à Diriger des Recherches in 2017. From 2004 to 2006, he was a Temporary Researcher with the Laboratory LEEL, INP/CNRS. In 2006, he joined the Laboratoire Génie de Production, of Ecole Nationale d'Ingénieurs Tarbes as an Associate Professor.



PRESENTATION

The EFICIENCE project aims to improve the power converters' efficiency. Power electronics integration and health monitoring of power electronics packaging issues will be addressed. Combined approaches applied to power electronics modules will be studied in 3 work packages. More particularly, the work carried out will relate to the passive component integration such as capacitors through multifunctional materials. More precisely, multifunctional ceramics will be developed. Health monitoring of the packaging will be achieved by a non-destructive test, novelty developed. The nondestructive test is based on analyzes of electromagnetic interactions. The increase in conversion efficiency will be done through combined integration of technologies and power converter topologies within a module: a highly integrated multilevel module. Target applications of EFICIENCE are related to mobility and energy transition trends, which lead to transform power conversion chains towards "more electric" systems.





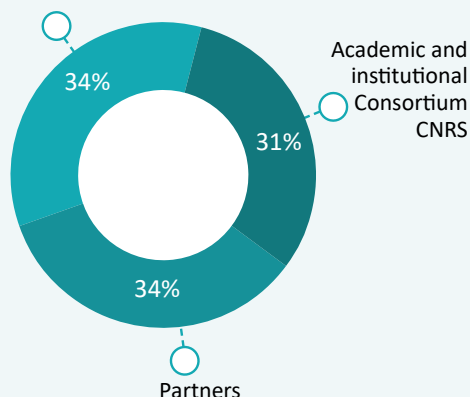
ORHYON

Micro-Organisms and Reactivity of Hydrogen in underground



FINANCIAL CONTRIBUTION/YEAR

ANR - French National Research Agency



PARTNERS

- Engie



KEY DATES

- Chair kick-off: November 2020

- Duration: 4 years



TEAM COMPOSITION

- Permanent employees: 2

- PhD: 3

- Post-doctoral fellows: 3



LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



LEADER

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Anthony RANCHOU-PEYRUSE

Dr. Anthony Ranchou-Peyruse is a member of the IPREM. As part of his research activity, he is interested in understanding the functioning of deep continental microbial ecosystems and has been collaborating for more than 10 years with industrialists exploiting geological resources.



PRÉSENTATION

Hydrogen (H₂) is a very promising resource but H₂ is mainly obtained by hydrocarbon reforming, though it can also be generated by water electrolysis using the excess of energy produced by renewables. It can be transported and stored in large amounts into underground natural reservoirs, such as aquifers. Although quantities remain to be determined, H₂ is also produced as a geological resource from natural emissions.

The ORHYON industrial chair, funded by the ANR and Engie, is based on the complementary strengths of Engie, the UPPA and the IFPEN. This project, in line with the partners activities, will focus on H₂ mobility and bio-chemical reactivity in natural porous media, from deep environments to surface. The results will lead :

- to a better understanding of the processes controlling H₂ migration and retention in geological formations;
- to new tools and methodologies to reduce the risks associated with geological storage;
- to provide technical guidance for its exploration and production.

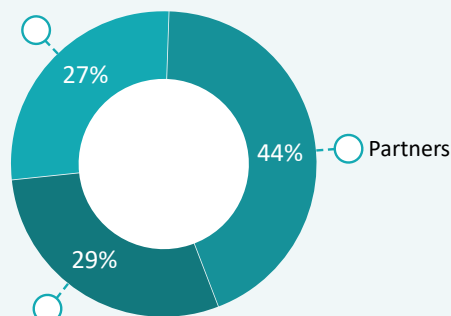


ORIGAMI

ORIGIN of GAs and Migration

FINANCIAL CONTRIBUTION/YEAR

ANR - French National Research Agency



Academic and institutional Consortium - CNRS



PARTNERS

- TotalEnergies E&P Recherche et Développement SAS



KEY DATES

- Chair kick-off: November 2020
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 3
- Post-doctoral fellows: 2



LOCALISATION: Pau

- Joint research unit UPPA/TotalEnergies/CNRS - Laboratory for complex fluids and their reservoirs (IPRA - LFCR)



LEADER

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Anne BATTANI

Anne Battani passed her Ph.D from the Université de Paris Sud-Orsay in 1999, and her Habilitation from UPPA in 2020. In the last two decades she worked at IFPEN, ANDRA and SUERC (Glasgow) as an expert in noble gas geochemistry. She joined the UPPA in November 2020.



PRESENTATION

The ORIGAMI Chair aims to study different aspects of the sub-surface fluid systems (water, liquid HC and gases, but also CO₂ and H₂) from their source to their storage. A specific aspect of the research topics will be to study fluid interactions and migration processes.

In this regard, noble gases are powerful physical tracers to study physical processes, as they are chemically inert and are not affected by any biological activity. Moreover, their low concentration gives them a simplified thermodynamic behaviour (whether in a steady-state or unsteady-state) which carry the fingerprint of physical processes occurring during fluid transfers through the crust.

A supplementary important aspect of the project will concern the set-up of a noble gas laboratory, with state of the art facilities and an in-house designed extraction / purification line, dedicated to natural fluid purification.

The research will benefit from a strong partnership between Total and the LFCR.





International Guest Chairs

International chairs are part time visiting professor positions. Applicants should have a track record demonstrating their high-level scientific achievements and strong international visibility. The call for applicants is opened and widely publicised internationally.

Laureates are appointed for five years upon recommendation of the external scientific committee of E2S UPPA. Recipients commit themselves to spending on average two months per year at the UPPA. Two doctoral fellowships and five years of post-doctoral fellowship are offered in order to strengthen the relationships between their group and our laboratories. Additional money is also provided for direct costs.

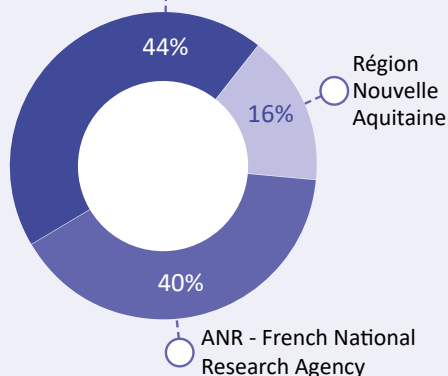
Some international guest chairs involve support from public and/or private partnerships allowing for shared funding with E2S UPPA.



Mathematics and statistics

FINANCIAL CONTRIBUTION/YEAR

Academic and institutional Consortium



KEY DATES

- Chair kick-off: January 2019
- Duration: 5 years

TEAM COMPOSITION

- Permanent employees: 2
- PhD: 2
- Post-doctoral fellows: 5

LOCALISATION: Anglet

- Joint research unit UPPA/CNRS - Laboratory for mathematics and their applications in Pau (IPRA - LMAP)

@ CONTACTS

- Leader: kerrie.mengersen@univ-pau.fr
- Coordinator in situ: benoit.liquet@univ-pau.fr



Kerrie Mengersen
Queensland University (AU)

I am an applied statistician. I hold a Research Chair in Statistics at the Queensland University of Technology. I am an elected Fellow of the Australian Academy of Science and the Australian Academy of Social Sciences, and a Fellow of a number of professional statistical societies.

PRESENTATION

My principal field of research is Bayesian statistics. I am interested in Bayesian modelling, computation and application. Regarding modelling, I focus on representations of complex systems, such as those with latent structures (e.g., mixture models) or interacting structures (e.g., networks). Regarding computations, I am currently interested in approximate simulation methods (e.g. ABC) and methods for tackling high dimensional problems. Regarding applications, I focus mainly on substantive problems in ecology and environment, health and society.

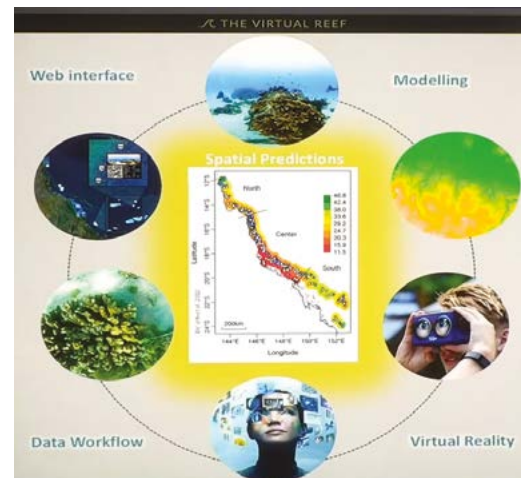
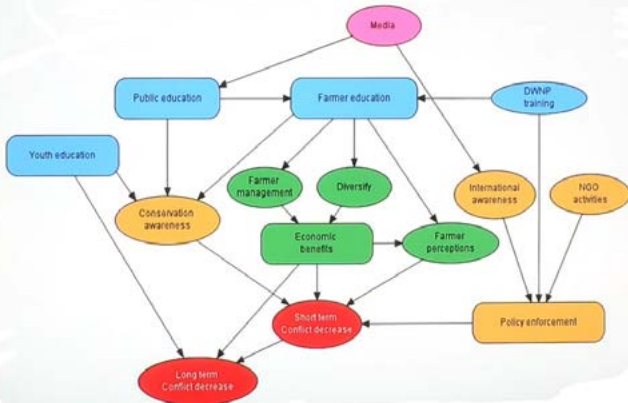
In this research programme, I will focus on Bayesian statistical approaches to problems in ecology and the environment, such as the identification of anomalies in water quality and conservation of coral reefs. This will require the development of new Bayesian methods and efficient algorithms for highly structured big data and systems data.

« Statistics is about taking these different kinds of data that we might have, examining those data and opening those data up to tell the stories that the data reveal. »





BN for human-cheetah conflict

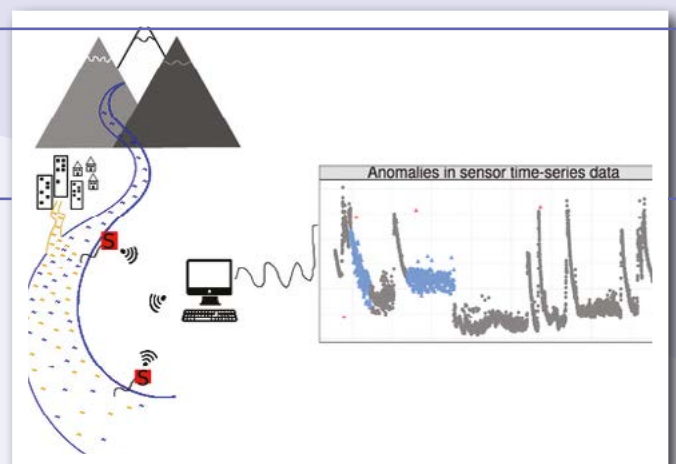


ACHIEVEMENTS

- In november 2019, Kerrie introduced E2S UPPA's second cycle of conferences with a lecture titled "Merging Data Science and Citizen Science for Conservation of Threatened Species". During this conference, Kerrie described some of the ways in which she and her team have been using citizen science data to address conservation challenges for jaguars in the Peruvian Amazon, koalas in Australia and coral cover in the Great Barrier Reef. She discussed the statistical challenges arising from the use of such data, including adjusting for bias and combining the data with other information sources.
- Kerrie has collaborated closely with UPPA colleagues to develop new statistical methodology at the interface of Bayesian statistics, machine learning and big data. These methods include anomaly detection in high-dimensional time series, spatio-temporal models, and meta-analytic methods for efficient analysis of large data with group structure. The new methods have been successfully applied to important problems in genomics and environment. (See references below.)
- To date, Kerrie and Benoit Liqueet have established a dynamic research team that has included an oceanograph expert Damien Sous (Associate Professor), four post-doctoral fellows (J. Rodriguez-Perez, C. Kermorvant, T. Baghfalaki, I. Ullah) and two PhD students (B. Mourguiart, T. Nguyen).

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- **Using a supervised principal components analysis for variable selection in high-dimensional datasets reduces false discovery rates.** bioRxiv. DOI: 10.1101/2020.05.15.097774 - I. Ullah, K. Mengersen, A. Pettitt, B. Liqueet (2020).
- **Bayesian meta-analysis models for cross cancer genomic investigation of pleiotropic effects using group structure.** Statistics in Medicine. Early View - T. Baghfalaki, T. Truong, A.N. Pettitt, K. Mengersen, B. Liqueet (2020).
- **Forecasting intensifying disturbance effects on coral reefs.** Global Change Biology 26(5), 2785-2797 - J. Vercelloni, B. Liqueet, E. Kennedy, M. Gonzalez-Rivero, M.J. Caley, E.E. Peterson, M. Puotinen, O. Hoegh-Guldberg, K. Mengersen (2020).

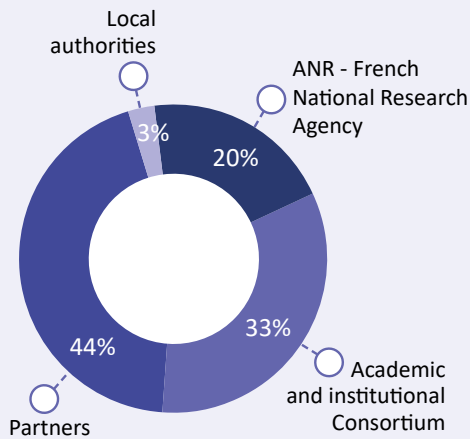




PULPA - Pulsed Power Science Technology and Applications



€ FINANCIAL CONTRIBUTION/YEAR



Bucur NOVAC

Loughborough University (UK)

My career started in 1977 at the Institute of Atomic Physics, Bucharest, Romania where I was the Head of the Plasma Laboratory, between 1993 and 1998.

Since 1998 I have been working at Loughborough University, UK and received the title 'Professor of Pulsed Power' in 2011. I am now the Head of the Plasma and Pulsed Power Group (P3G).

The results of the work undertaken along my career have resulted in more than 200 publications and I delivered International Invited Courses in 10 countries over 3 continents.

🤝 PARTNERS

- CEA - Commissariat à l'énergie atomique et aux énergies alternatives
- ITHPP SAS - Groupe ALCEN
- RNA - Région Nouvelle Aquitaine



KEY DATES

- **Chair kick-off:** January 2019
- **Duration:** 5 years



TEAM COMPOSITION

- **Permanent employees:** 5
- **PhD:** 3
- **Post-doctoral fellows:** 5



LOCALISATION: Pau

- UPPA's research unit - Laboratory for applied sciences in mechanics and electrical engineering (IPRA - SIAME)



CONTACTS

- **Leader:** bucur.novac@univ-pau.fr
- **Coordinator in situ:** laurent.pecastaing@univ-pau.fr



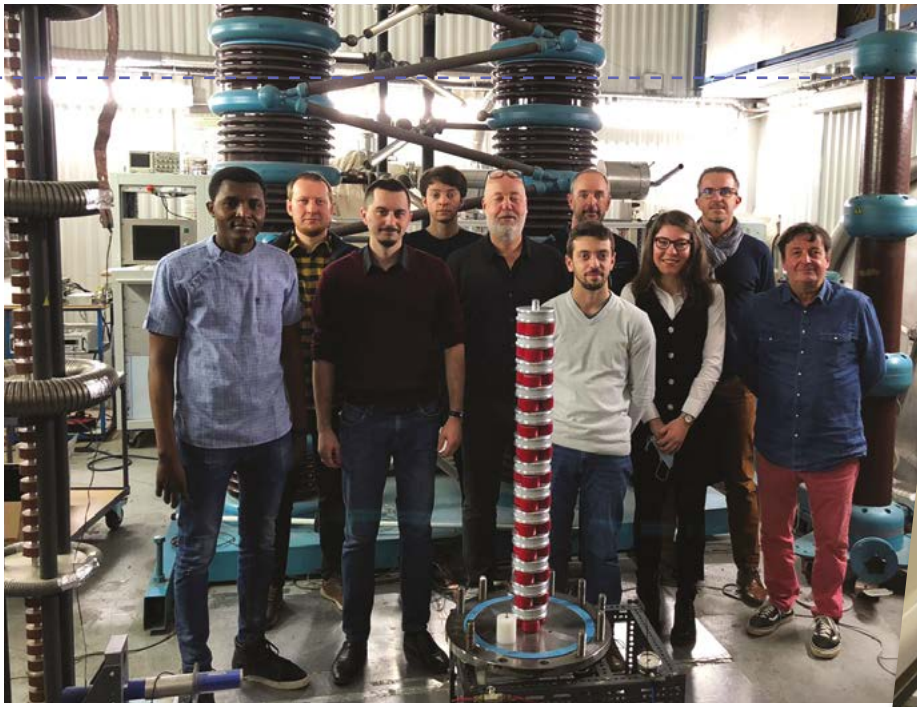
PRESENTATION

Pulsed Power is a technology based on slowly accumulating electrostatic energy in a capacitor, provided by an initial energy source, and releasing this energy as a very fast transient and high-power voltage impulse.

Three domains related to pulsed power applications: sterilisation with pulsed electron beam, cancer treatment by non-invasive pulsed electric field techniques and electric-driven hard rock drilling.

Between the Plasma and Pulsed Power Group (P3G), Loughborough University (UK) and the Pulsed Power Group at UPPA, led by Professor Laurent Pecastaing, there is a long and fruitful scientific collaboration with a large number of jointly published papers in the most reputed international journals plus many common presentations at the best international conferences in our domain.

The chair includes 2 research engineers, 2 post-doctoral fellows and 3 PhD students, all under my guidance. The team is very ambitious, and our main aim is to discover and advance the knowledge well beyond the present worldwide state-of the art. That very same team is also in charge of the NI-ILO project.



ACHIEVEMENTS

- 3 PhD students, 2 post-doctoral fellows and 1 research engineer are currently working for the Chair. A new research engineer is expected to start in March 2021.
- The first major results obtained by our research group should come out this year and they will be presented at the international EAPPC-BEAMS 2021 conference, a highly prestigious event that our research group is organizing in Biarritz.
- The chair also submitted a project, NI-ILO, in answer to the "Technology Transfer" call for projects, which nominated as laureate. We also signed a research contract with the company LVMH.



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- Analysis of the effect of ultra-wideband electromagnetic pulses on biological cells: A step towards a non-invasive approach for cancer treatment, N. IBRAHIMI, M. RIVALETTO, A. DE FERRON, L. PECASTAING, B.M. NOVAC, L. MIR, F. ANDRE, 3rd World Congress on Electroporation and Pulsed Electric Fields in Biology, Medicine and Food & Environmental Technologies, Toulouse, 2019**
- Analysis of the effect of ultra-wideband electromagnetic pulses on biological cells: An introduction to invasive and non-invasive approaches for cancer treatment, N. IBRAHIMI, M. RIVALETTO, A. DE FERRON, L. PECASTAING, B.M. NOVAC, L. MIR, F. ANDRE, 25th UK Pulsed Power Symposium, Loughborough, UK, 2019**
- Preliminary results of invasive and non-invasive studies using ultra-wideband electromagnetic pulses for cancer treatment, N. IBRAHIMI, L. PECASTAING, M. RIVALETTO, A. DE FERRON, B.M. NOVAC, ISP workshop, Eindhoven, 2019**
- A novel subnanosecond pulsed power system for bio-medical applications, N. IBRAHIMI, L. VALLET, F. ANDRE, L. ARIZTIA, M. RIVALETTO, A. DE FERRON, B.M. NOVAC, L. MIR, L. PECASTAING, International Conference on Plasma Science, Singapur, 2020 (virtuel)**
- A new approach to triggering thyristors in impact-ionization wave mode using a nonlinear PCSS driven by a semiconductor laser pumped by an avalanche S-diode, A. GUSEV, L. PECASTAING, B.M. NOVAC, I. PRUDAEV, International Conference on Plasma Science, Singapur, 2020 (virtuel)**
- Measurements of pressure waves generated by pulsed electric discharges in water, Y. BACQUEYRISSSES, T. REESS, A. DE FERRON, B.M. NOVAC, R. TUJAGUE, A. MORELL, International Conference on Plasma Science, Singapur, 2020 (virtuel)**

EAPPC-BEAMS MEGAGAUSS 2020
BIARRITZ - FRANCE

8th Euro-Asian Pulsed Power Conference
23rd High Power Particle Beams Conference
17th Megagauss Magnetic Field Generation and Related Topics Conference

29 August - 02 September 2021
Biarritz - France

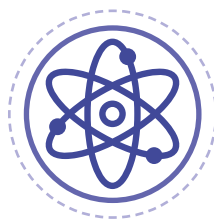
IMPORTANT DATES

- Jan. 01, 2020 : Opening of registration
- Feb. 01, 2020 : Opening of abstract submission
- Apr. 16, 2021 : Closing of abstract submission
- Jun. 11, 2021 : Notification of abstract acceptance

TOPICS

- Pulsed power physics and technology
- Generator and components
- Pulsed power applications
- High power microwave and RF sources
- High-energy density physics and technology
- Particle beam technology

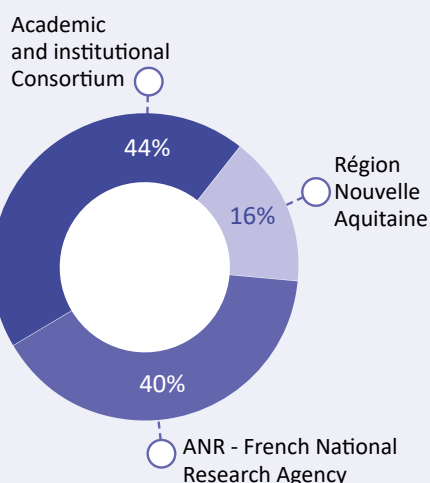
info@eappc-beams2020.org www.eappc-beams2020.org



Creating Structural Diversity through BN/CC Isosterism

Developing New Energy Conversion Platforms using Boron-Nitrogen Heterocycles

FINANCIAL CONTRIBUTION/YEAR



KEY DATES

- Chair kick-off : March 2019
- Duration : 5 years



TEAM COMPOSITION

- Permanent employees: 4
- PhD: 2
- Post-doctoral fellows: 5



LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



CONTACTS

- Leader: shihyuan.liu@univ-pau.fr
- Coordinator in situ: anna.chrostowska@univ-pau.fr



Shih-Yuan LIU
Boston College (USA)

- 1998 TU Wien (BSc)
 - 2003 MIT (PhD organic chemistry with Gregory C. Fu)
 - 2003-2006 MIT (Postdoc inorganic chemistry with Daniel G. Nocera)
 - 2006-2012 Assistant Professor, Univ. of Oregon
 - 2012-2013 Associate Professor, Univ. of Oregon
 - 2013- Full Professor, Boston College
- Expertise: Synthetic organic chemistry



PRESENTATION

We are engaged in synthetic chemistry with emphasis on developing molecules of importance in biomedical research and materials science.

We are particularly interested in the development of boron(B)–nitrogen(N)-containing heterocycles, specifically azaborines. These are structures resulting from the replacement of two carbon atoms in benzene with a boron and a nitrogen atom. Azaborines closely match the size and shape of ordinary benzene rings, but most of their other physical, chemical, and spectroscopic properties are significantly altered.

We aim to exploit the unique properties of azaborines and investigate their potential as arene surrogates in materials and biomedical research. Our approach combines the broad utility of arenes with the unique elemental features of boron.

Areas of exploration include organic synthesis, catalysis, hydrogen storage, optoelectronic materials, and drug discovery.



Danylo Hatych
Doctorant



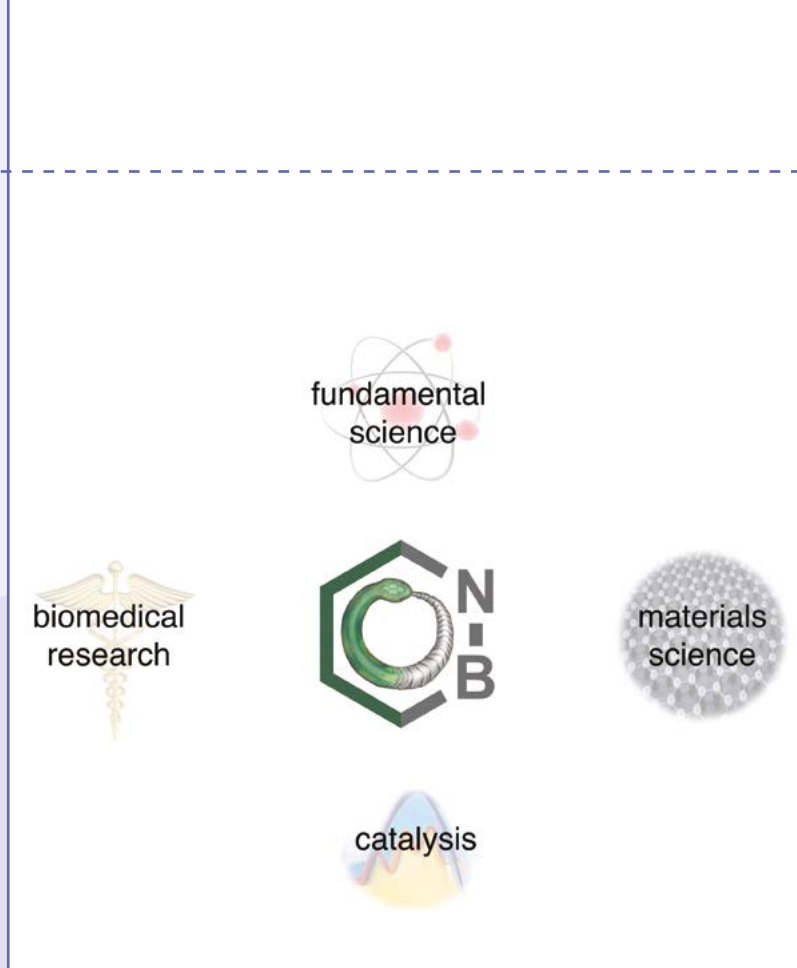
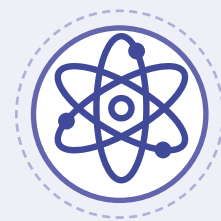
Walid Lamine
Post-doctorant



Ramlakshmi Rongala
Post-doctorante



Chen Zhang
Doctorant



ACHIEVEMENTS

- The Chair's team has been established with 2 new postdocs and 2 PhD students working alongside 7 permanent staff members at IPREM.
- In June 2019, as part of the monthly E2S UPPA conferences, Professor Liu gave a lecture entitled "Translating Structure to Function Using Chemical Synthesis".
- In July 2019, Dr. Tom Autrey, a senior Researcher at US Pacific Northwest National Laboratory and a former collaborator of the chair, gave an E2S UPPA conference lecture entitled: "Energy landscapes defining catalytic reaction pathways leading to energy storage in chemical bonds".
- The chair is making progress toward the methods development of BN azulenes as well as BN cycloparaphenylenes. Two papers as a result of the collaborative work between the Chair and the UPPA IPREM team have been published (see Bibliography).
- The team is also making progress in establishing synthetic capability for the chair at IPREM through laboratory renovations.
- One postdoc and one PhD student are engaged in international research internships at the chair's home institution.



BIBLIOGRAPHY

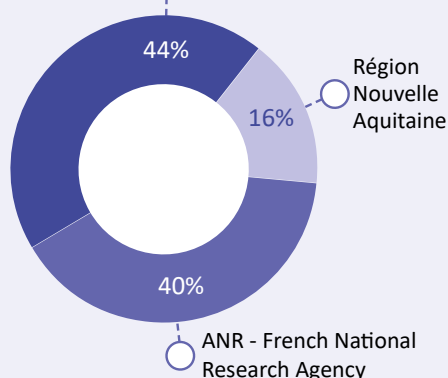
- **A BN-Doped Cycloparaphenylene Debuts** - Angew. Chem. Int. Ed. 2021, 60, 1556-1560. DOI: 10.1002/anie.202010556 - Chen M.; Unikela K. S.; Ramalakshmi R.; Li B.; Darrigan C.; Chrostowska A.; Liu S.-Y.
- **Cation- π Binding Ability of BN Indole** - Chem. Commun. 2020, 56, 3749-3752. DOI: 10.1039/D0CC00869A - Boknevitiz K.; Darrigan C.; Chrostowska A.; Liu S.-Y.



InterMat - Interface Matters in Solution Processed Inorganic/Organic Thin Film Solar Cells for Bio-inspired Solar Fuels Generation

€ FINANCIAL CONTRIBUTION/YEAR

Academic and institutional Consortium



📅 KEY DATES

○ Chair kick-off: May 2019

○ Duration: 5 years



TEAM COMPOSITION

○ Permanent employees: 3

○ PhD: 2

○ Post-doctoral fellows: 5



LOCALISATION: Pau

○ Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



CONTACTS

○ Leader: emilio.palomares@univ-pau.fr

○ Coordinator in situ: laurent.billon@univ-pau.fr



Emilio PALOMARES
Institute of Chemical Research of Catalonia (Spain)

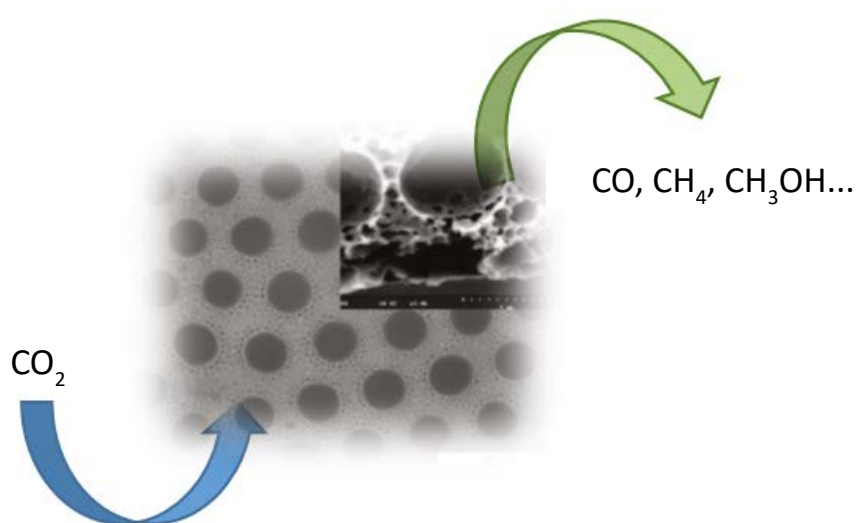
Dr. Emilio Palomares (Spain, 1974) is ICREA Research Professor at the Institute of Chemical Research of Catalonia (ICIQ). His research focuses on energy conversion devices; from the synthesis of the materials to the analysis of the full device in operando conditions. He is Fellow of the Royal Society of Chemistry (UK) and has published over 250 articles.



PRESENTATION

InterMat aims to approach perovskite solar cells and novel catalysts to their use in CO₂ conversion photo-electrocatalytic systems to mimic photosynthesis. On the one hand, it will focus also on the investigation of the interface between the nanoscale inorganic semiconductor layers in these thin film solar cells to reduce non-radiate charge recombination processes and maximize the solar cell efficiency. Furthermore, it will study the photo-electrocatalytic reactions at the surface of the organic or inorganic nano/micro-structured semiconductor electrodes used in the photo-reactor for the reduction of CO₂ into solar fuels.

How materials work-function changes, the interfacial charge transfer reactions that limits the devices theoretical maximum efficiency for CO₂ conversion, the mechanism for charge accumulation and charge transport across the interface are still unresolved challenges to achieve a quantum leap in efficiency in earth abundant and novel solution process photo-electrocatalytic systems for CO₂ catalysis.



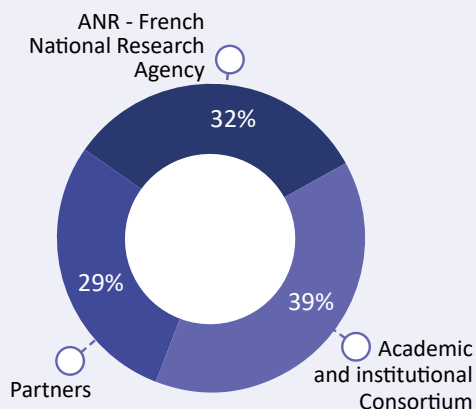
ACHIEVEMENTS

- Installation of a GC / MS to online monitor CO₂ reduction (€ 60k invested 40% Interimat, 40% eSCALED, 20% FDR).
- 3 month stay of Fabio VIERA (Oct-Dec 2020), recruited in January 2020, at ICIQ to stabilize the layers of photoactive materials on the electrodes.



Untargeted Molecular-level Analysis of Complex Systems: An opportunity to learn from sample complexity

FINANCIAL CONTRIBUTION/YEAR



Ryan RODGERS

Florida State University (USA)

Professor Rodgers received a B.S. in chemistry from the University of Florida in 1995, and a Ph.D. in analytical chemistry from Florida State University in 1999. Following a postdoctoral appointment at Oak Ridge National Laboratory, he joined the Ion Cyclotron Resonance Program at the National High Magnetic Field Laboratory (NHMFL) as an Assistant Scholar-Scientist and a courtesy faculty member of the Department of Chemistry and Biochemistry at Florida State University. He currently is the Director of the Future Fuels Institute, FSU Distinguished Scholar, and an Associate Editor of Energy and Fuels.

PARTNERS

- TotalEnergies E&P Recherche et Développement SAS



KEY DATES

- Chair kick-off: May 2019
- Duration: 5 years



TEAM COMPOSITION

- Permanent employees: 2
- PhD: 2
- Post-doctoral fellows: 5



LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)



CONTACTS

- Leader: ryan.rodgers@univ-pau.fr
- Coordinator in situ: brice.bouysiere@univ-pau.fr



PRESENTATION

Over the past two decades, high field FT-ICR mass spectrometry has forever changed the utility and expectations of complex mixture analysis by mass spectrometry. The inherent high resolving power and high mass accuracy enable direct determination of elemental compositions to tens of thousands of individual components in complex mixtures by mass measurement alone. Modern ionization methods facilitate the selective ionization of components based coarsely on chemical functionality, which combined with FT-ICR MS, reveals acidic, basic, and aromatic contributions to complex mixtures at a molecular level. In this research plan, we will continue to pioneer petrochemical and environmental applications of the technology to aid in the understanding of complex degradation / cycling processes of organic carbon in the environment and advance efforts for the judicious use of heavy petroleum fractions.



Brice Bouysière
Coordinateur



Carlos Celis Cornejo
Post-doctorant



Deisy Giraldo Davila
Doctorante



ACHIEVEMENTS

- First implementation of online GPC to the highest world field FT-ICR MS (21T) for the analysis of complex asphaltene fractions.
- First comparison of elemental quantitative analysis (GPC-ICP HR MS) and molecular analysis (GPC-FT-ICR/MS) highlighting the ionization competition phenomenon observed by FT-ICR/MS when analyzing asphaltenes samples.



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- **Chemical Characterization Using Different Analytical Techniques to Understand Processes: The Case of the Paraffinic Base Oil Production Line** – Rémi Moulian, Johann Le Maître, Hélène Leroy, Ryan Rodgers, Brice Bouyssiere, Carlos Afonso, Pierre Giusti, Caroline Barrère-Mangote – *Processes*, 2020, 8 (11), pp.1472, DOI: 10.3390/pr8111472.
- **Speciation of Metals in Asphaltenes by High-Performance Thin-Layer Chromatography and Solid-Liquid Extraction Hyphenated with Elemental and Molecular Identification** – Rémi Moulian, Martha Chacón-Patiño, Oscar Lacroix-Andrivet, Sandra Mounicou, Anna Luiza Mendes-Siqueira, Carlos Afonso, Ryan Rodgers, Pierre Giusti, Brice Bouyssiere, Caroline Barrère-Mangote – *Energy and Fuels*, 2020, 34 (10), pp.12449–12456, DOI: 10.1021/acs.energyfuels.0c02525.
- **Probing Aggregation Tendencies in Asphaltenes by Gel Permeation Chromatography. Part 1: Online Inductively Coupled Plasma Mass Spectrometry and Offline Fourier Transform Ion Cyclotron Resonance Mass Spectrometry** – Jonathan C. Putman, Rémi Moulian, Caroline Barrère-Mangote, Ryan P. Rodgers, Brice Bouyssiere, Pierre Giusti, Alan G. Marshall – *Energy and Fuels*, 2020, 34 (7), pp.8308–8315, DOI: 10.1021/acs.energyfuels.0c01522.
- **Probing Aggregation Tendencies in Asphaltenes by Gel Permeation Chromatography. Part 2: Online Detection by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry and Inductively Coupled Plasma Mass Spectrometry** – Jonathan C. Putman, Rémi Moulian, Donald F. Smith, Chad R. Weisbrod, Martha L. Chacón-Patiño, Yuri E. Corilo, Greg T. Blakney, Leah E. Rumancik, Caroline Barrère-Mangote, Ryan P. Rodgers, Pierre Giusti, Alan G. Marshall, Brice Bouyssiere – *Energy and Fuels*, 2020, 34 (9), pp.10915–10925, DOI: 10.1021/acs.energyfuels.0c02158.
- **Compositional trends for total vanadium content and vanadyl porphyrins in gel permeation chromatography fractions reveal correlations between asphaltene aggregation and ion production efficiency in atmospheric pressure photoionization** - Martha L. Chacón-Patiño, Rémi Moulian, Caroline Barrère-Mangote, Jonathan C. Putman, Chad R. Weisbrod, Greg T. Blakney, Brice Bouyssiere, Ryan P. Rodgers, and Pierre Giusti – *Energy and Fuels*, 2020, 34 (12), pp.16158-16172, DOI: 10.1021/acs.energyfuels.0c03349.



German Gascon Colmenares
Post-doctorant



Julie Guillemant
Post-doctorante



Nathaniel Terra Telles Souza
Doctorant

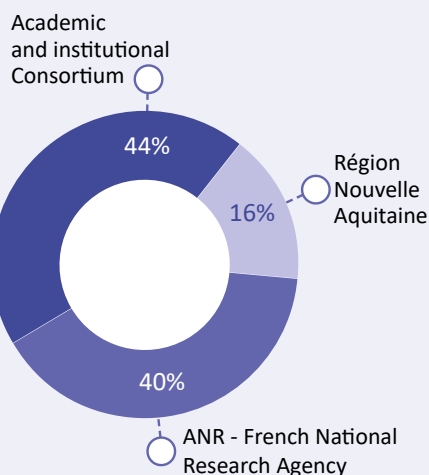


Pierre Giusti
Coordinateur Total



Accelerated Development of Alloy Materials for Energy Technologies

FINANCIAL CONTRIBUTION/YEAR



KEY DATES

- Chair kick-off: September 2019
- Duration: 5 years

TEAM COMPOSITION

- Permanent employees: 2
- PhD: 2
- Post-doctoral fellows: 5

LOCALISATION: Pau

- Joint research unit UPPA/CNRS - Institute of analytical sciences and physical chemistry for the environment and materials (IPREM)

CONTACTS

- Leader: andrew.gellman@univ-pau.fr
- Coordinator in situ: herve.martinez@univ-pau.fr



Andrew GELLMAN

Carnegie Mellon University (USA)

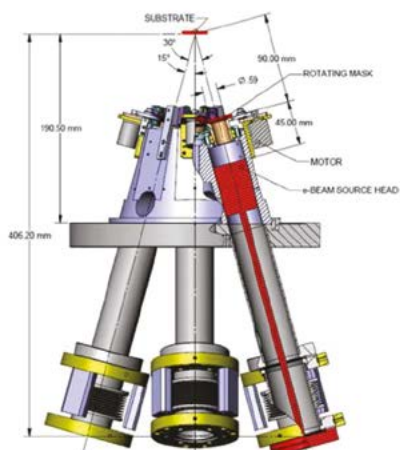
My research is in the field of surface chemistry and surface science. I hold a BS in Chemistry from Caltech (1981) and a PhD in Physical Chemistry from UC Berkeley (1985). After one year as an ICI postdoctoral fellow at Cambridge University (1986), I joined the University of Illinois at Urbana-Champaign as an Assistant Professor of Chemistry. I now hold the Lord Chair of Chemical Engineering at Carnegie Mellon University and where I also serve as the co-Director of the W.E. Scott Institute for Energy Innovation.

PRESENTATION

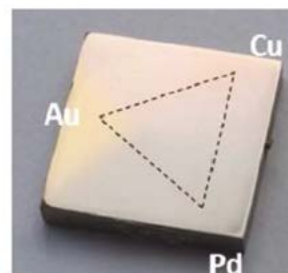
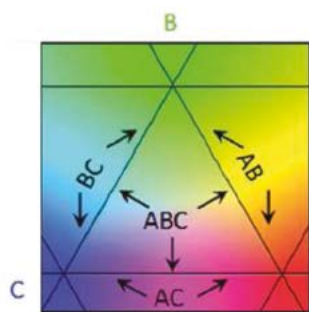
Professor Gellman's research is in the area of surface chemistry with particular emphasis on catalytic surface chemistry, selective chemistry on chiral surfaces, tribology and high throughput study of alloy surfaces. He has developed a number of experiments and methodologies for exploring fundamental aspects of surface chemistry in each of these areas. His research is now focusing on the development and application of high throughput methods for study of alloy surface properties such as catalysis and surface processes relevant to energy technologies. His laboratory has developed tools for preparing Composition Spread Alloy Films that contain all possible compositions of binary or ternary alloys; $A_x B_y C_{1-x-y}$ with $x = 0 \rightarrow 1$, $y = 0 \rightarrow 1-x$. These are used for studying alloy properties such as catalysis, corrosion, and adsorption spanning all possible alloy compositions. In addition to enabling optimization of alloy properties, these studies provide comprehensive datasets that can serve as the basis for development of models that predict the composition dependence of these phenomena on alloys.



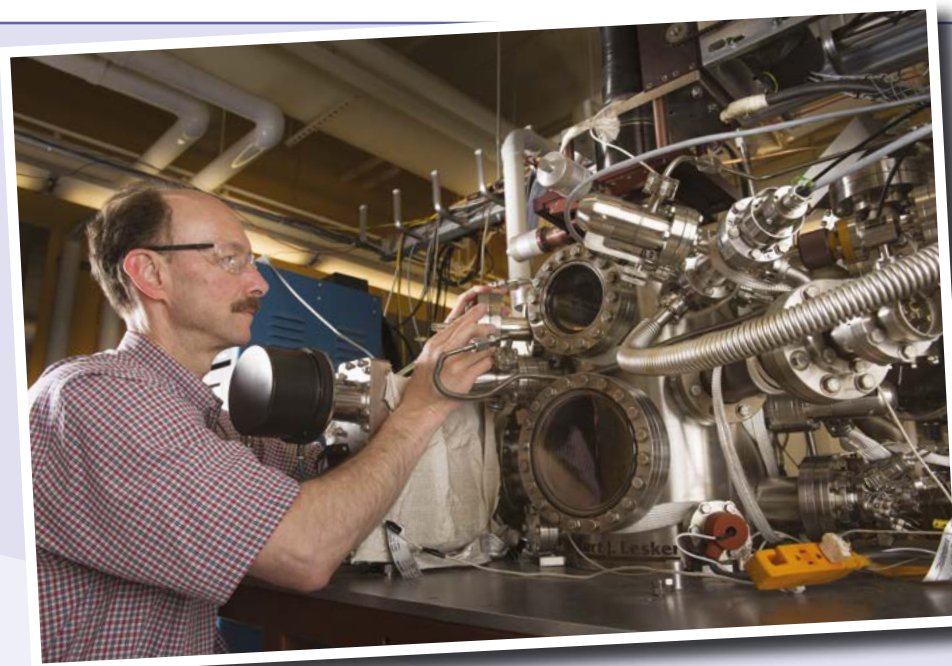
Multi-component Materials Science



Schematic of the new deposition tool



Schematic and photograph of the ternary alloy



Jean-Charles Dupin
Assistant professeur



Camille Ferris
Doctorante



Jean-Bernard Ledeuil
Ingénieur de recherche



Hervé Martinez
Professeur

