

Université Bordeaux Segalen – INSERM U 869 : ARNA

Team: ChemBioMed

PERMANENT STAFF

➤ Six extra permanent researchers/engineers are not (yet) involved in AMADEus-relevant projects



Philippe Barthélémy
Prof.
Team leader



Isabelle Bestel
Ass. Prof.



Arnaud Gissot
Ass. Prof.



Laurent Latxague
Ass. Prof.



Laurent Azema
Ass. Prof.



Frederic Vigier
IE

MOBILIZED COMPETENCES

➤ Molecular and supramolecular chemistry for Biomedical applications
+ Nano sciences
+ Drug delivery
+ Bioinspired systems
+ Nucleic acid chemistry

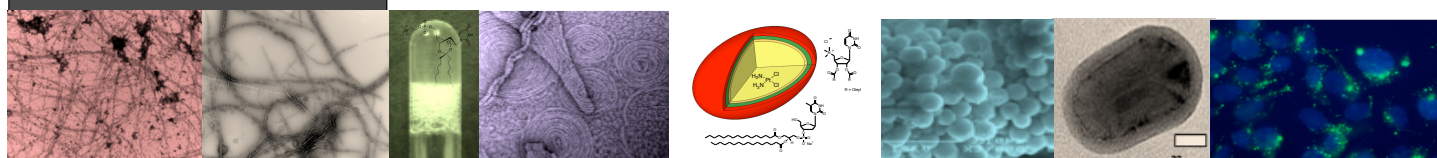
- Synthesis and applications of hybrid bioinspired molecules: Nucleoside Lipids (NLs), Glycosylated Nucleoside Lipids (GNLs), Amino Acid nucleoside lipids (AANLs), Lipid Oligonucleotide conjugates (LONs) etc.
- Supramolecular engineering, bottom up approach for the preparation of nano organized systems (nanoparticles, nanocapsules, nanotubes, nanogels etc)
- Biofunctionalization, and hybrid lipids wrapping of nanomaterials
- Formulation in water or physiological media
- Conception, design and development of specific drug delivery systems (DDS)

MAIN FACILITIES

- Conventional facilities for molecular, supramolecular and physico chemistry (organic synthetic lab, NMR, UV-Vis, tensiometer, nano-sizer, zeta potential, ultrasound...
- Specific synthesis facilities: Automated oligonucleotides synthesis, microwave-assisted synthesis, etc.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of advanced systems for drug delivery applications
- NanoGels for Stem cells culture
- Transfection hybrid lipids for the delivery of oligonucleotide sequences, siRNA, DNA etc).
- Self-vectorized oligonucleotide targeting biological relevant RNA sequences
- Physico chemistry of hybrid synthetic molecules (Nucleolipids, Lipid oligonucleotide conjugates etc)
- Design of encoded supramolecular systems





PERMANENT STAFF

MOBILIZED COMPETENCES

➤ *Nucleic Acids structures*
+ *self assembly*
+ *molecular recognition*

MAIN FACILITIES

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

ARN: Régulations Naturelle & Artificielle – INSERM U869

Team: Unusual Nucleic Acids Structures



Anne Bourdoncle
Ass. Prof.



Aurore Guédin
Ass. Ing.



Jean-Louis Mergny
*Senior Res.
Team Leader*



Gilmar Salgado
Ass. Prof.

- DNA and RNA structures
- Self-assembly of Guanine-rich nucleic acids
- DNA origamis and DNA nanotiles
- Molecular beacons and DNA-based nanodevices
- Nucleic acids ligands : small compounds (*Quadruplex ligands as antiproliferative agents*) and proteins (*Helicases involved in Cancer*)

- Biochemical and biophysical characterization of nucleic acid structures: UV-vis Absorbance, Fluorescence (*static, time-resolved, FRET*), Calorimetry (*DSC, ITC*), Electrophoresis
- Single molecule studies (*magnetic tweezers*)
- Access / Use of IECB structural platform (*NMR, Surface Plasmon Resonance, Circular Dichroism, Cell culture*) & U869 facilities (*DNA synthesizer, capillary electrophoresis*)

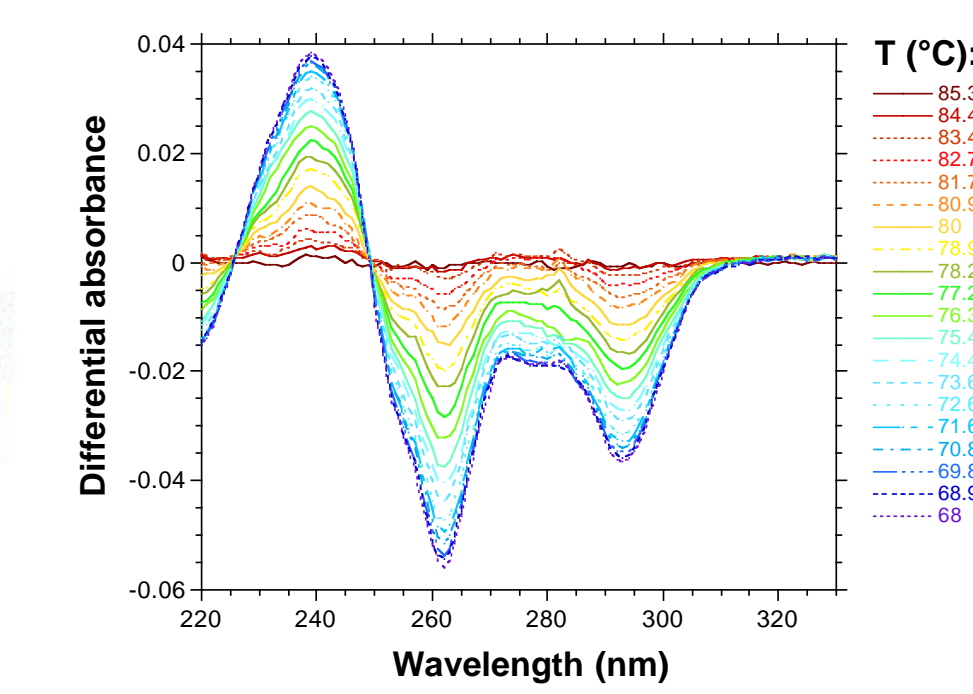
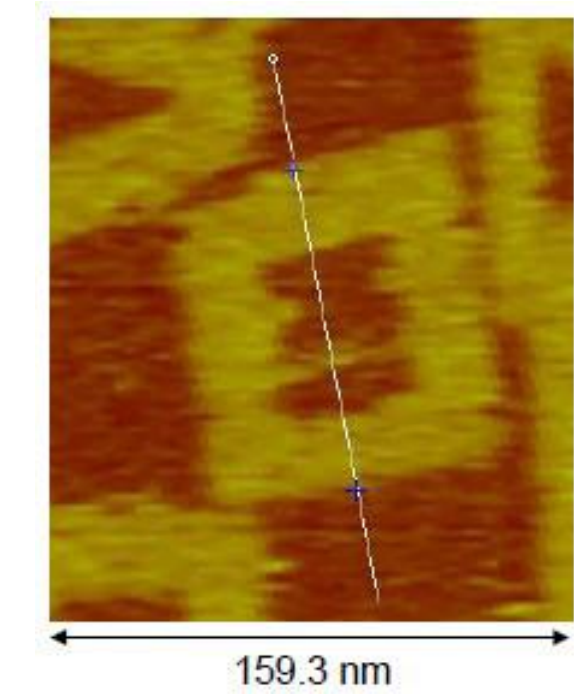
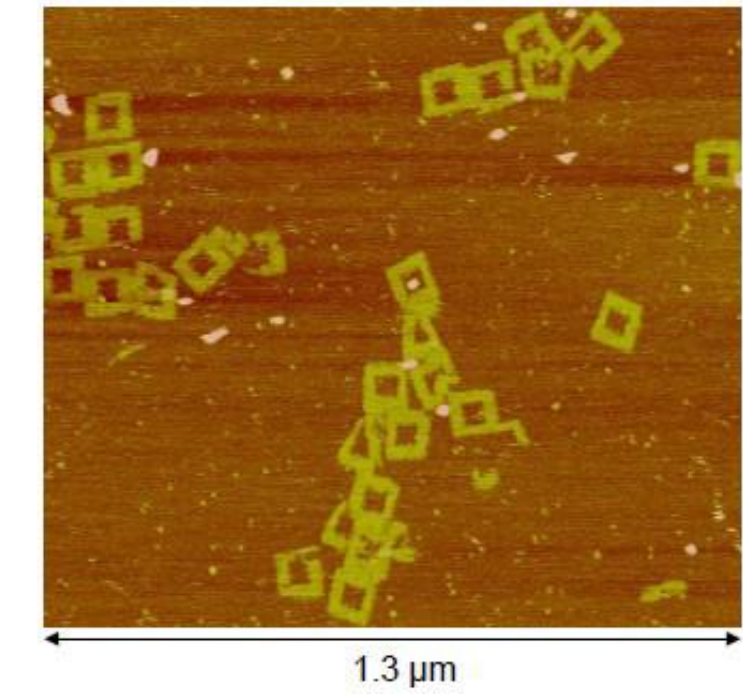
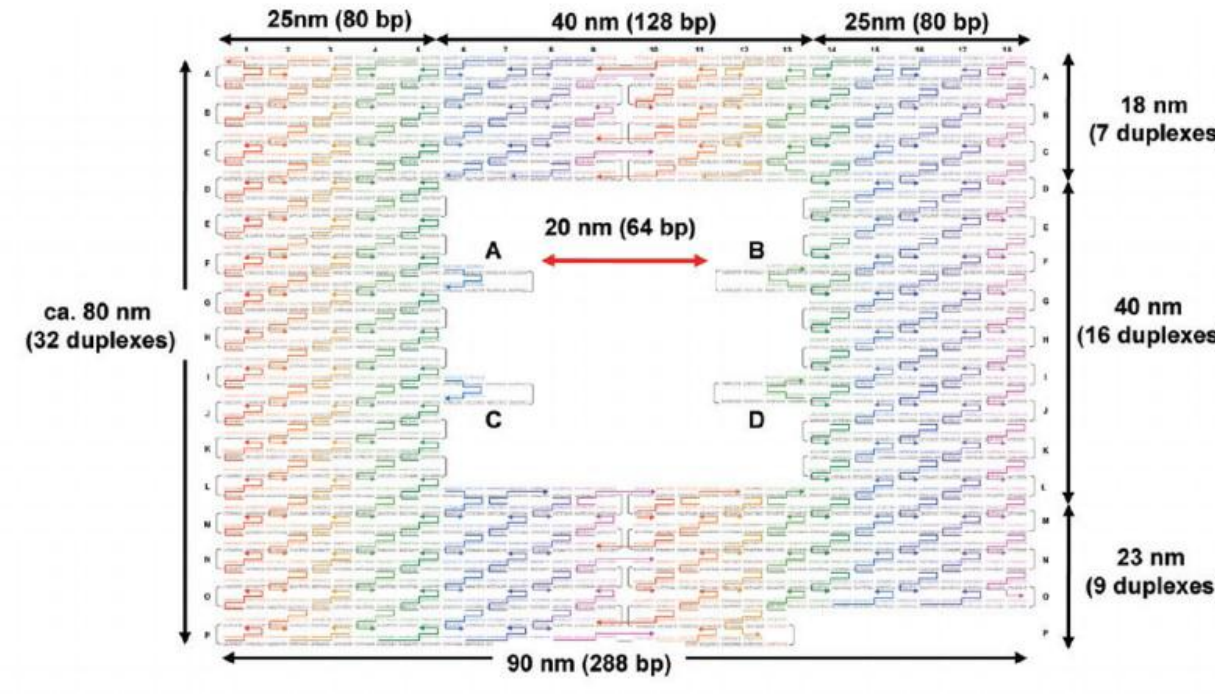
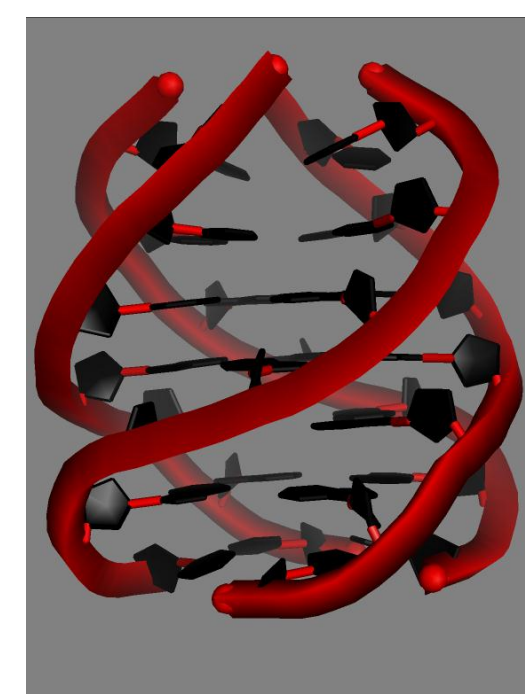
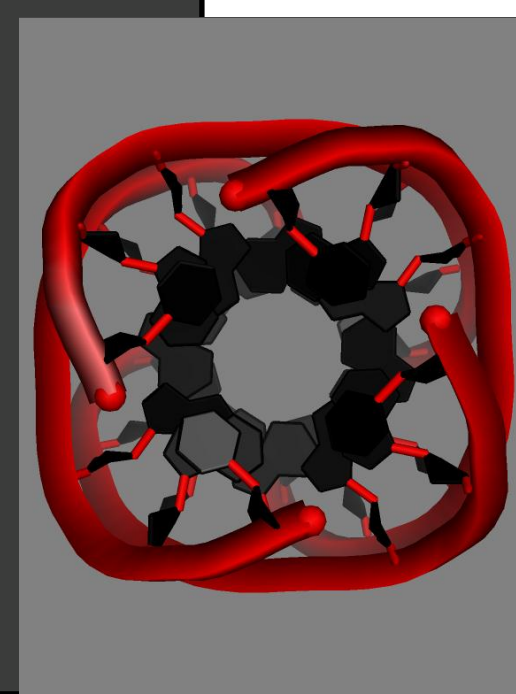
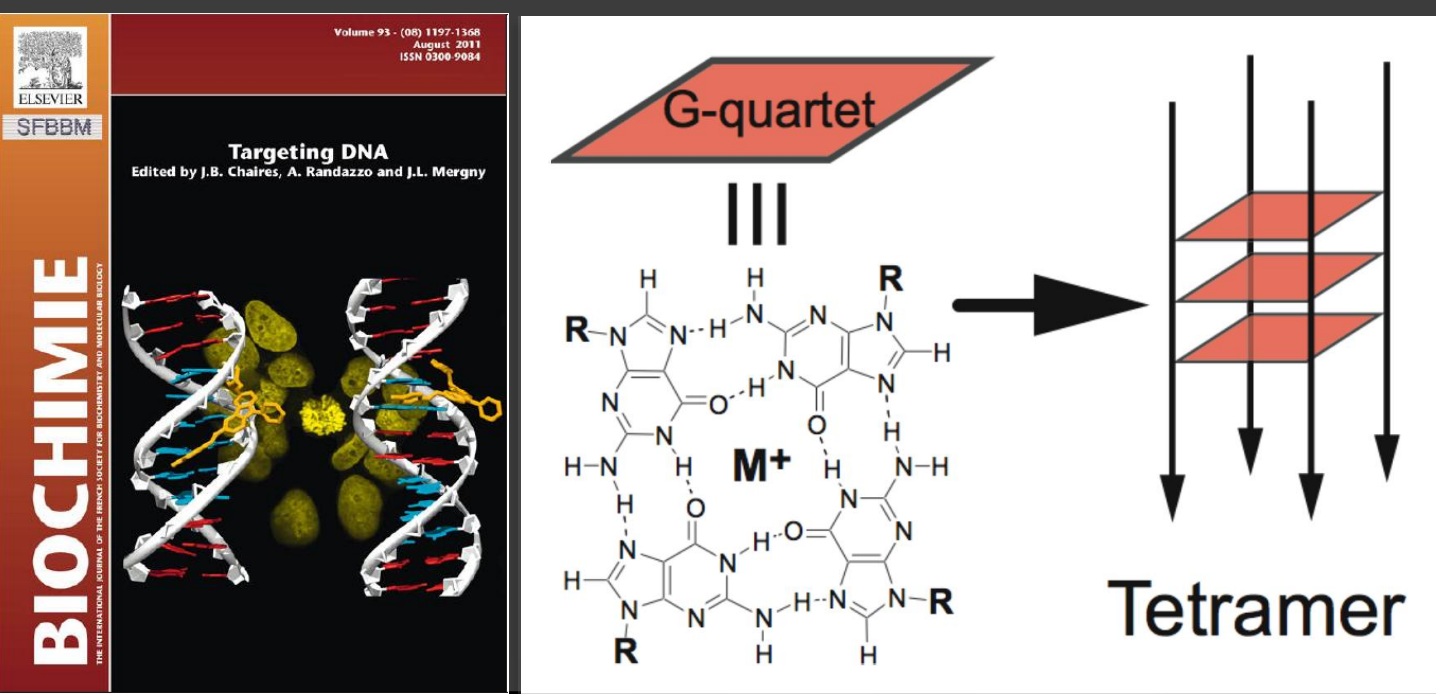
- Chaperoning / Repairing DNA-based nanomaterials (origamis; tiles)
- Visualising single molecules embedded within a DNA frame
- DNA as a template for cellular attachment
- DNA-based “smart” materials – integrating multiple external stimuli
- DNA-based logic gates (AND / OR)
- Conductivity of nucleic acid structures – G-wires
- *In vivo* NMR of nucleic acids – Interactions of ligands with nucleic acids using NMR



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Advanced MAterials by DEsign



PERMANENT STAFF

➤ Nine permanent researchers and 5 engineers are involved in AMADEus-relevant projects



Joëlle Amédée

Senior Res.
Team leader



Laurence Bordenave

Res Prof.



Olivier Chassande

Junior res.



Fabien Guillemot

Junior Res.



Jean Christophe Fricain

Res. prof.



Damien Le Nihouannen

Ass. Prof.

MOBILIZED COMPETENCES

➤ Tissue engineering
+ Biomaterial science
+ Laser assisted bioprinting
+ Human stem cell biology sciences
+ Cell / biomaterial interfaces
+ Experimental models (tissue / biomaterial interfaces and bioimaging)

- Bone and vascular tissue engineering
- Human adult stem cell cultures and their cell biology
- Laser interactions with biomaterials and biological tissues / biofabrication
- Local micro-environments modifications through laser interaction (mechanical and biochemical gradients)
- Cell interfaces with 2D functionalized surfaces
- Cell fate within a 3D (functionalized) scaffold (polymer, composite biomaterials...)
- Mechanical stress (flow chambers, bioreactor)
- Host tissue / tissue engineered constructs – Preclinical models and bioimaging

MAIN FACILITIES

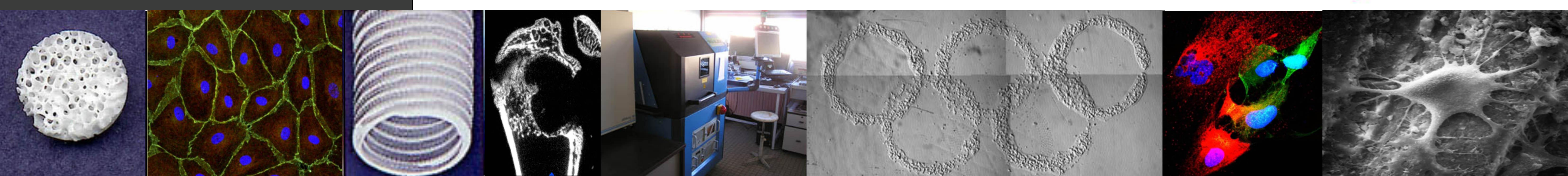
- Conventional facilities for human stem cell cultures and characterization (cell and molecular biology)
- Flow cytometry and confocal microscopy
- 2 workstations dedicated to Laser Assisted Bioprinting Specific
- Facilities for biomaterial characterization (SEM, profilometry...)
- Facilities for experimental models, surgery and bio-imaging.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Design and produce appropriate biocompatible and bioresorbable materials
- Understand the interaction between material surface and stem cells by integration of a set of skills and tools, such as targeting and signaling components.
- Create local mechanical and biochemical environments able to drive stem cell differentiation.
- Biofabrication on demand of 3D complex tissues and organs.
- Multifunctional large micro/nanopatterned matrices for tissue reconstruction
- Evaluate *in vivo* these tissue-engineered constructs using animal models for bone and vascular reconstruction, with the know-how of the technology transfert unit : CIC-IT Biomaterials.



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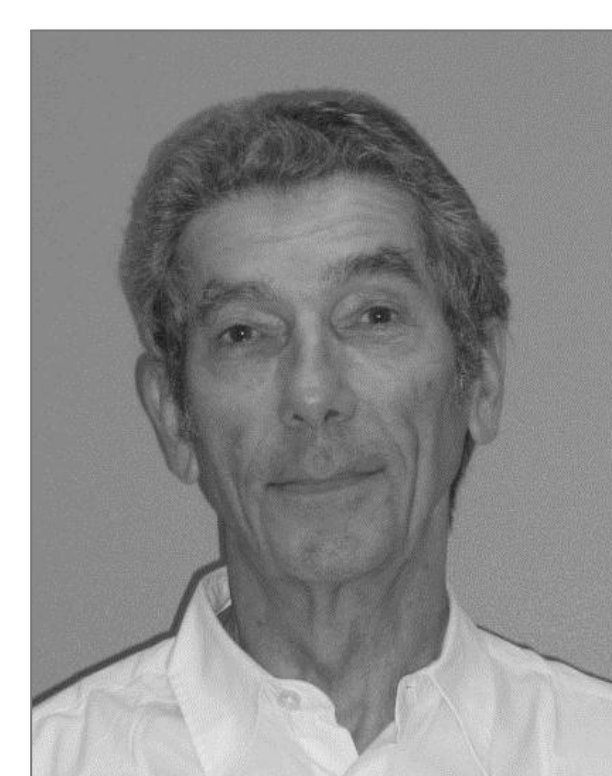


Chimie et Biologie des membranes et Nano-Objets - UMR 5248

Team: Molecular Imaging and NanoBiotechnology



**Anthony
Bouter**
Ass. Prof.



**Alain
Brisson**
Prof.
Team leader



**Céline
Gounou**
Ing.



**Sisareuth
Tan**
Ing.

PERMANENT STAFF

MOBILIZED COMPETENCES

➤ Bio-physico-chemistry
+ structural biology
+ protein and lipid chemistry
+ nanobiotechnology

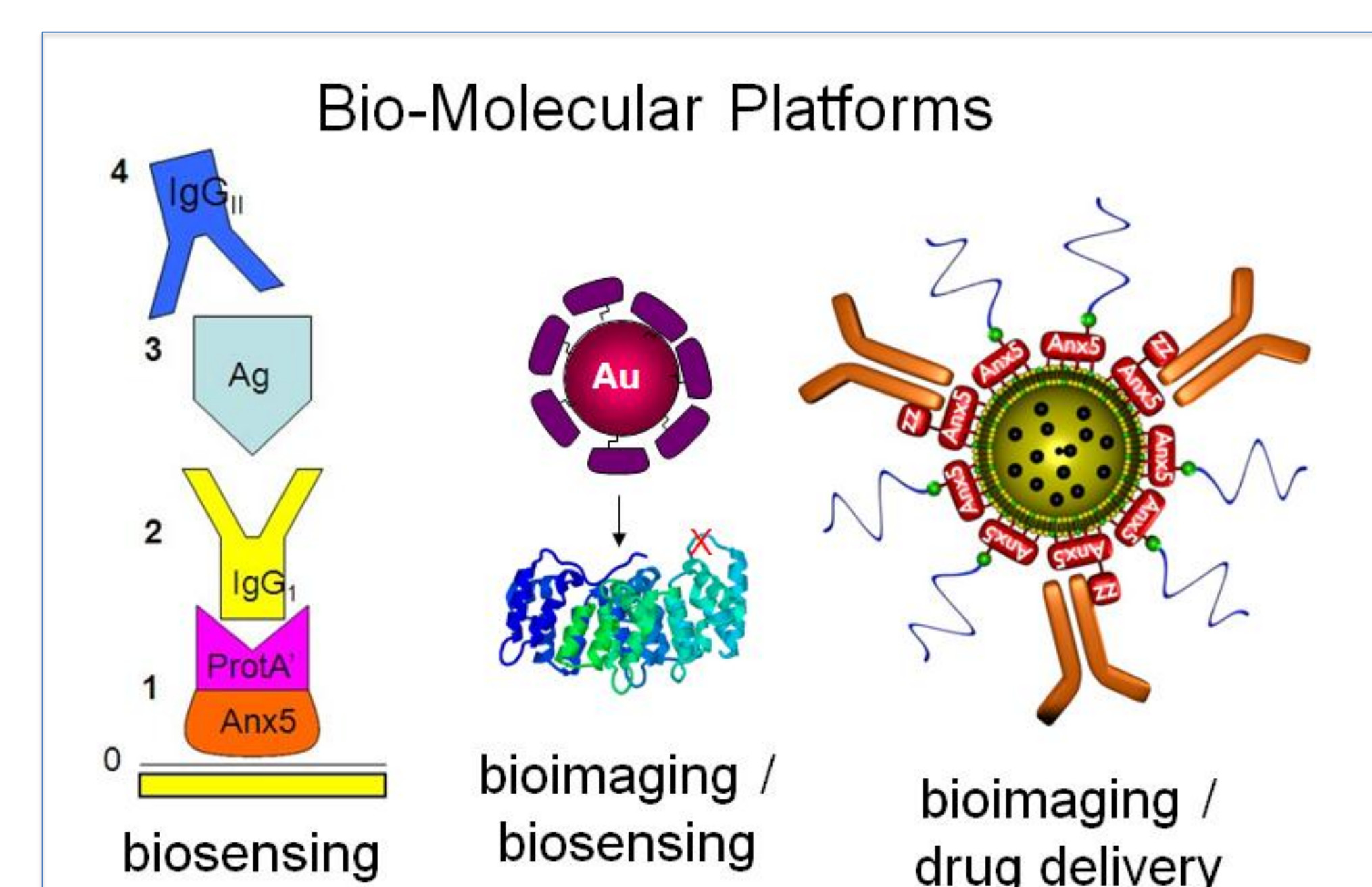
- Synthesis and applications of bio-functionalized nanoparticles
- Synthesis of chimeric proteins for biotechnological applications
- Nanoscale molecular tools for bio-imaging and bio-sensing
- 2D self-assembly of bio-molecular platforms
- Design of composite inorganic-organic-bioorganic nanoparticles
- Synthesis of lipid- and protein- functionalized surfaces and nanoparticles
- Structural and physico-chemical characterization

MAIN FACILITIES

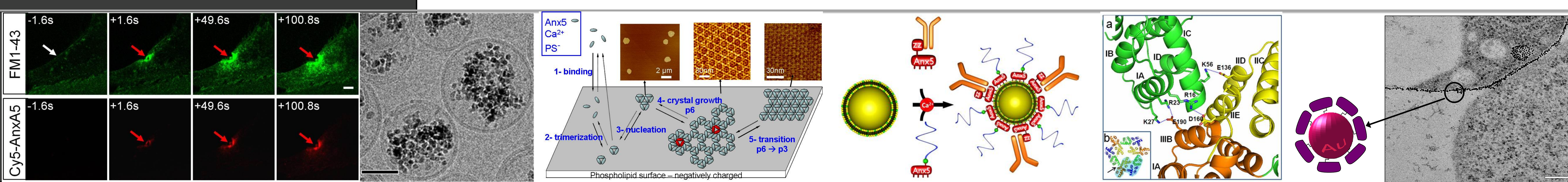
- Conventional facilities for biochemistry and molecular biology, protein synthesis, purification and characterization of proteins and membranes
- Specific facilities in bio-molecular imaging : cryo-TEM, AFM, fluorescence microscopy
- Specific characterization facilities : Flow Cytometry, Quartz Crystal Microbalance.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of protein-functionalized nanoparticles for isolation, targeting, imaging
- Development of drug delivery systems
- Basic and applied studies of membrane processes : fusion, repair, ...
- Bio-sensing for early detection of diseases
- Theranostics



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PERMANENT STAFF



**Yann
Ferrand**
Junior Res.



**Frédéric
Godde**
Ass. Prof.



**Ivan
Huc**
*Senior Res.
Team leader*



**Victor
Maurizot**
Junior Res.

MOBILIZED COMPETENCES

➤ *Supramolecular chemistry*
+ *molecular design*
+ *synthetic chemistry*
+ *structural chemistry*

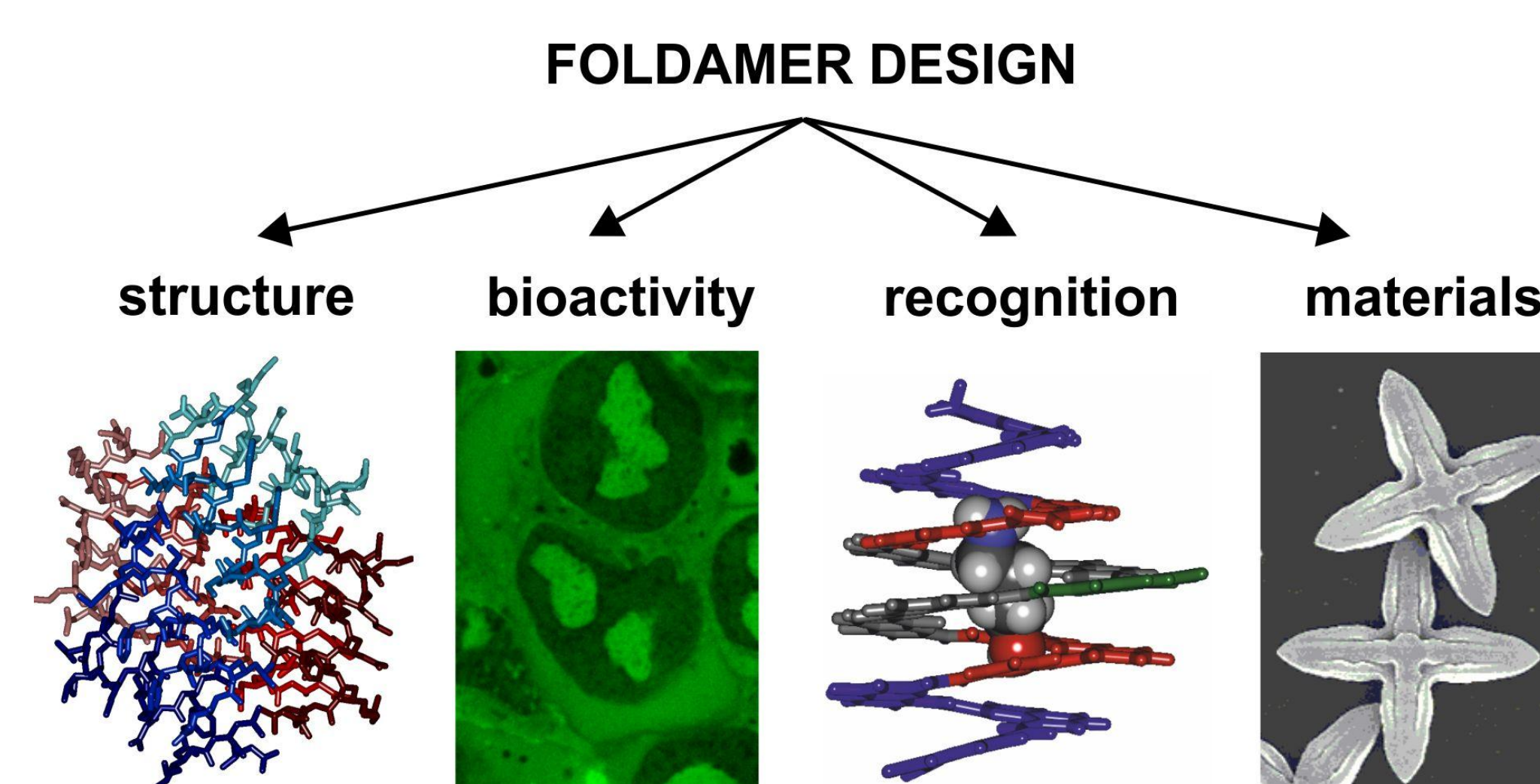
- Design of nanoscale molecular structures self-organized by folding
- Artificial folded architectures (foldamers)
- Orchestration of non-covalent interactions
- Stepwise chemical synthesis of protein-sized organic molecules
- Control of shape, size and size-distribution
- Structural characterization
- Molecular recognition and sensing
- Biological applications – protein and nucleic acid recognition
- Self-assembly

MAIN FACILITIES

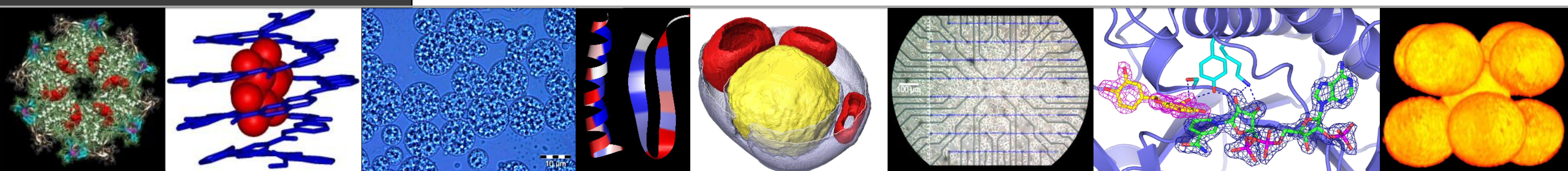
- Conventional facilities for organic synthesis, purification and characterization of organic molecules
- Specific synthesis facilities: solid phase synthesis, microwave-assisted synthesis, etc.
- Specific characterization facilities: preparative HPLC, GPC, high flux X-ray diffraction, ultra high field Nuclear Magnetic Resonance, Surface Plasmon Resonance, etc.

CURRENT AND FUTURE PROJECTS WITHIN AMADEUs FRAMEWORK

- Foldamer based materials
- Organic electronics
- Photo-induced electron transfer
- Light-harvesting
- Molecular wires
- Molecular scaffolding
- Molecular motors
- Sensors
- Therapeutics



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PERMANENT STAFF



**Marie-Christine
Durieu**
Senior Res.



**Sylvain
Nlate**
Ass. Prof.



Reiko Oda
*Senior Res.
Team leader*



**Emilie
Pouget**
Junior Res.

MOBILIZED COMPETENCES

➤ Colloid chemistry
+ materials sciences
+ molecular sciences
+ biomaterials

- Molecular interaction and Ion specific effect governing amphiphilic molecular assemblies
- Molecular and supramolecular chirality of amphiphilic molecules
- Synthesis and applications of hybrid organic-inorganic nanoobjects
- Organic molecular catalysis by molecular assemblies
- Surface functionalization, Surface engineering approaches to micro-, nano-pattern surfaces for cell-based assays, Cell adhesion, migration and differentiation studies
- Photo sensitive amphiphiles and their aggregation behaviors

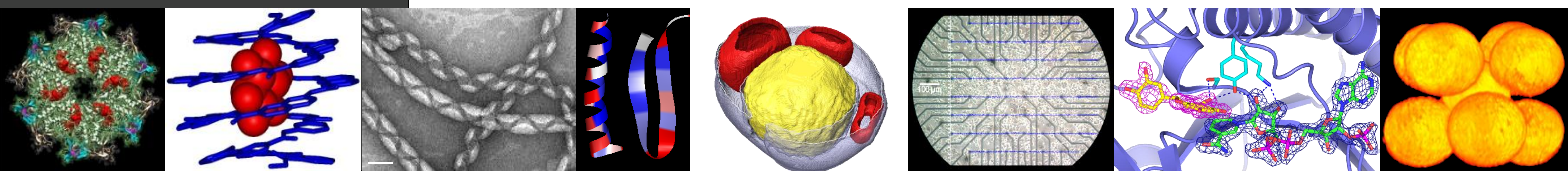
MAIN FACILITIES

- Physical chemical techniques for characterization of nanoobjects and colloidal solution
- Spectroscopy: Circular Dichroism, NMR, FT-IR, UV
- Scattering techniques: Small Angle X-ray Scattering, Light Scattering
- Electron microscopy (Cryo TEM, freeze fracture), Optical microscopy (phase contrast, DIC, video microscopy (Time Laps), , epifluorescence)
- photolithography

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Balance-of-Forces Determining Structures of Ionic Amphiphile Assemblies
- Functional hybrid organic-inorganic nanohelices: studies of the exalted phenomena at nanometric scales
- Nanostructures based on molecular assemblies for enantioselective catalysis
- Nano-Bio Materials Synthesis and their influences on stem cells adhesion and differentiation
- Specific cationic transfection agents
- Membrane fusion via protein SNAREs
- pH-sensitive nanoparticles grafting onto biomaterial for local delivery of an antibiotics

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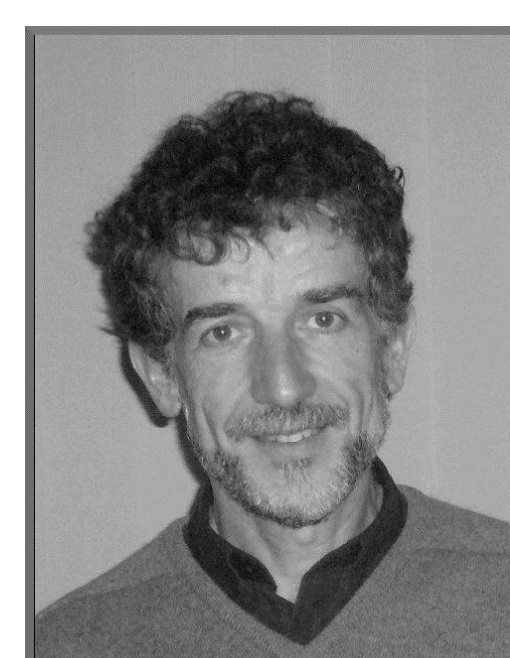
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Team: Self Assembled Composites & Metamaterials

PERMANENT STAFF



Philippe Barois
Senior Res.
Team leader



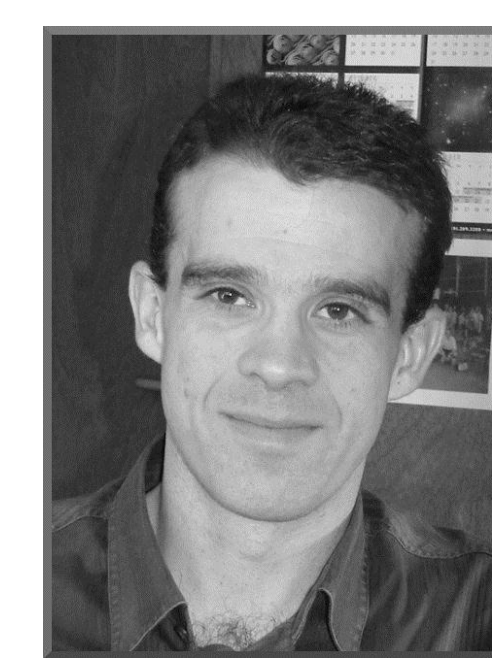
Olivier Mondain-Monval
Professor



Ashod Aradian
Junior Res.



Philippe Cluzeau
Ass. Prof.



Jean-Christophe Loudet
Ass. Prof.



Virginie Ponsinet
Junior Res.



Hassan Saadaoui
Engineer



Isabelle Ly
Ass. Engin.

MOBILIZED COMPETENCES

➤ Solid state chemistry
+ materials sciences
+ molecular sciences

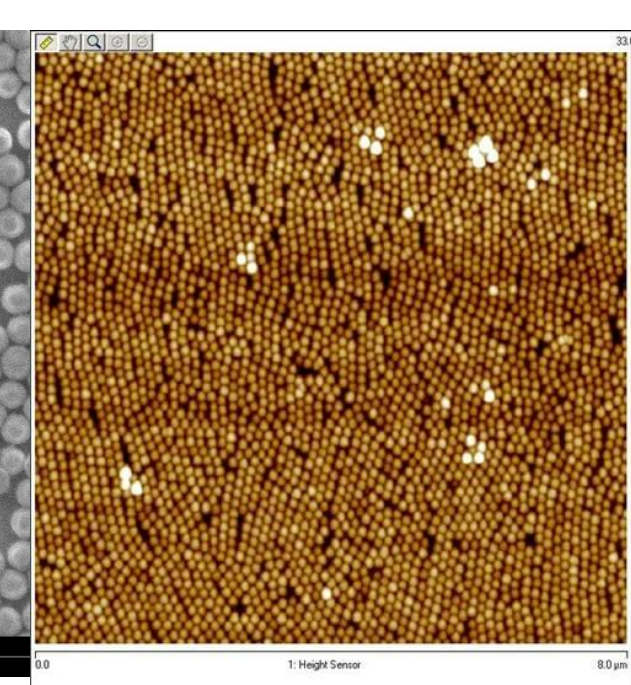
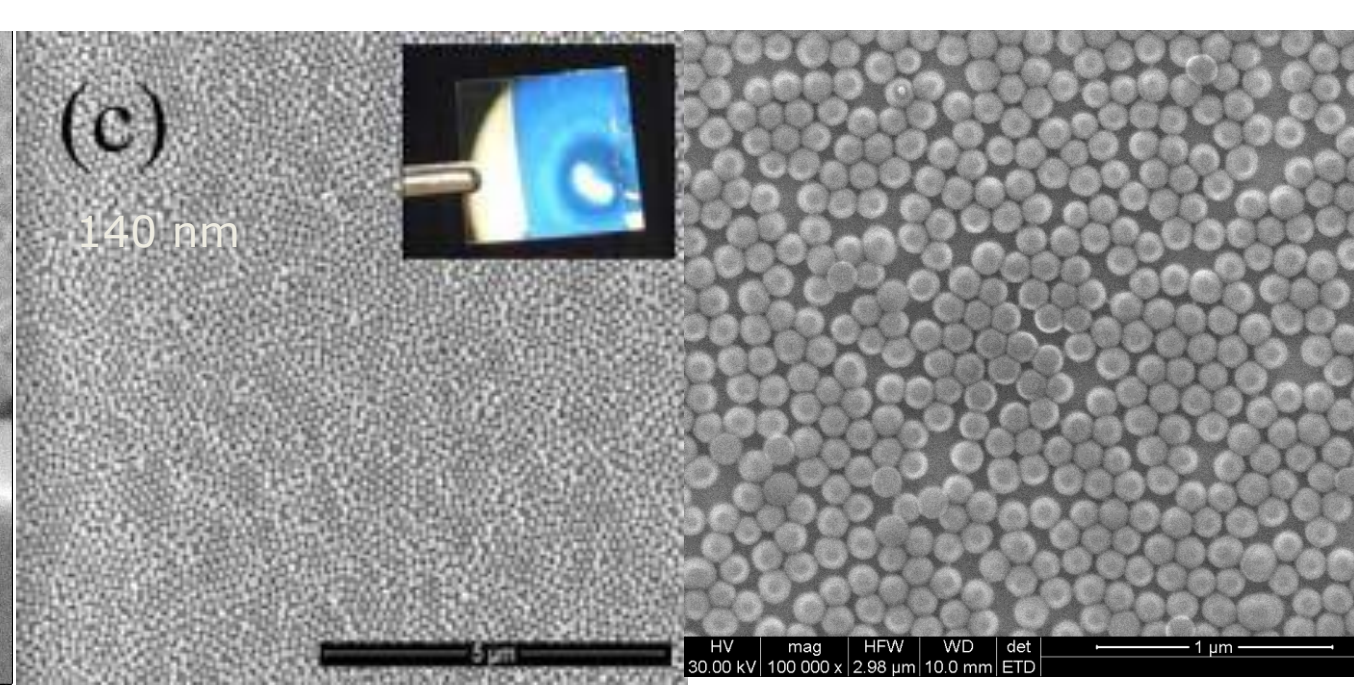
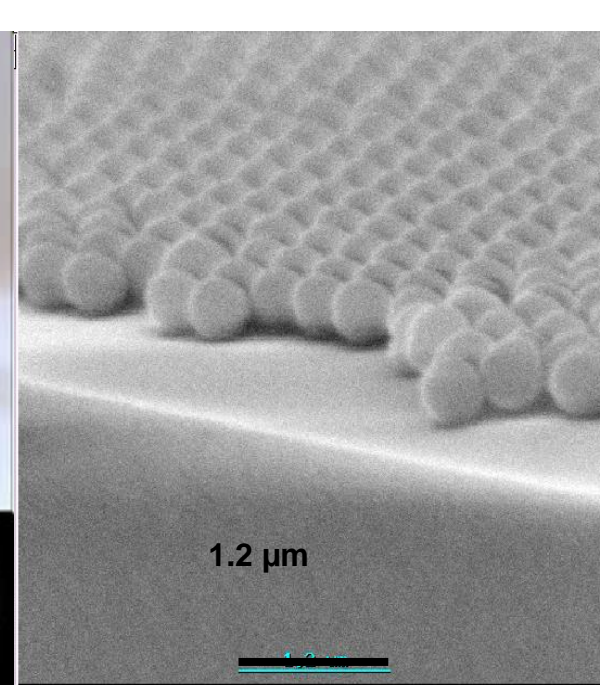
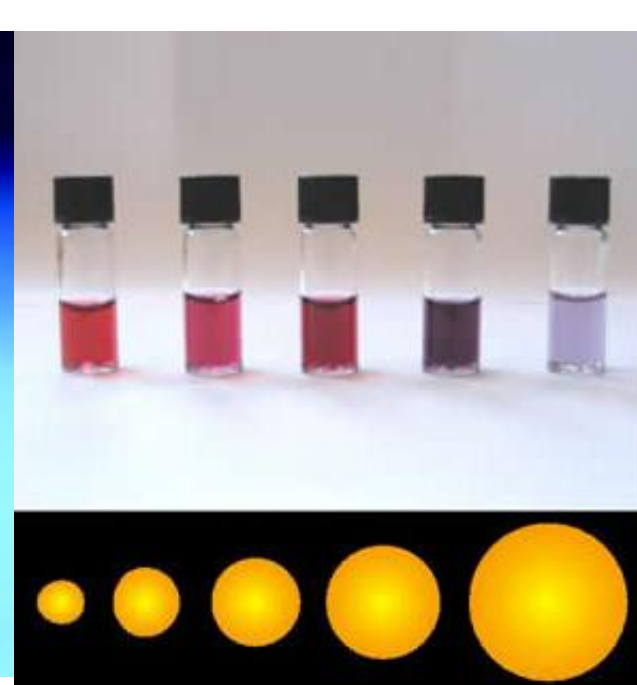
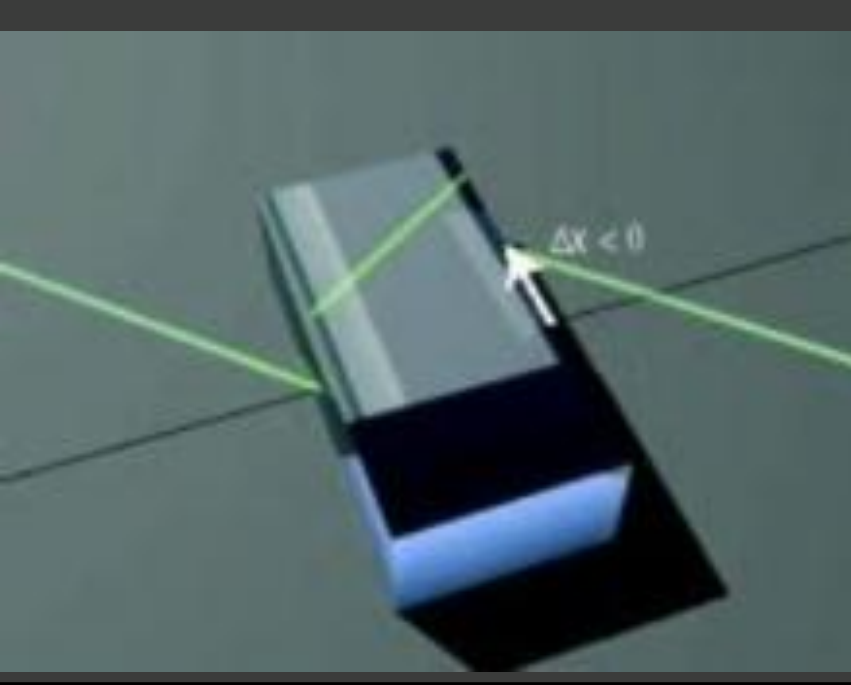
- Synthesis and surface chemistry of plasmonic nanoparticles
- Self-assembly of nanostructured composites
- Physical chemistry of polymers and copolymers
- Physical chemistry of colloids, interfaces and thin films
- Liquid crystalline structures
- Analysis and modeling of electromagnetic properties of nanostructured composites

MAIN FACILITIES

- Conventional facilities for synthesis of engineered nanoparticles
- Langmuir-Blodgett troughs
- Optical and imaging facilities for characterization of nanomaterials (IR, UV-vis spectroscopy, transmission electron microscopy)
- Specific characterization facilities: small angle X-ray scattering, X-ray reflectivity, variable angle spectroscopic ellipsometry, freeze-fracture transmission electron microscopy, atomic force microscopy

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of new nanostructured metamaterials with extreme electromagnetic properties (large and near zero dielectric permittivity, lower than 1 refractive index)
- Development of acoustic metamaterials
- Fundamental understanding of the static and dynamic behavior of micro- and nano-inclusions.



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Advanced Materials by Design



Centre de Recherche Paul Pascal – UPR 8641

Team: Molecular Magnetic Materials



**Rodolphe
Clérac**

*Junior Researcher
Team leader*



**Claude
Coulon**

Professor



**Pierre
Dechambenoit**

*Associate
Professor*



**Mathieu
Rouzières**

*Assistant
Engineer*

PERMANENT STAFF

MOBILIZED COMPETENCES

➤ Solid state chemistry
+ materials sciences
+ molecular sciences

- Synthesis, formulation and design of functional coordination complexes and new molecule-based magnetic materials by self-assembly processes.
- Chemical functionalization of metal-ion complexes and their formulation toward soft-matter
- Characterization of molecule-based materials
- Magnetic, photomagnetic, optical, structural and phase transition properties
- Analysis and modelization of the solid state and soft matter physical properties

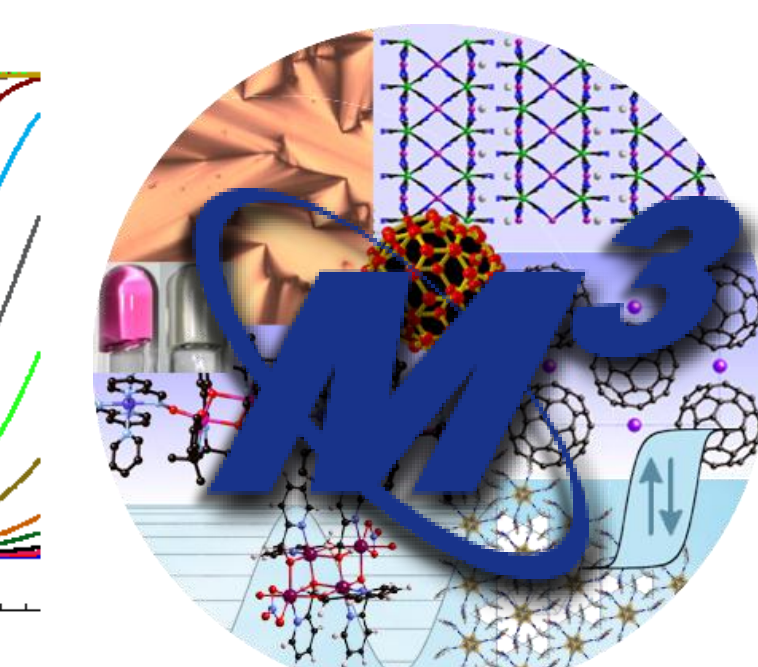
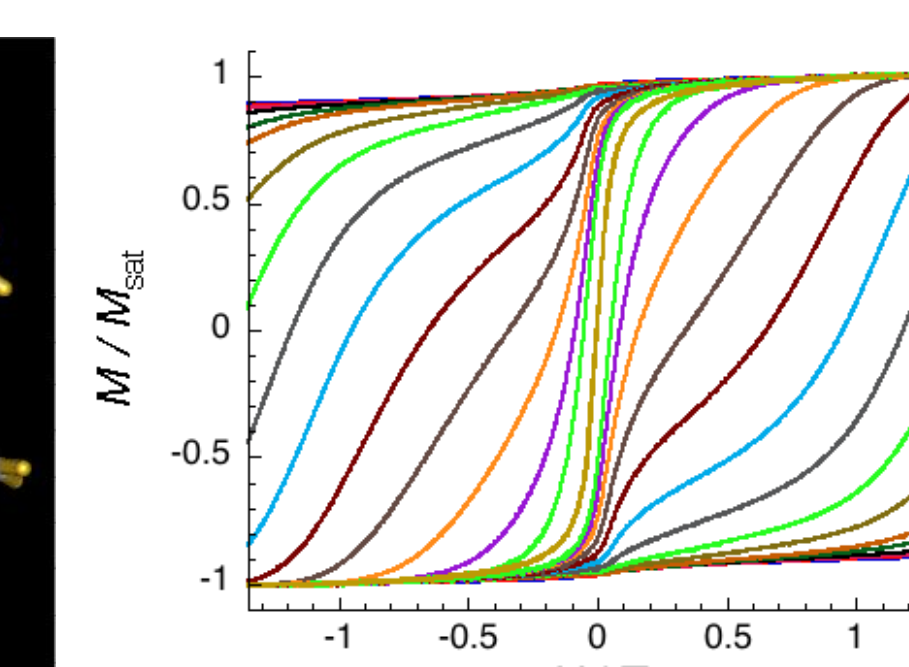
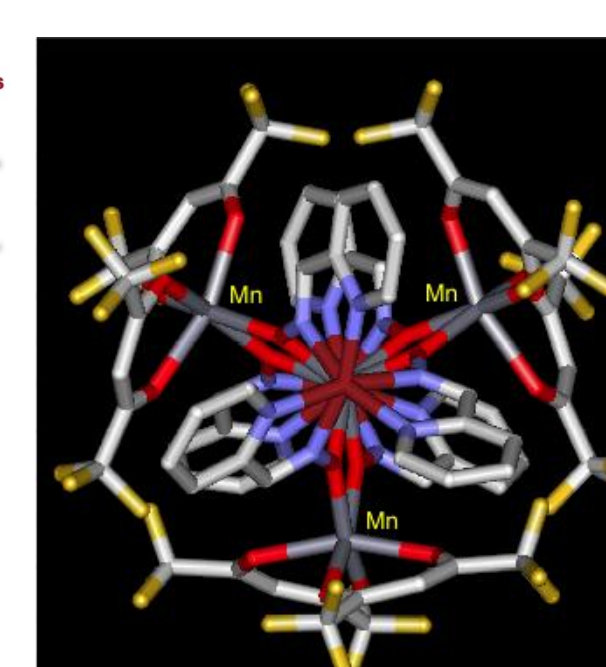
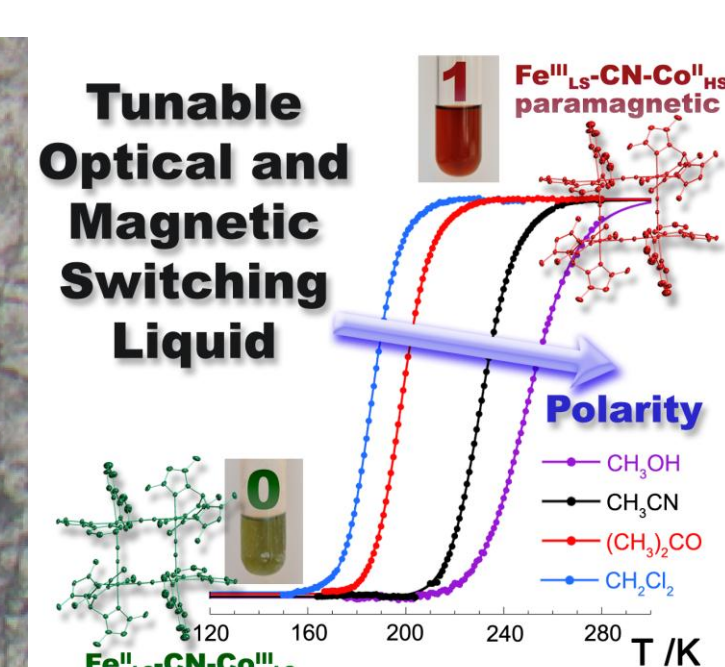
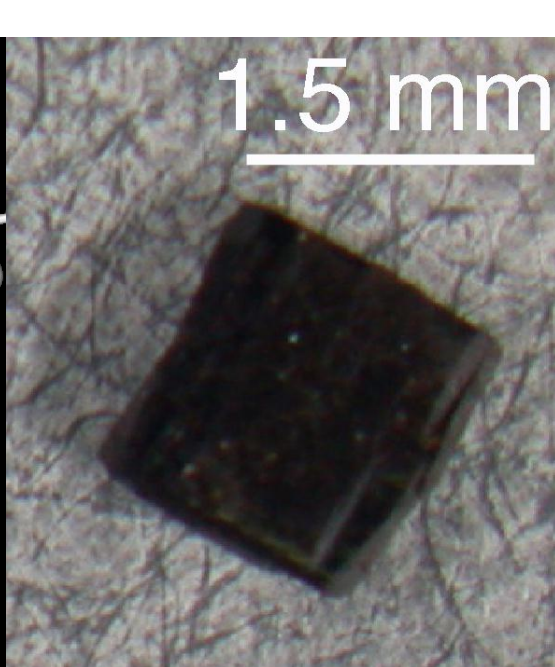
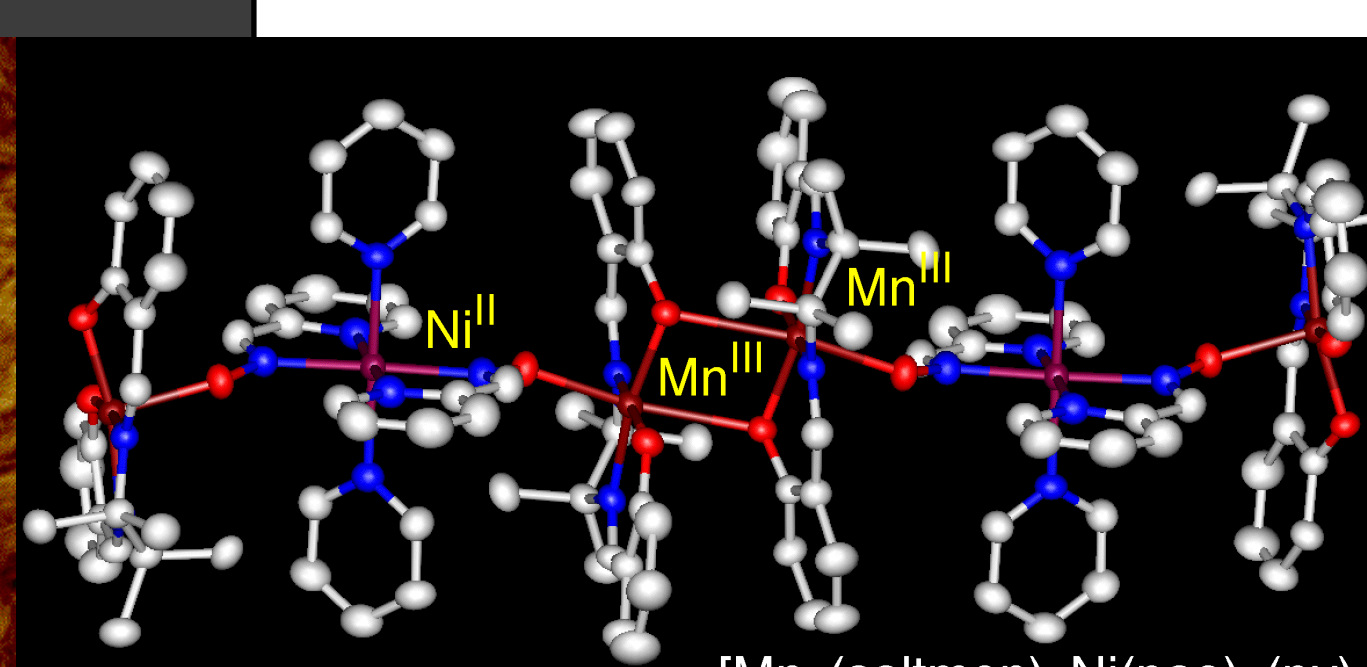
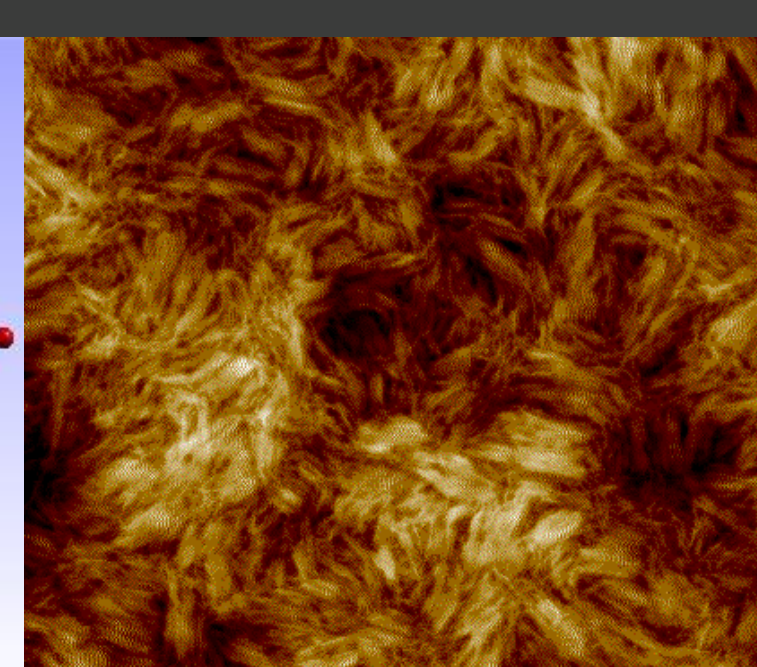
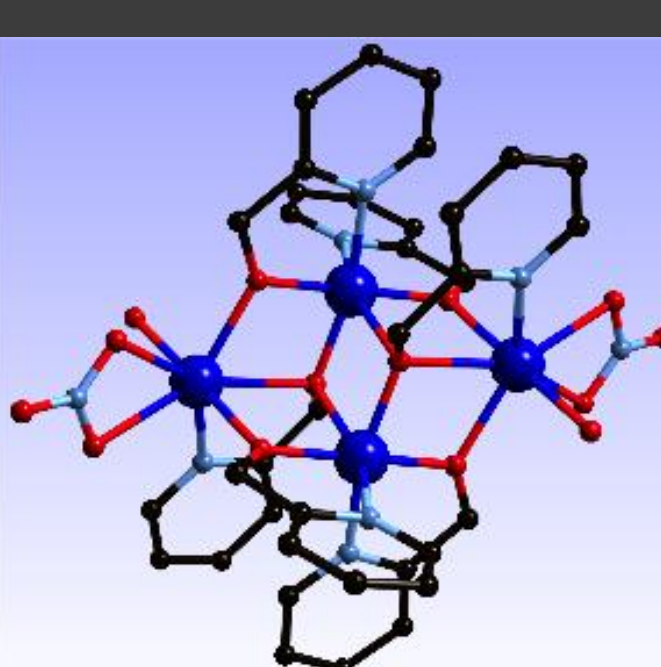
MAIN FACILITIES

- Conventional facilities for organic, inorganic and coordination chemistry in air or in controlled atmosphere (using dry boxes and Schlenck technique)
- Conventional facilities for characterization of molecular materials (NMR, IR, UV-vis, TGA, DSC, optical and electronic microscopy...)
- Specific characterization facilities: dynamic and static magnetic properties (down to 1.8 K, up to 9 T), optical reflectivity measurements (down to 10 K), home-made photomagnetic apparatus, calorimetric measurements (down to 30 mK), X-ray diffraction on single-crystal and powder, small-angle X-ray diffraction...

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of new molecule-based magnets (single-molecule magnets, single-chain magnets, and classical ordered magnets)
- Development of new stimulus-responsive magnetic materials and magnets
- Development of new magnetic hybrides: formulation of magnetic solutions and liquid-crystals

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Team: Biosensors & Biofuel Cells

PERMANENT STAFF



**Nicolas
Mano**

CNRS Researcher
Team leader



**Sébastien
Gounel**

Engineer

MOBILIZED COMPETENCES

➤ Bio-Electrochemistry
+ Enzyme Engineering
+ materials sciences

- Electrochemistry and Bio-Electrochemistry of biological systems
- Chemical functionalization and modification of electrodes surfaces
- Design and Characterization of enzymes
- Engineering of new electrodes materials
- Elaboration of biosensors and biofuel cells

MAIN FACILITIES

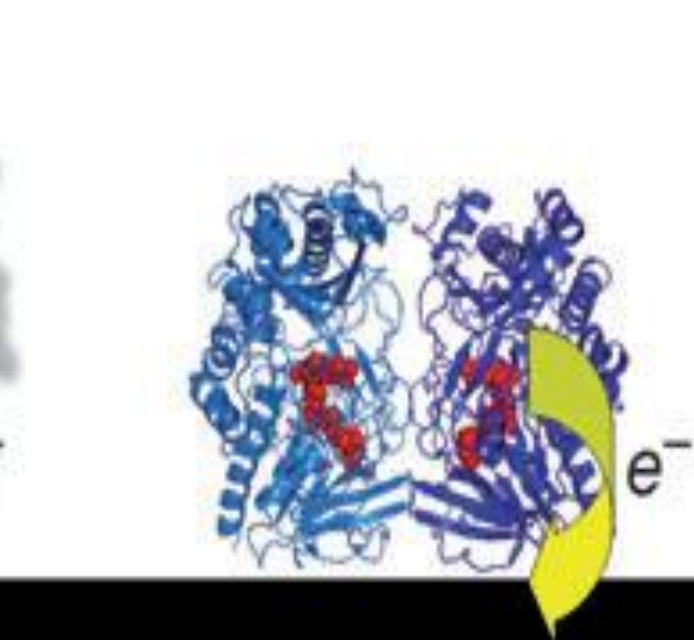
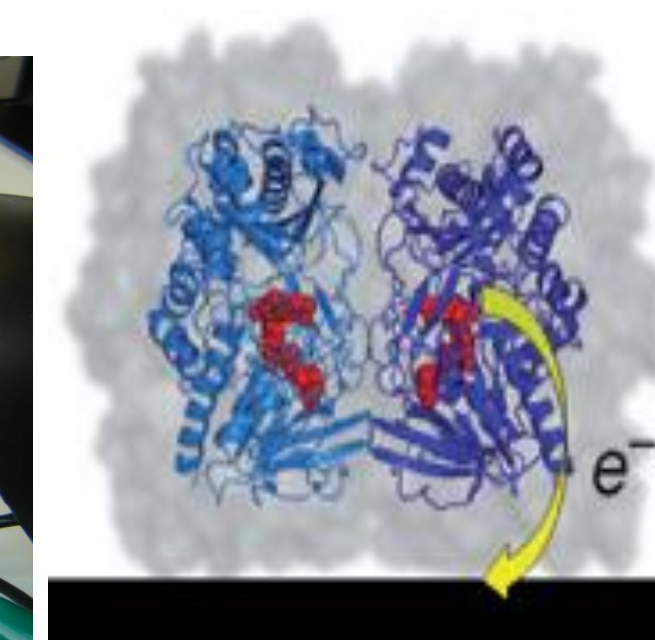
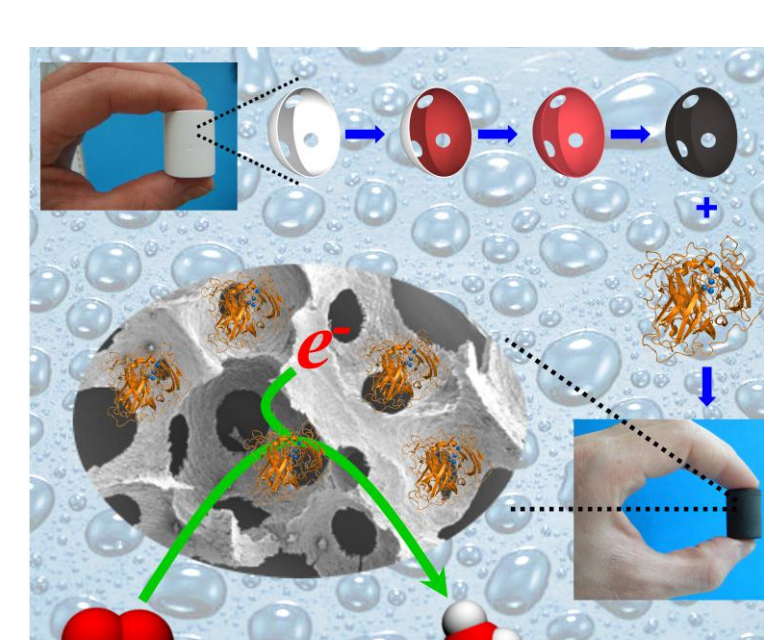
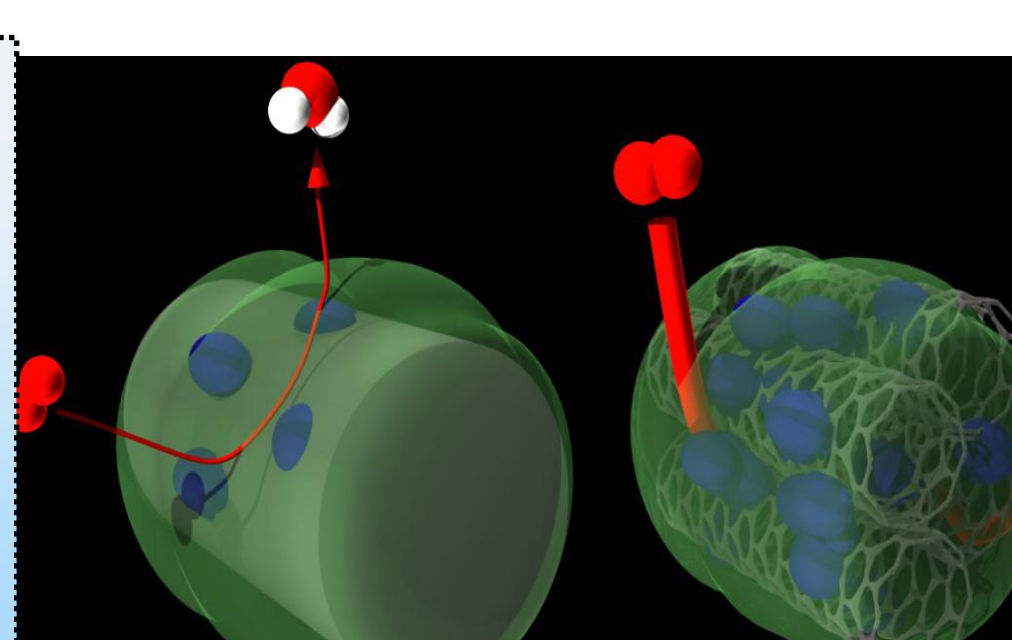
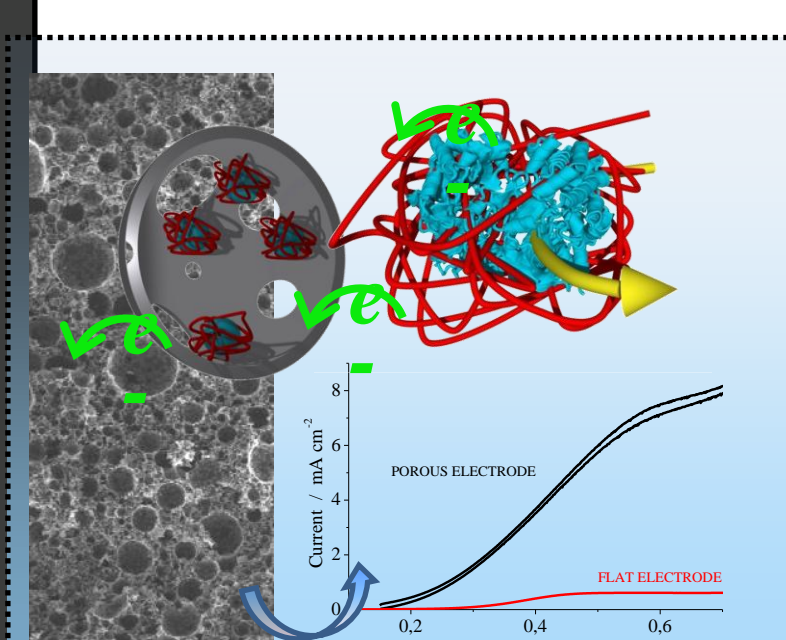
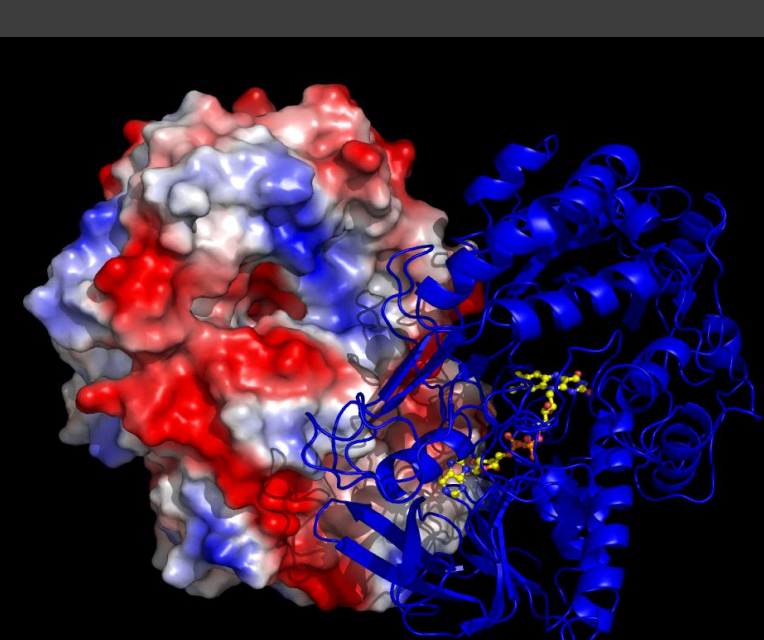
- Conventional facilities for Electrochemistry and Bio-electrochemistry under controlled atmosphere and temperature (galvanostats, potentiostats, plasma)
- Conventional facilities for molecular biology (5l Fermentor, Incubator, PCR, bacterial room, ...)
- Specific characterization facilities: Stop Flow, circular dichroism, thermostated UV, Enzymatic purification and concentration system (AKTA), Oxymeter

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of biosensors and implanted power source
- Development of new enzymes for glucose oxidation and Oxygen reduction
- Development and design of new highly organized porous and hierarchical electrodes structures



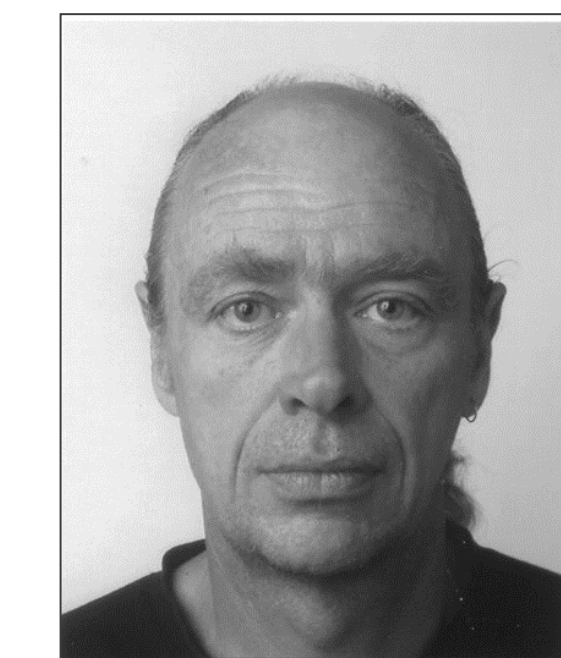
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Centre de Recherche Paul Pascal - UPR 8641

Team: Carbon Nanotubes and Graphene



**Alain
Derré**
CNRS Res.



**Christèle
Jaillet**
Ass. Prof.



**Wilfrid
Neri**
Ass. Eng.



**Alain
Pénicaud**
CNRS Res.



**Philippe
Poulin**
CNRS Res.

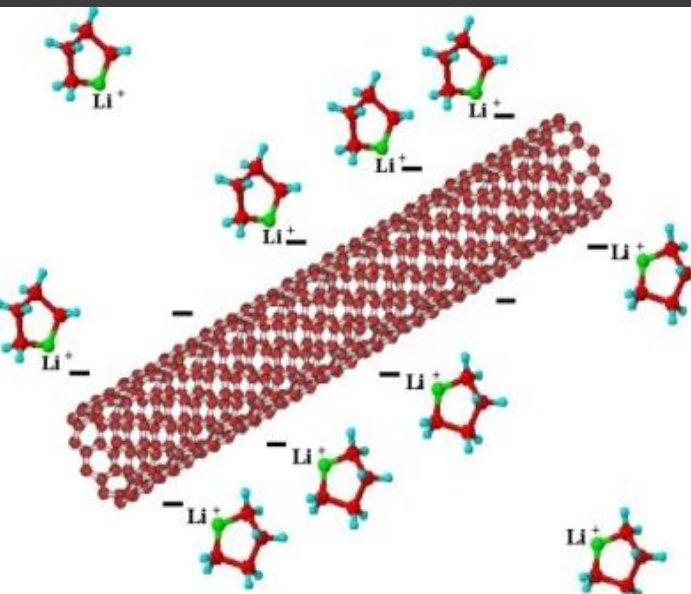
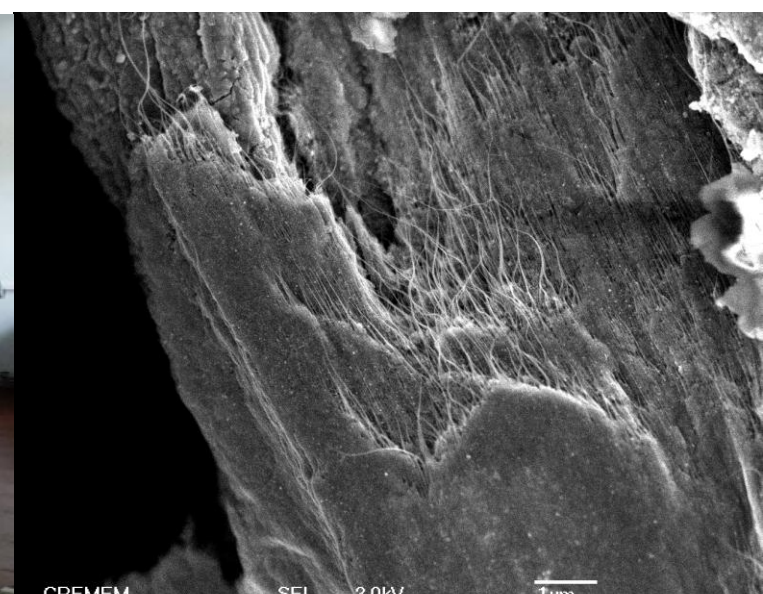
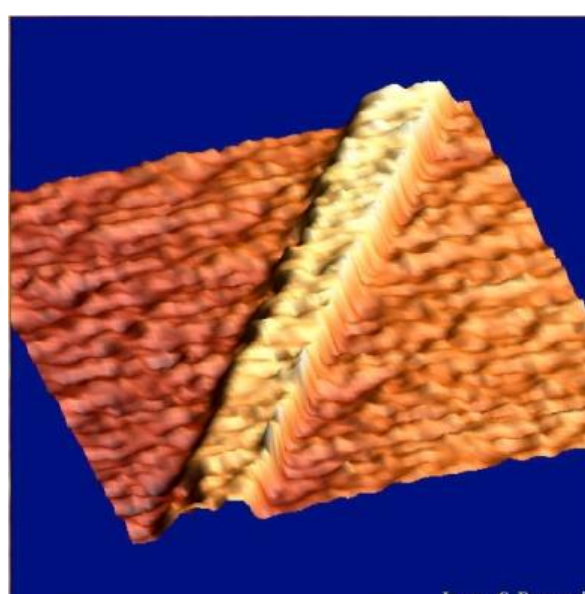
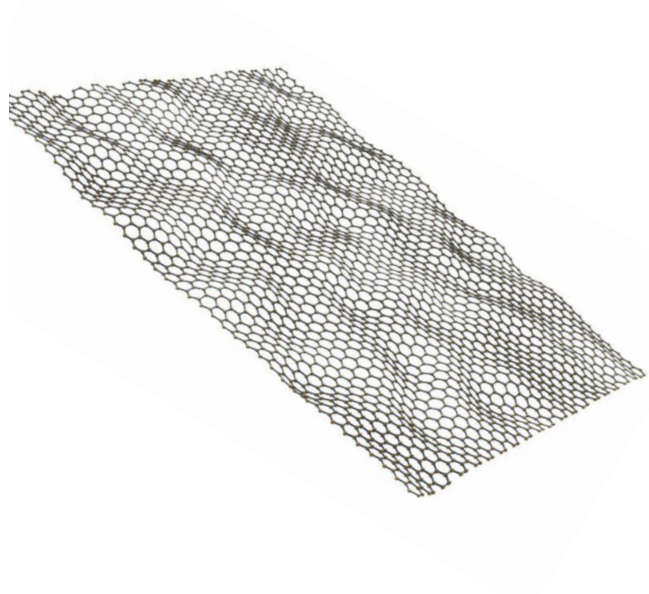
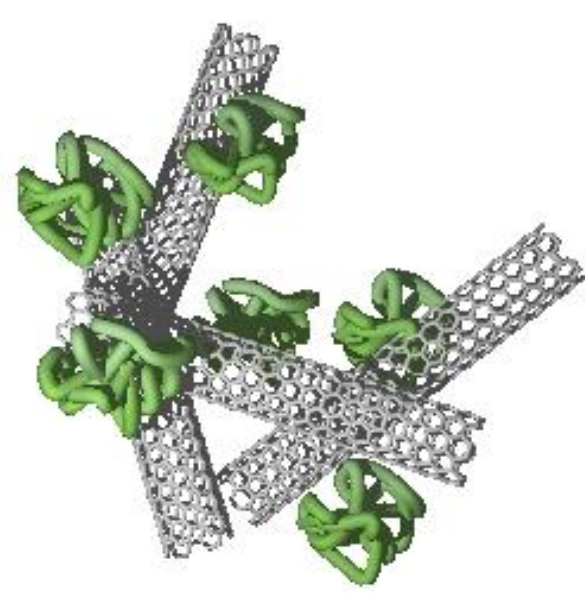


**Cécile
Zakri**
Prof.

- Dispersion, solutions of graphene and carbon nanotubes in liquid and polymer media
- Functionalization of nanotubes and graphene
- Nanocomposites, transparent conductive films, fibers
- Functional materials: microelectrodes, actuators
- Polymer science

- Conventional facilities for physical chemistry, inorganic and organic chemistry of carbon nanotubes and graphene
- Conventional facilities for characterization of nanomaterials
- Specific facilities: glove box for alkali reduction of soluble forms of nanotubes and graphene, wet-spinning line for fibre synthesis
- Specific characterization facilities: Devices for electromechanical characterizations, Small angle X-ray diffraction, Small angle light scattering

- Phase behavior and dynamic properties of nanotube and graphene-based solutions and dispersions
- Development of novel nanotube and graphene-based materials for bio and energy applications:
 - Conductive inks for organic electronics*
 - Transparent conductive electrodes, microelectrodes for electromechanical actuators and bio-fuel cells, biosensors*
- Polymer composites with actuating and sensing capabilities: shape memory, piezo resistivity
- Functional fibers for strong and smart textile applications



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Institut de Mécanique et d'Ingénierie - Bordeaux – UMR 5295

Team: Thermal Multiscale characterisation

PERMANENT STAFF



**Elena
Palomo**
Prof.



**Jean-Luc
Battaglia**
Prof.
Team leader



**Andrzej
Kuziak**
Ass. Prof.



**Didier
Lasseux**
Junior CNRS Res.



**Henry
Bertin**
CNRS Res.



**Whabi
Jomaa**
Prof.

MOBILIZED COMPETENCES

➤ *Heat and Mass transfer*

- Characterisation of heterogeneous materials, composite, surfaces and structures by traditional thermal methods
- Modelling of behaviours of heat and mass transfer in complex media and structures
- Quantitative and Non Destructive Testing
- Surface, interface and damage characterisation (composite delaminations, cracks, inverse problems)

MAIN FACILITIES

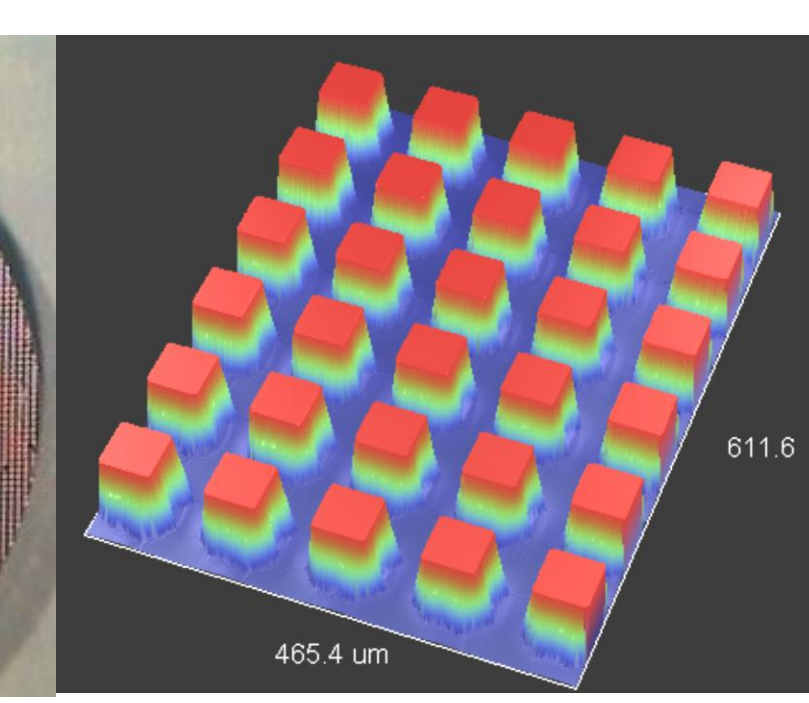
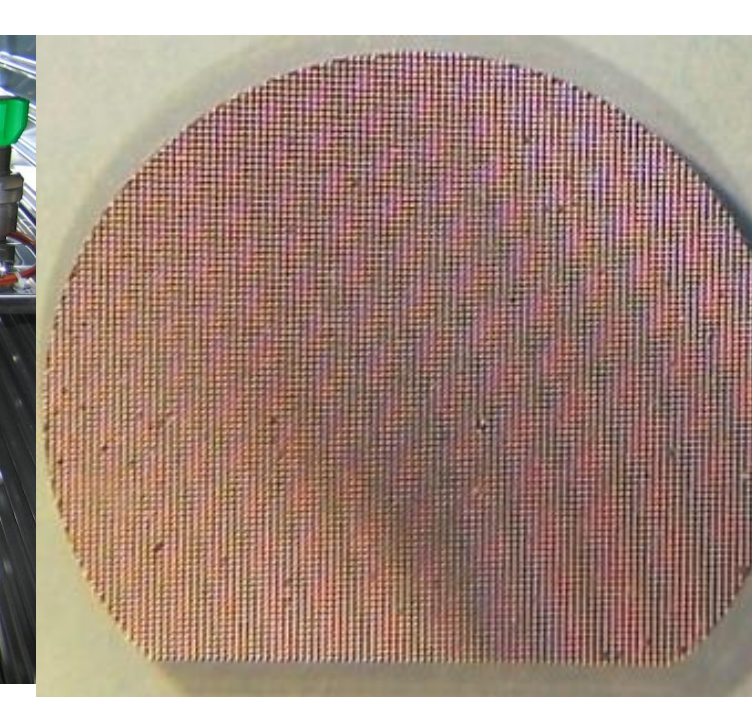
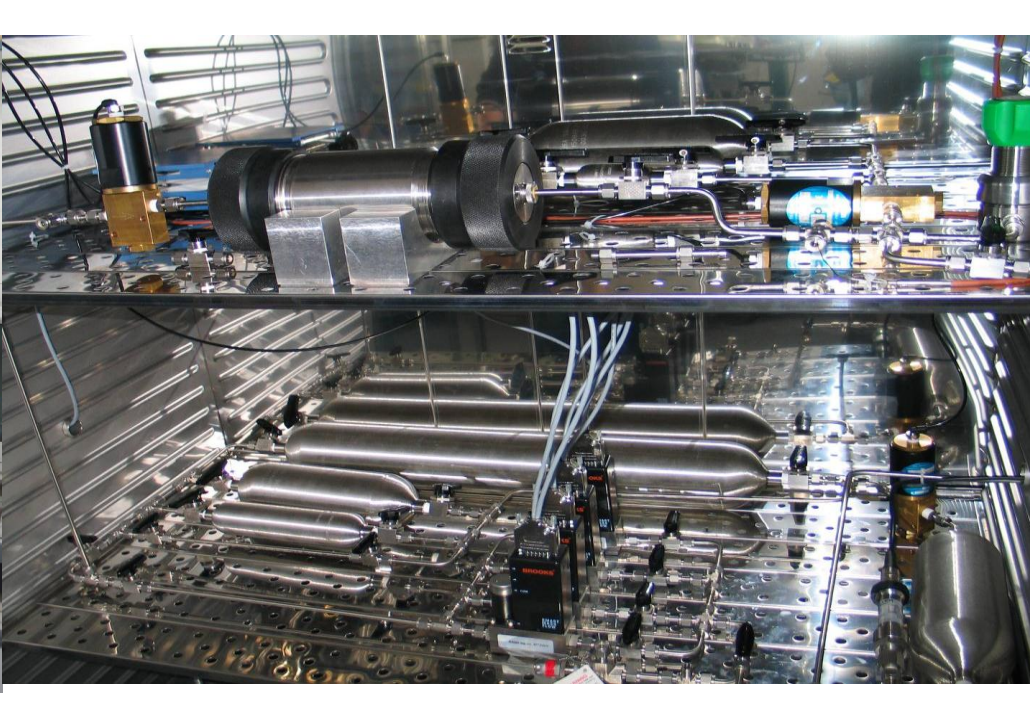
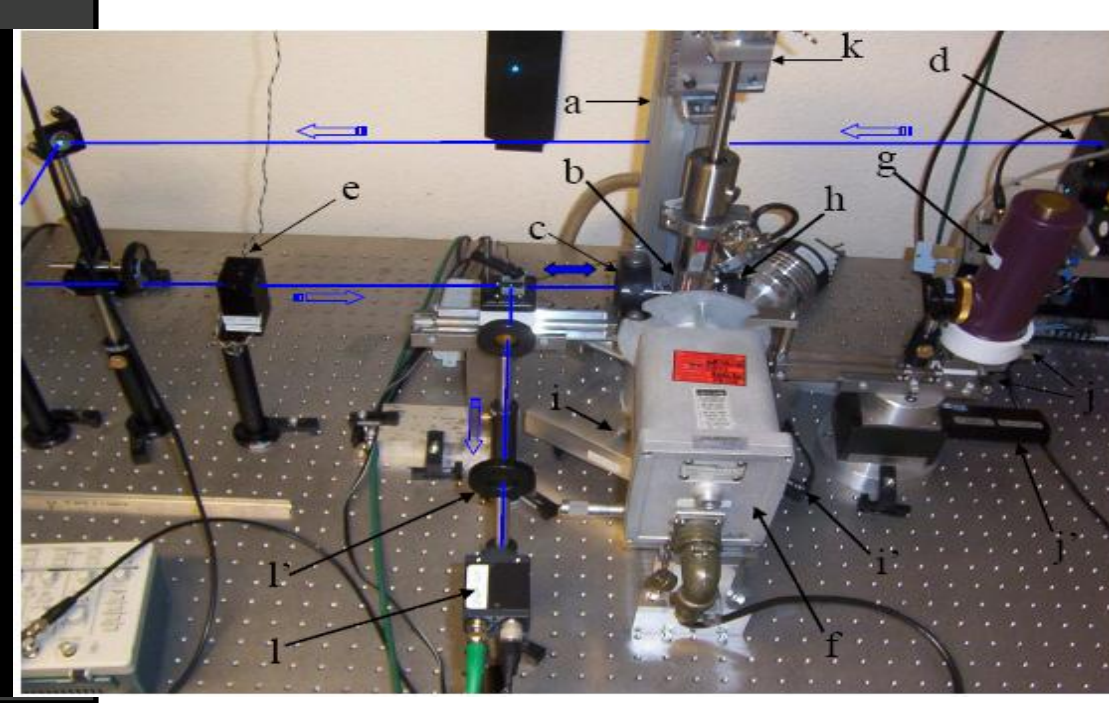
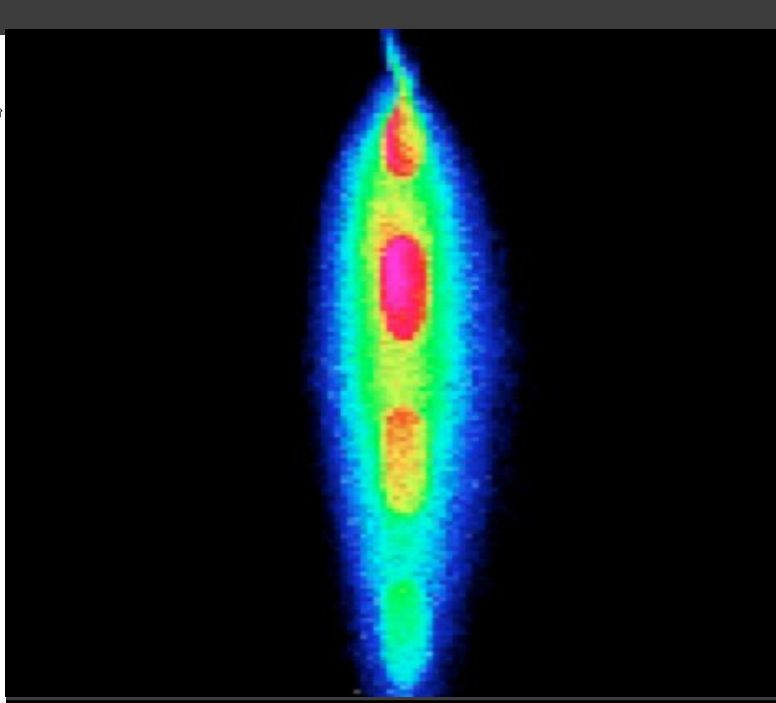
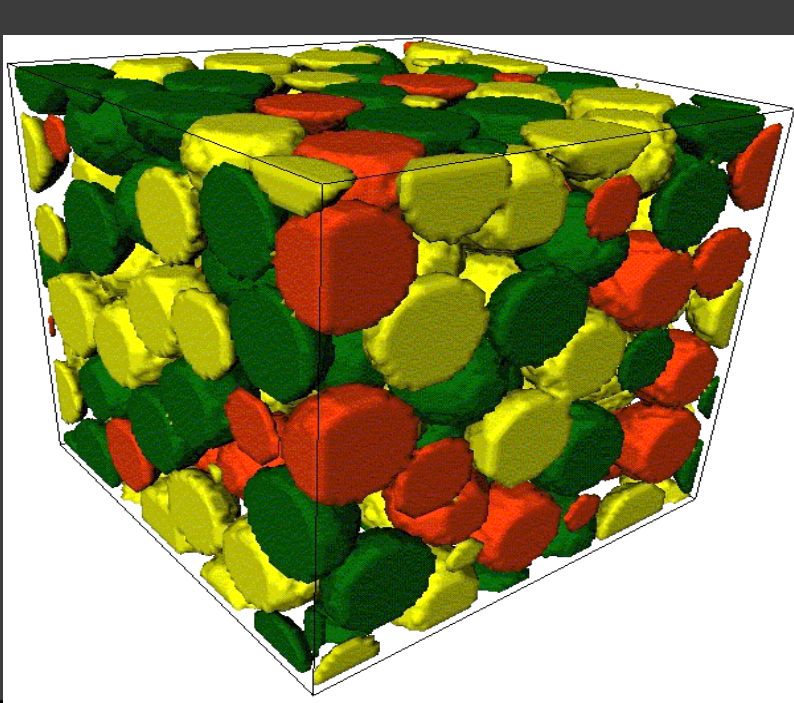
- Infrared cameras, thermal sensors synchronized instrumentation for the characterization of thermophysical properties of heterogeneous samples from micrometer to meter and from microsecond to several days
- Gamma ray rigs, gas-phase chromatography, porous media
- Environmental microscope

CURRENT AND FUTURE PROJECTS WITHIN AMADEUS FRAMEWORK

- Vibro thermography (study of the heat dissipation of acoustic waves in viscoelastic structures)
- Thermophysical and mechanical characterization of thin layers for microelectronic industry and for biomechanical applications
- Thermal characterisation of composites damage
- Characterization of very low permeable materials (gas-shales, composite materials...)
- Strongly non linear transport phenomena in porous media: rapid flow, non-newtonian flow, particle deposition, effusive flow, particular thermodynamic conditions.



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PERMANENT STAFF



T. Brunet
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Prof.



M. Castaings
Prof.



A. Shuvalov
Senior Res.



C. Aristegui
Prof.



C. Rossignol
Junior Res.



Y. Guillet
Ass. Prof.



A. Meziane
Ass. Prof.



M. Deschamps
Senior Res., Team leader



C. Bacon
Prof.

MOBILIZED COMPETENCES

↳ *Solid Mechanics*
Physical Acoustics

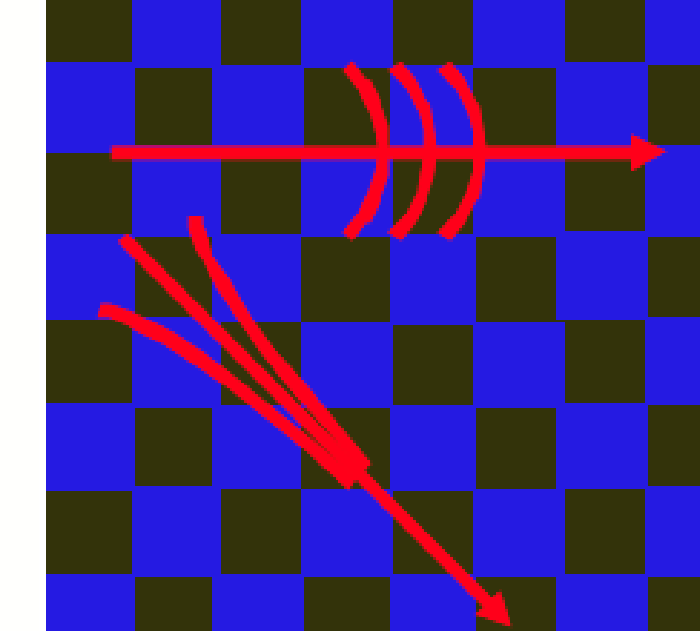
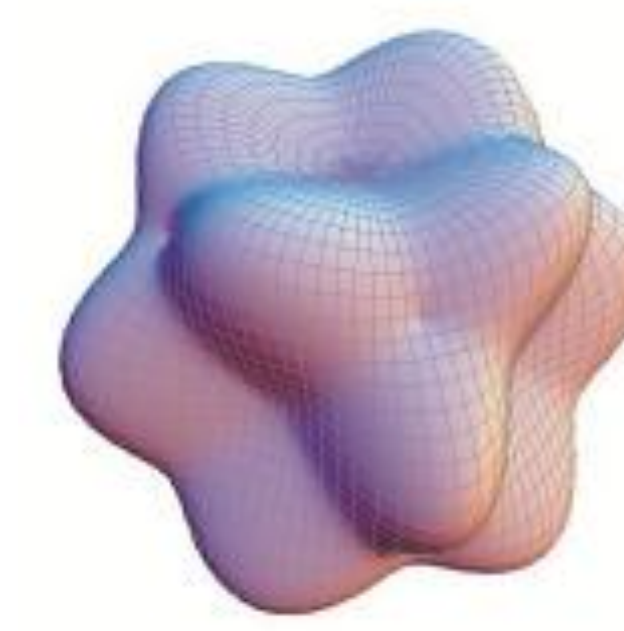
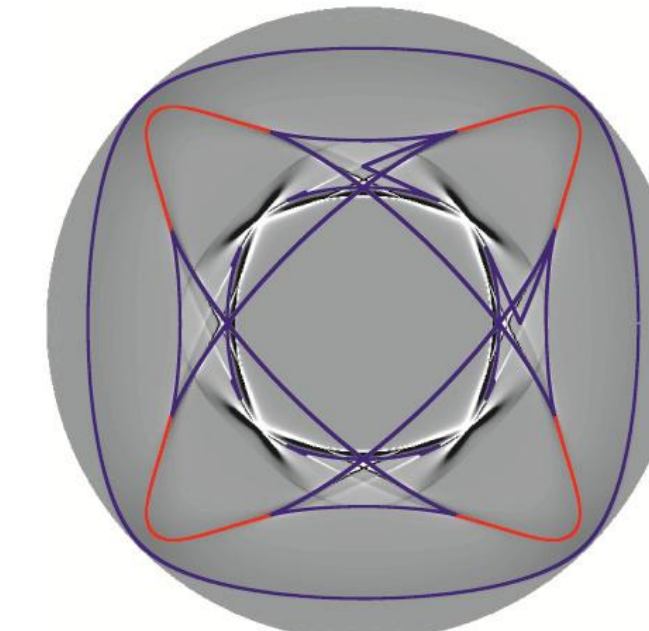
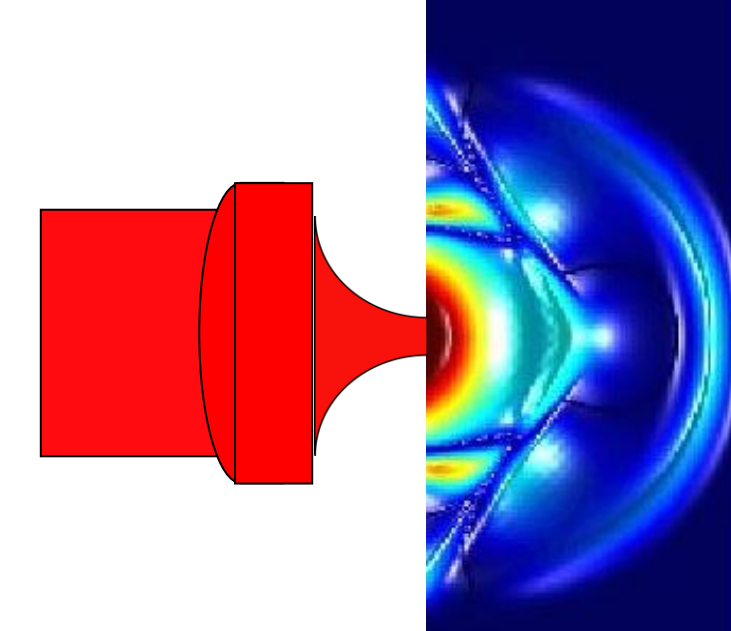
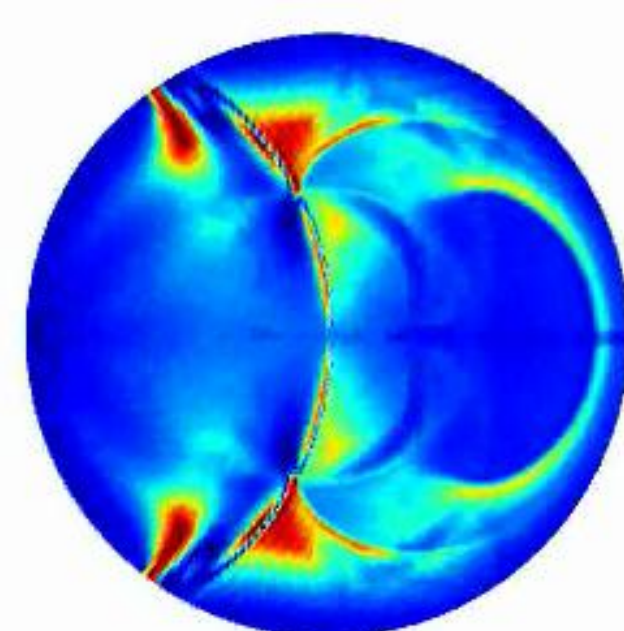
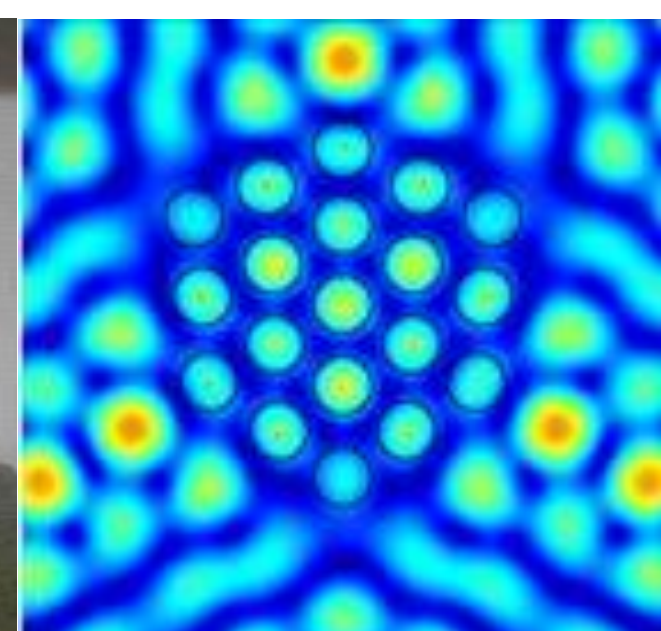
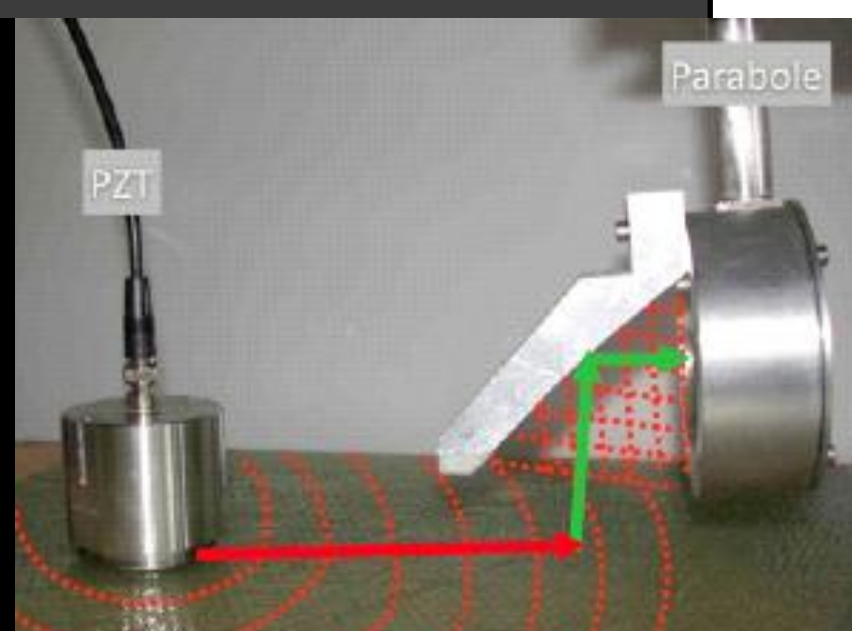
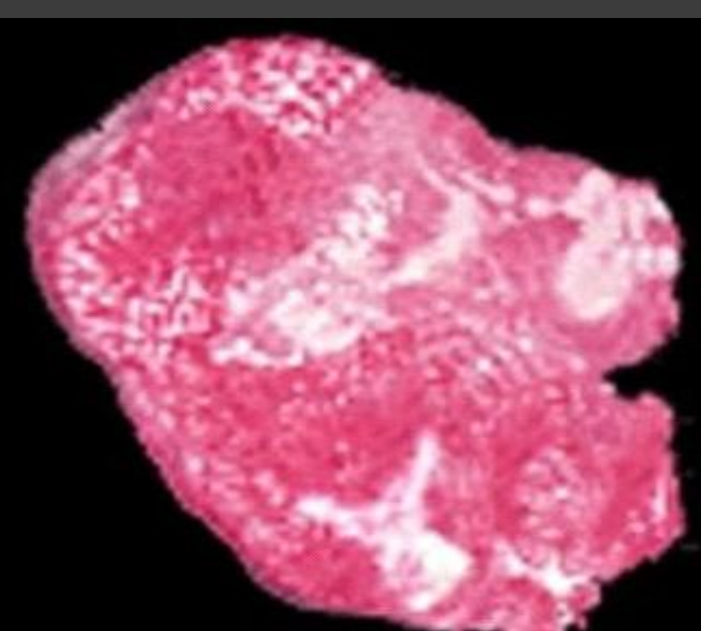
- Characterisation of heterogeneous materials, composite, surfaces and structures by ultrasonic methods
- Modelling of wave propagation complex media and structures
- Quantitative and non destructive testing
- Surface, interface and damage characterisation
- Inverse problem
- Dynamics of single nanoparticles

MAIN FACILITIES

- Ultrasonic experimental set-up available from 10 KHz to 100 GHz for analysing a broad variety of objects ranging, from nanometric layers to the airplane wing structures, using :
 - Laser-Ultrasound system
 - Air coupled transducer arrays
 - Micro wave generation

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

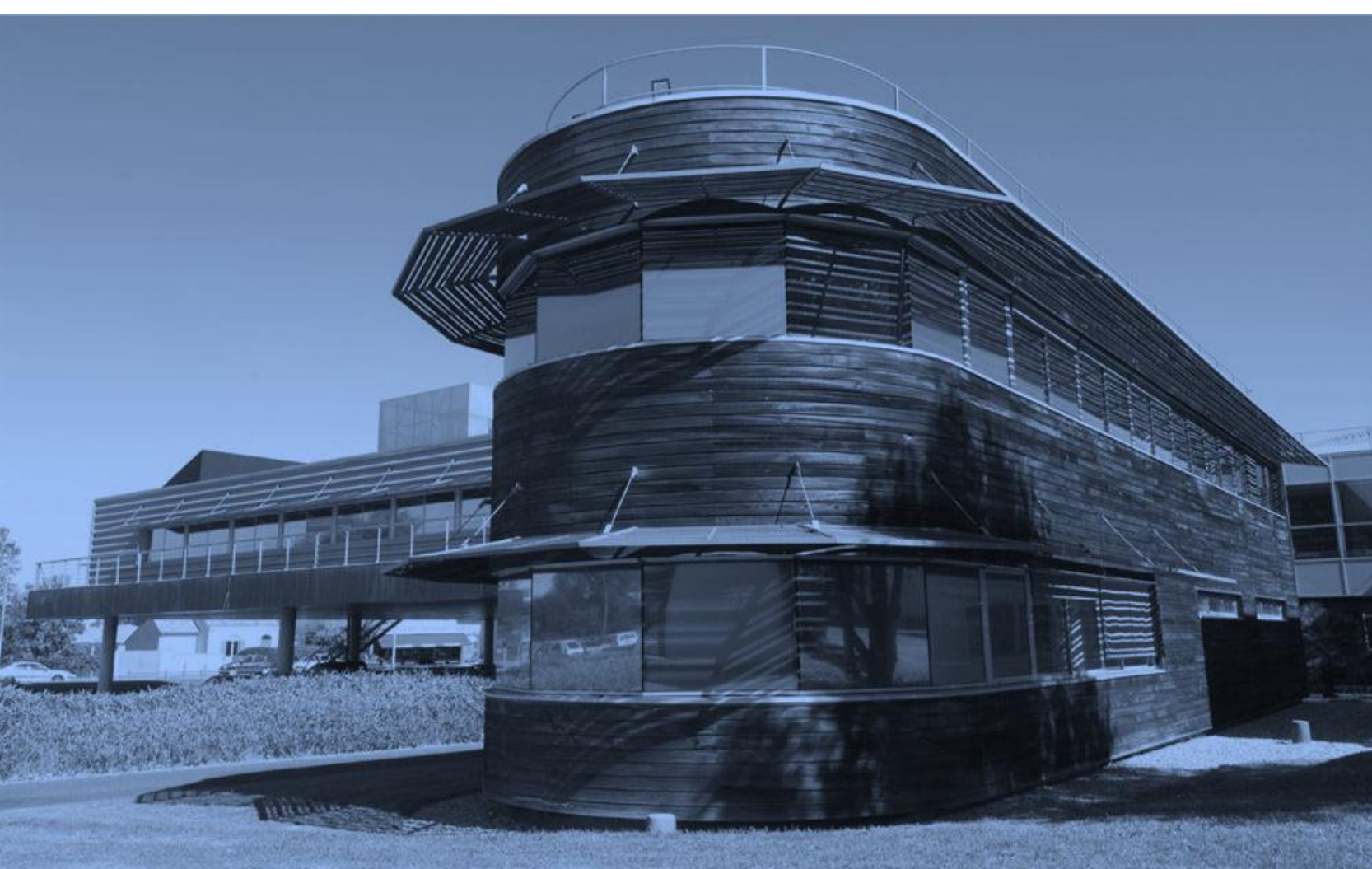
- Vibro thermography (study of the heat dissipation of acoustic waves in structures)
- Mechanical characterisation of thin layers for microelectronic industry and for biomechanical applications
- Mechanical characterisation of composites damage
- Developments of new imaging methods for structure inspection from nano scale to the dimension of aircraft wings
- Dynamic homogenisation of complex media



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PERMANENT STAFF



**Cyril
Aymonier**
Junior Res.
Team leader



**François
Cansell**
Prof.



**Yves
Garrabos**
Senior Res.



**Carole
Lecoutre**
Res. Ing.



**Anne
Loppinet-Serani**
Ass. Prof.



**Samuel
Marre**
Junior Res.

MOBILIZED COMPETENCES

➤ *Green chemistry in
supercritical media*
+ *Materials Sciences*
+ *Chemical Engineering*
+ *Supercritical Microfluidics*

- SuperCritical Fluids (SCFs) thermo-hydrodynamics
- Tunable chemical reactivity in SCFs
- Nucleation & growth in SCFs
- Controlled, continuous & confined, versatile & reproducible processes for:
 - ✓ Nano-engineering of multifunctional & complex nanostructures
 - ✓ Eco-design of advanced nanostructured materials with specific properties
- Design & fabrication of high pressure - high temperature microreactors
- Micro-hydrodynamics & nanomaterials synthesis in SCFs microflows
- Basic tools for eco-technology developments with SCFs

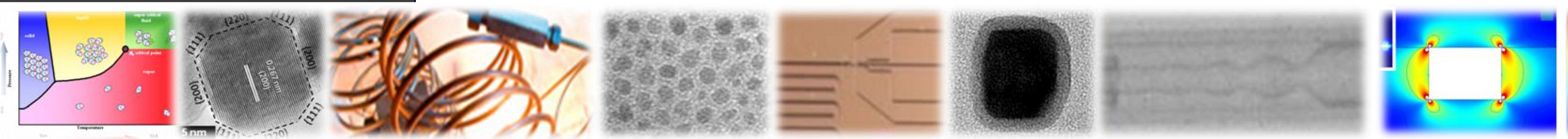
MAIN FACILITIES

- High pressure - high temperature lab-scale equipments:
 - ✓ Up to 30 MPa and 600° C in mL to L reactors
 - ✓ From CO₂ & alcohols to water-based technologies
 - ✓ Continuous or batch pilots
- Supercritical microfluidic platform:
 - ✓ Optical access & *in situ* probes for measurements
 - ✓ *In situ* fluorescence, UV, IR & Raman spectroscopies

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- SCFs/harmful solvents substitution for green chemistry applications
- Synthesis and functionalization of nanocrystals with required specifications:
 - ✓ Various inorganic cores nature (metal, oxides, ...)
 - ✓ Several available functionalization approaches with organic molecules and macromolecules
- Design of multifunctional building blocks for hierarchically devices manufacturing
- Materials recycling with SCFs technology
- Support to scale-up and large scale production of nanomaterials

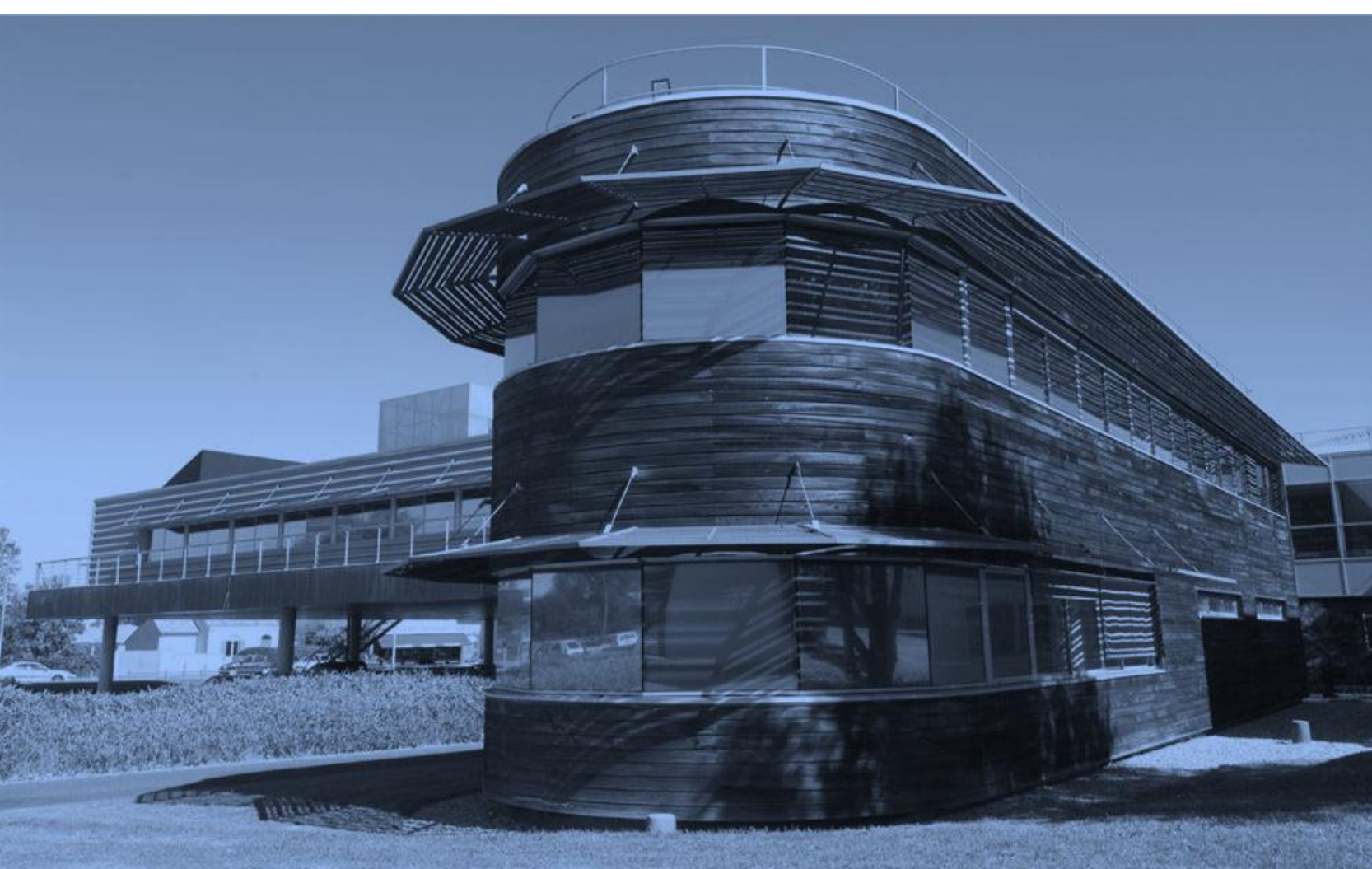
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PERMANENT STAFF

↘ Six extra permanent researchers/engineers are not (yet) involved in AMADEus-relevant projects



Marie-Hélène Delville
Senior Res.



Etienne Duguet
Prof.
Team leader



Graziella Goglio
Ass. Prof.



Stéphane Mornet
Junior Res.



Lydia Roudier
Techn.



Mona Treguer-Delapierre
Ass. Prof.

MOBILIZED COMPETENCES

↘ Solid state chemistry
+ materials sciences
+ molecular sciences

- Synthesis and applications of hybrid organic-inorganic nanoparticles
- Preparation of inorganic cores based on metal oxides or noble metals
- Control of shape, size and size-distribution
- Surface derivatization, biofunctionalization and polymer encapsulation
- Colloidal stabilization in water or physiological media
- Dispersion in polymer matrices
- Self-assembly into supra-colloids
- Optical, magnetic and redox properties

MAIN FACILITIES

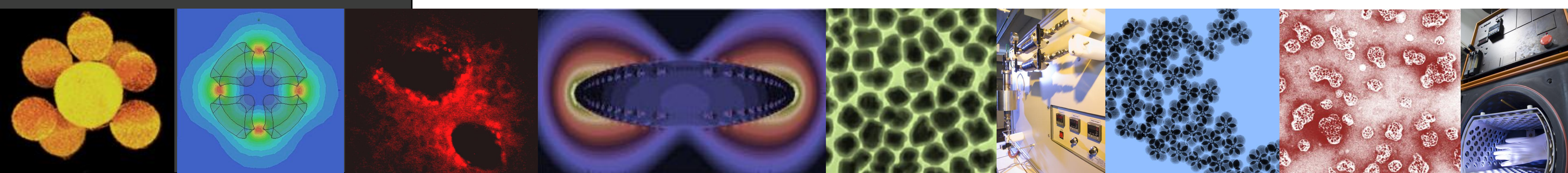
- Conventional facilities for inorganic, organic and polymer chemistry and characterization of nanoparticles
- Specific synthesis facilities: surface or core fluorination, reduction of metal salts by radiolysis, microwave-assisted synthesis, synthesis room applying Good Manufacturing Practices for medical applications, etc.
- Specific characterization facilities: TGA in reactive gas, hyperthermia platform, etc.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of functionalized nanoparticles as targeting MRI contrast agents
- Self-regulated hyperthermia mediators based on magnetic nanoparticles with controlled Curie temperature
- Heat-triggered drug-release from conjugates of magnetic nanoparticles and temperature-sensitive macromolecules
- Structured silica/silver nanoparticles for assembling into metamaterials optically active in the visible range
- Highly magnetic nanoparticles assembled by block-copolymers for magnetic recording media of ultra high density



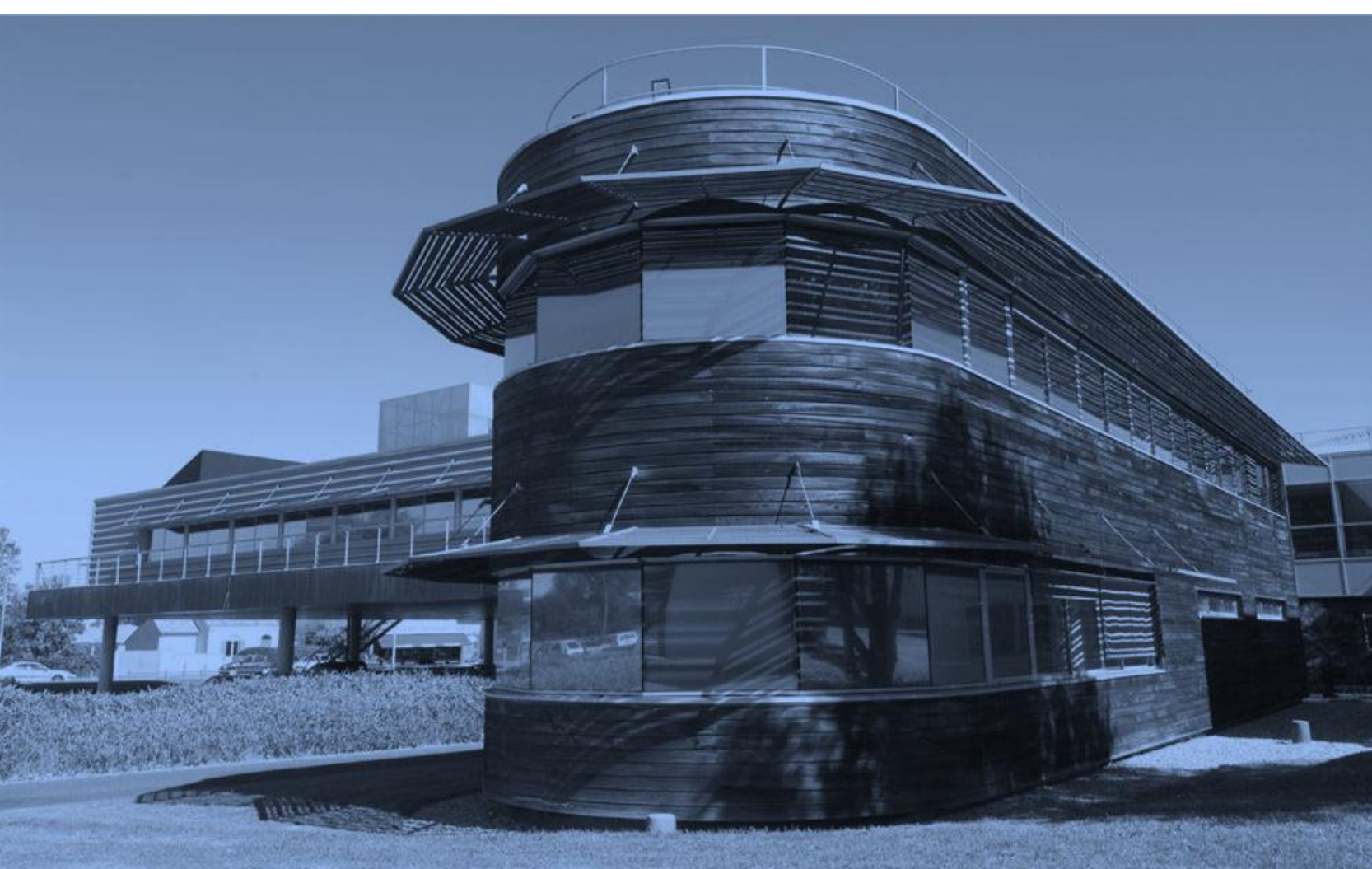
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Institut de Chimie de la Matière Condensée de Bordeaux - UPR 9048

Team: **Molecular Sciences:** **Thermo-, Photo-, Piezo-Materials**

PERMANENT STAFF



**Guillaume
Chastanet**
Junior Res.



**Nathalie
Daro**
Ing. Etude



**Cédric
Desplanches**
Ass. Prof.



**Philippe
Guionneau**
Prof.



**Jean-François
Létard**
Senior Res.
Team leader



**Samir
Matar**
Senior Res.



**Corine
Mathonière**
Prof.



**Olivier
Nguyen**
Ass. Ing.



**Patrick
Rosa**
Junior Res.

MOBILIZED COMPETENCES

➤ *Molecular chemistry*
+ *materials Sciences*

- Design and synthesis: Coordination chemistry and supramolecular systems
- Synthesis and applications of switchable molecular magnetic materials
- Preparation of spin-crossover and/or charge transfer molecular materials
- Switchable nanoparticles: shape and size control
- Optical and magnetic properties
- Molecular switching in solid state: Photomagnetism
- Structure-properties correlation : RX diffraction under constraints, DFT calculations

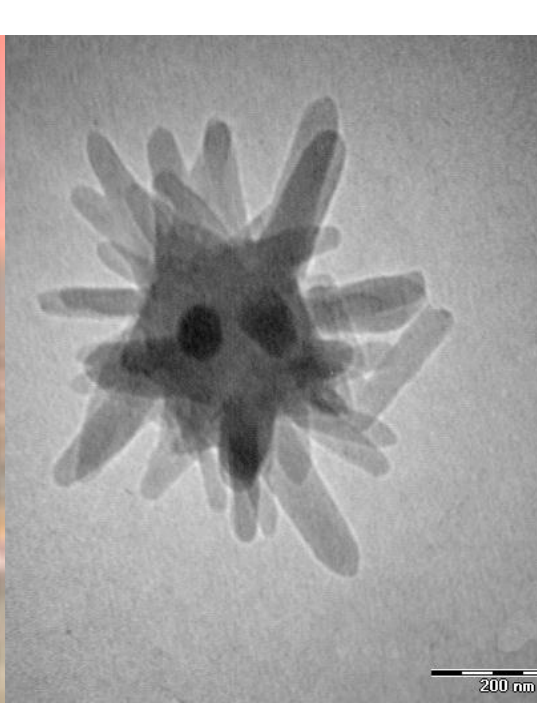
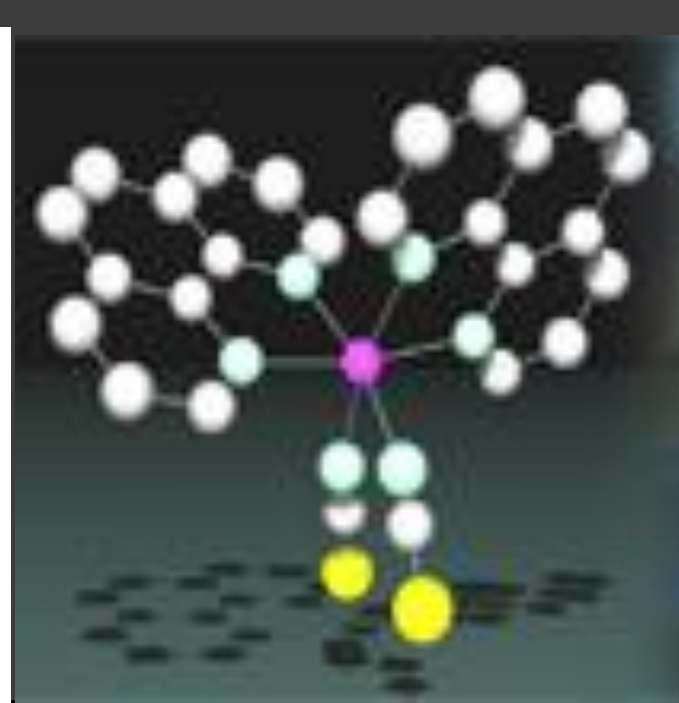
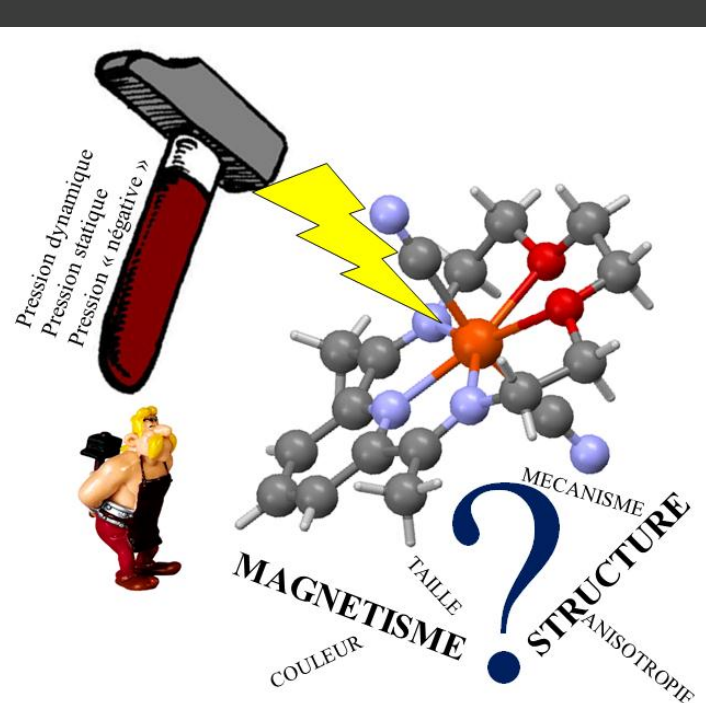
MAIN FACILITIES

- Conventional facilities for organic and coordination chemistry
- Specific characterization facilities: Platform of photomagnetism (SQUIDs coupled to Laser or Diode-Laser Sources), Diffused optical reflectivity, etc.
- Specific facilities: Q-Sun Xenon Test Chamber for reproducing the damaging wavelengths of indoors or outdoors light
- Local workstations and University massively parallel computers
- Specific transfer facilities : OliKrom *Structure*

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of smart pigments: thermo-, photo- and/piezo-sensibles
- Design of multifunction inks based on molecular materials
- Switchable molecular materials for holographic recording media of ultra high density
- Elaboration of molecular magnetic materials with optimized switching properties

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Institut de Chimie de la Matière Condensée de Bordeaux - UPR 9048

Team: Ferroelectric materials, ceramics and composites

PERMANENT STAFF

➤ Four extra permanent researchers/engineers are not (yet) involved in AMADEus-relevant projects



Dominique Bernard
Senior Res.



Jean-Marc Heintz
Prof.



Mario Maglione
Senior Res.
Team Leader



Sandrine Payan
Ass.Prof.



Jean-François Silvain
Senior Res.

MOBILIZED COMPETENCES

➤ Advanced sintering
+ 3D-imaging and modelling
+ thin films processing

- Advanced sintering of inorganic ceramics and composites
- Interface control in dense ceramics and composites
- Dielectric properties of inorganic and organic materials
- Thermal properties of dense composites and hybrids
- X-Ray tomography and 3D image analysis
- 3D modeling of multimaterials
- Interfaces in polycrystalline dielectric films

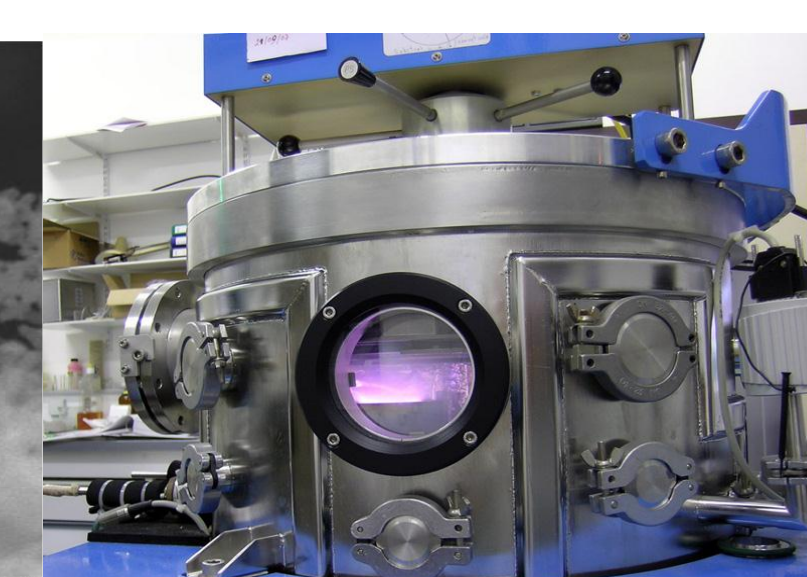
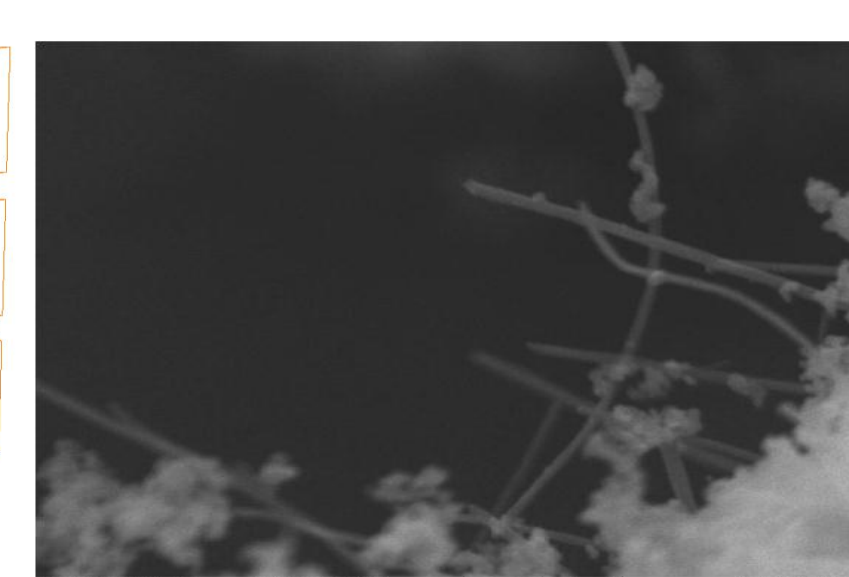
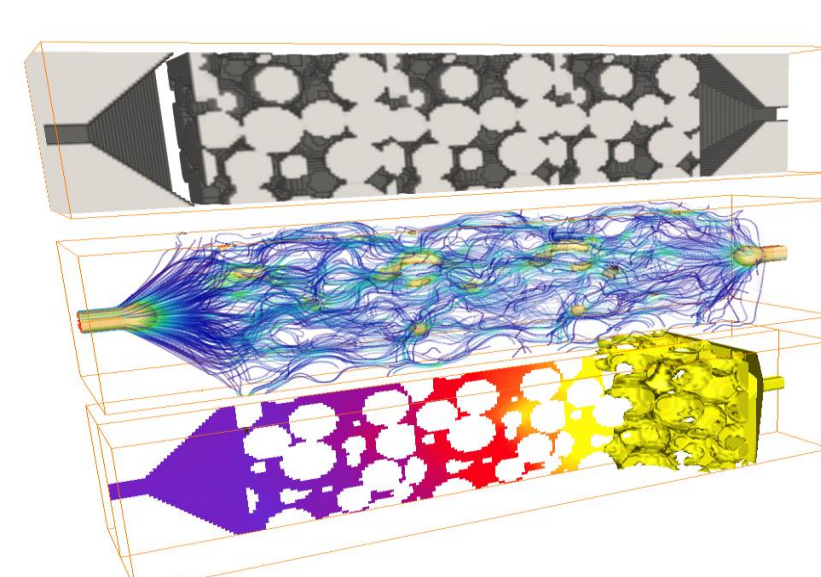
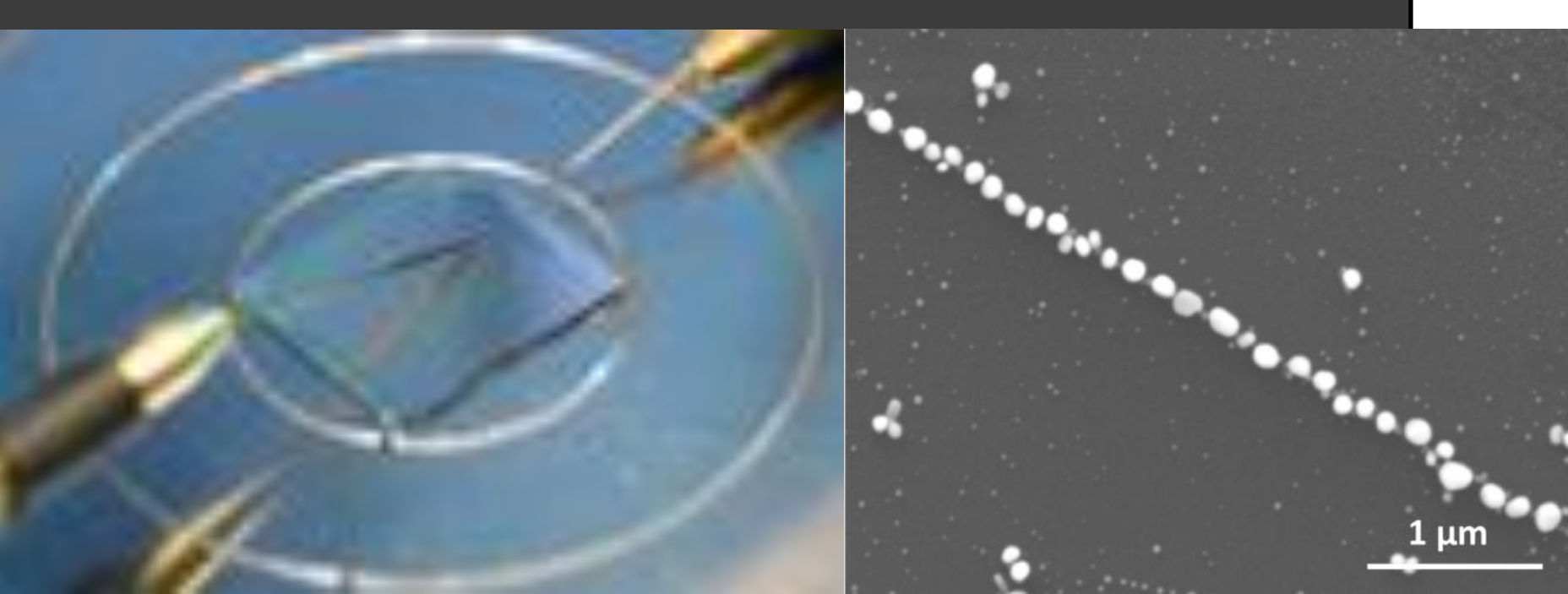
MAIN FACILITIES

- High temperature sintering (2000°C), hot-pressing, microwave sintering (with and without uniaxial pressure), Spark Plasma Sintering (SPS)
- 3D-Tomography (lab and synchrotron), image processing and 3D properties modelling (80 cores serveur and CPU-GPU hybrid serveur)
- Inorganic thin films processing using radio-frequency sputtering

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Non destructive X-Ray tomography as a first step for real space modeling of adMulti scale 3D imaging (X-Ray tomography and FIB) and numerical modeling
- vanced materials
- Non-linear inorganic dielectric films and their compatibility with organic electronic devices
- Dielectric micro particles for metamaterials in the TeraHertz frequency range
- Gathering several sintering routes for the design of advanced multimaterials
- Design of interfaces in advanced inorganic multimaterials

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PERMANENT STAFF

↘ Six extra permanent researchers



Cédric Ayéla

Junior Res.



Benjamin Caillard

Ass. Prof.



Hélène Debéda

Ass. Prof.



Isabelle Dufour

Prof.

Team leader



Claude Lucat

Senior Res.



Claude Pellet

Prof.

MOBILIZED COMPETENCES

↘ Technological process
+ materials sciences
+ soft matter physics
+ electrical engineering

- Development of new processes of fabrication of non-silicon Microsystems: screen printed technics, spray-coating associated with shadow-masking method, photolithography, wafer bonding.
- Modeling of MEMS by taking into account of viscoelastic properties of materials
- Mechanical and electrical characterisation of MEMS
- (Bio)chemical sensors: chemical sensing in gas media, biomimetic sensing in liquid media by means of Molecularly Imprinted Polymers (MIPs)

MAIN FACILITIES

- Thin films microprocessing: spin-coater, spray-coater, mask aligner, hotplates, wet etching of photoresists
- Thick films processing: screen printers, ovens, inks formulation
- Wire-bonding assembly: ball-bonder, wedge-bonder
- Films and devices characterisation: profilers, AFM, SEM, vibrometer, gain/phase analyser, etc.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Organic MicroElectroMechanicalSystems (MEMS): microsensors with organic integrated actuation and integrated detection capabilities
- MEMS for characterisation of soft matter (Rheometer on chip): characterization of complex fluids and viscoelastic thin films
- MEMS alternative to silicon MEMS for label-free (bio)chemical detection: static mode detection and dynamic mode detection in gas or liquid media



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Advanced Materials by Design



Laboratoire de l'Intégration du Matériau au Système – UMR CNRS 5218

Team: Organic Electronics



**Sylvain
Chambon**

Junior Res.



**Lionel
Hirsch**

*Senior Res.
Team leader*



**Pascal
Tardy**

Ass. Prof.



**Laurence
Vignau**

Ass. Prof.



**Guillaume
Wantz**

Ass. Prof.

PERMANENT STAFF

MOBILIZED COMPETENCES

↳ *Physics of semiconductors*
+ *materials sciences*
+ *organic devices*

- Organic electronics devices fabrication
- Charge carrier transport mechanisms in organic semiconductors
- Low temperature electro-optical studies
- Surface preparation and functionalization
- Photovoltaic cells – fabrication and characterization
- Polymer light emitting diodes
- Lifetime and reliability of organic devices
- Organic field effect transistors
- Modeling of photonic crystals

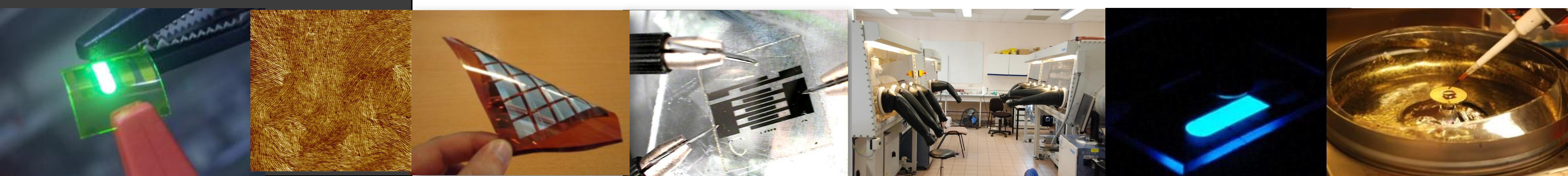
MAIN FACILITIES

- Organic electronics technological platform (ELORGA)
 - Thermal and e-beam evaporators, spin coaters in N₂ glove boxes
 - Helium close cycle and liquid nitrogen cryostats
 - AM1.5 Solar simulators, micro probe station
 - Optical and electrical setups for devices characterization
 - Inkjet printer

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of air stable organic solar cells
- ITO free transparent electrodes for OLED and OPV applications
- Flexible hybrid solar cells
- Ink formulations for OPV applications
- Recombination mechanisms in organic and hybrid solar cells
- Control of the nano-morphology of organic semiconductor blends
- Surface and interface modifications with self assembled monomolecular (SAM) layers
- Ambipolar organic field effect transistors for printed electronic circuits
- Integration of photonic bangap structures in organic devices

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PERMANENT STAFF



**Corinne
Dejous**

Prof.



**Hamida
Hallil**

Assoc. Prof.



**Jean-Luc
Lachaud**

Ing.



**Vincent
Raimbault**

Junior Res.



**Dominique
Rebière**

Prof.

Team Leader



**Angelique
Tetelin**

Assoc. Prof.

MOBILIZED COMPETENCES

➤ *Microsystems*
+ (bio)chemical detection
+ thin film characterization
+ visco-elasticity characterization
+ interaction mechanisms

➤ *Experience in multidisciplinary projects*

- Surface acoustic wave propagation in multilayered systems
- Combination with sensitive films: polymeric, hybrid, meso- and nano-structured materials, biomaterials
- Combination with microfluidic features
- Understanding and modeling of interaction mechanisms: wave/gas, wave/fluid, wave/solid, influence of target compounds immobilization (bacteria, viruses, toxins, heavy metals, vapors, VOC...), temperature effects
- Prototyping of ultra-sensitive platforms for early detection or dynamic monitoring
- New research themes: digital microfluidics, on-chip lensless microscopy for fluorescence measurements by using organic thin films

MAIN FACILITIES

➤ *Technological platform*
+ TAMIS
(Alternatives to Silicon Microsystems Technologies)
+ Clean room environment

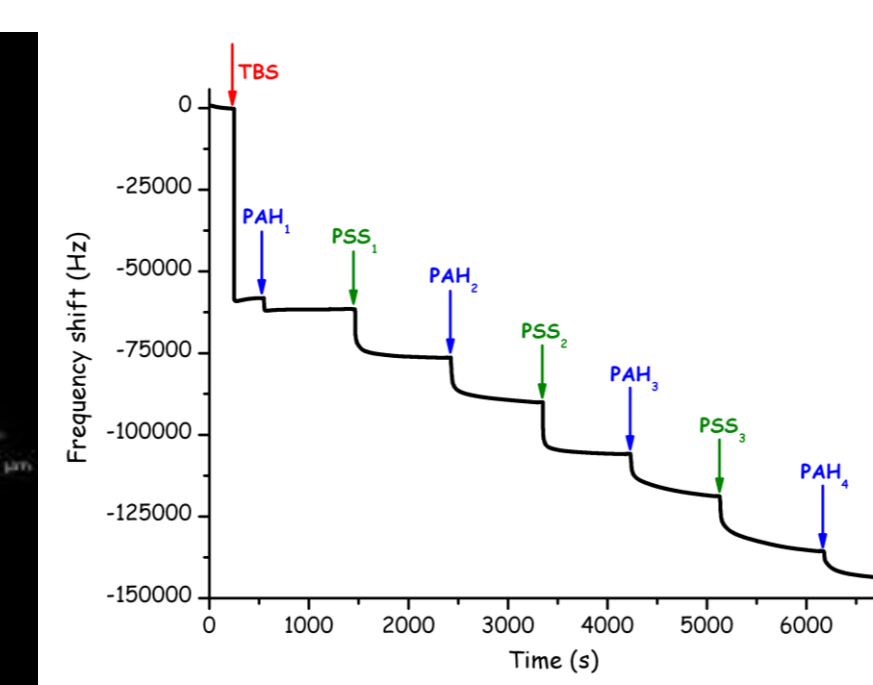
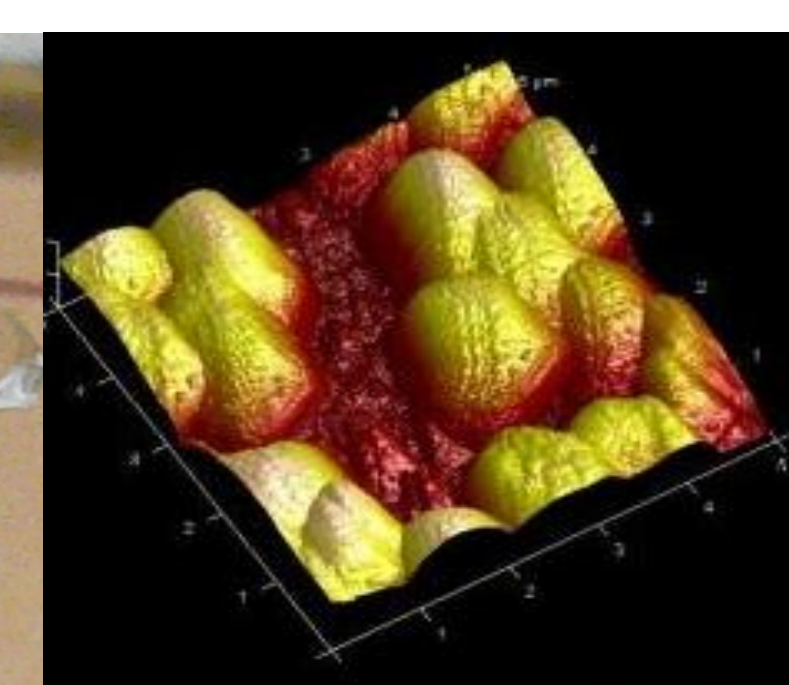
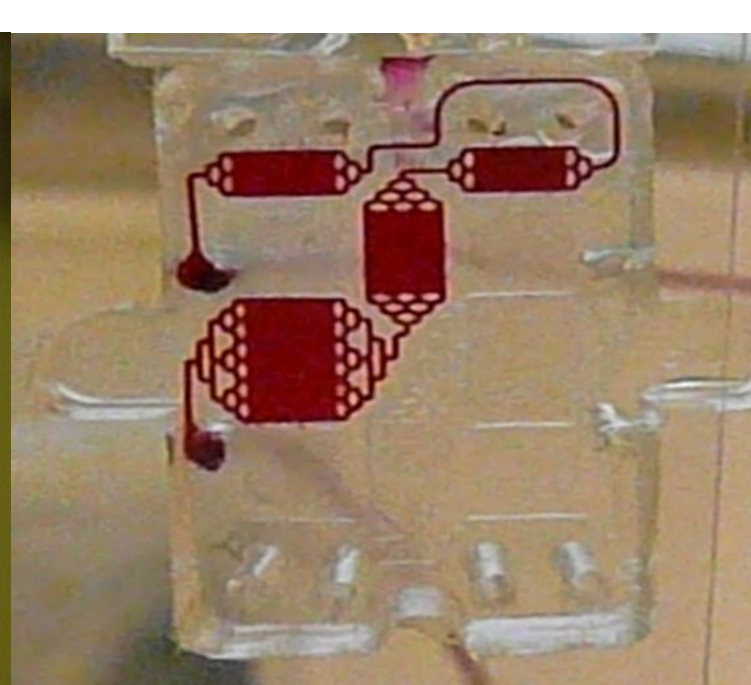
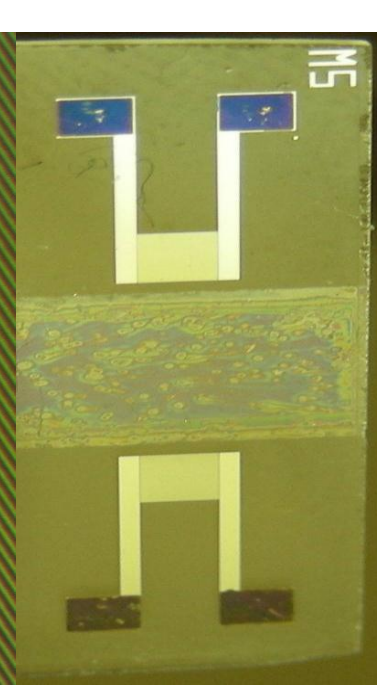
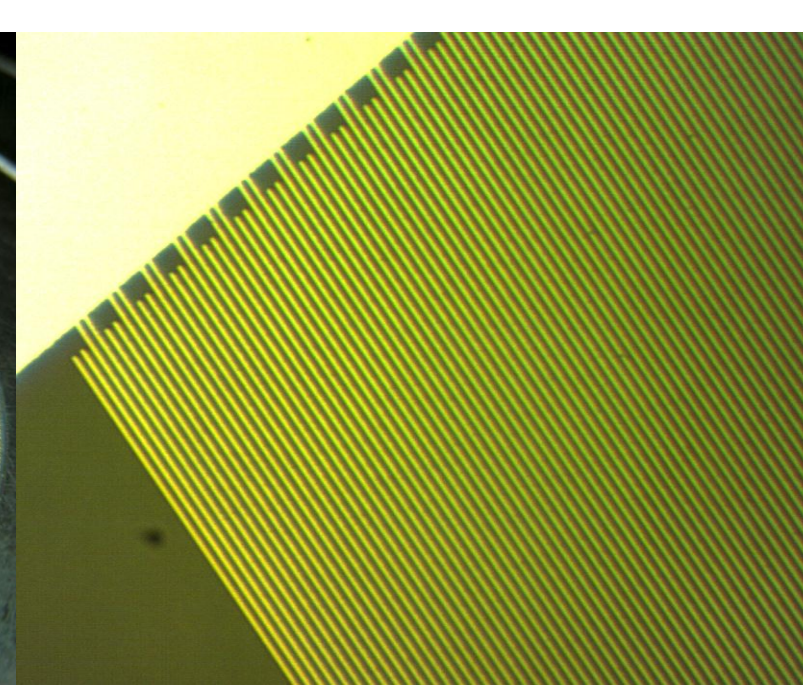
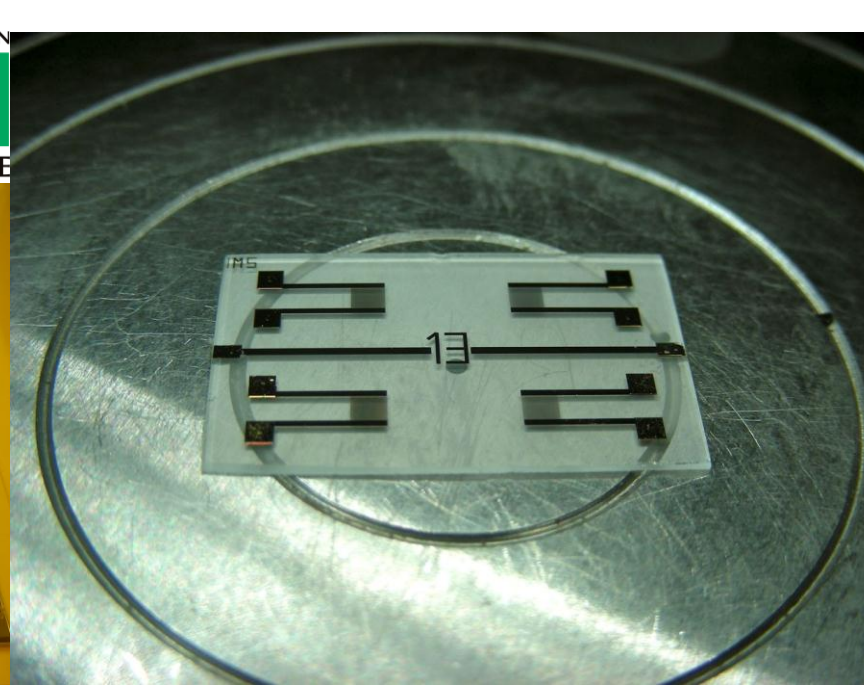
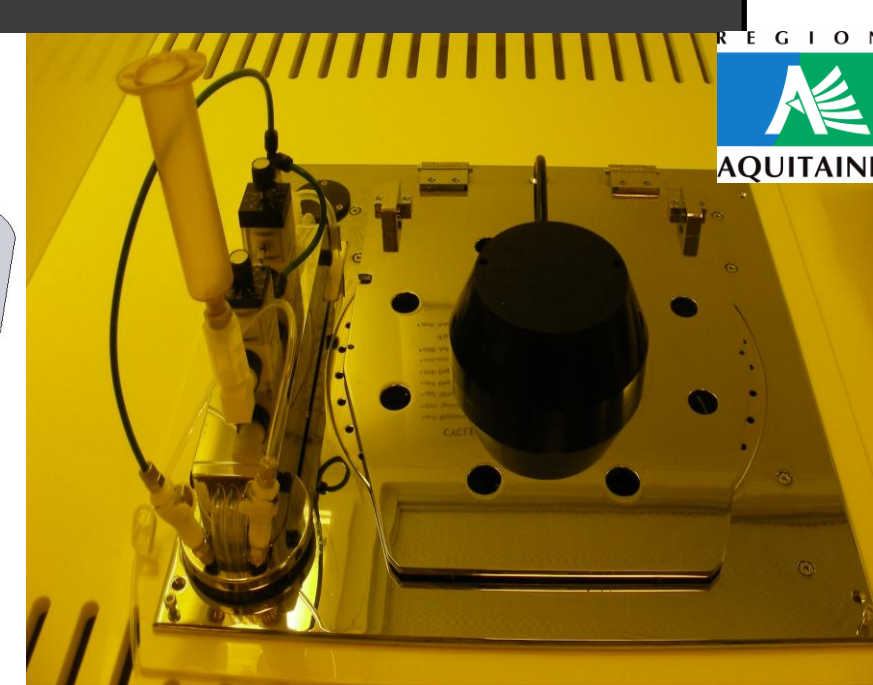
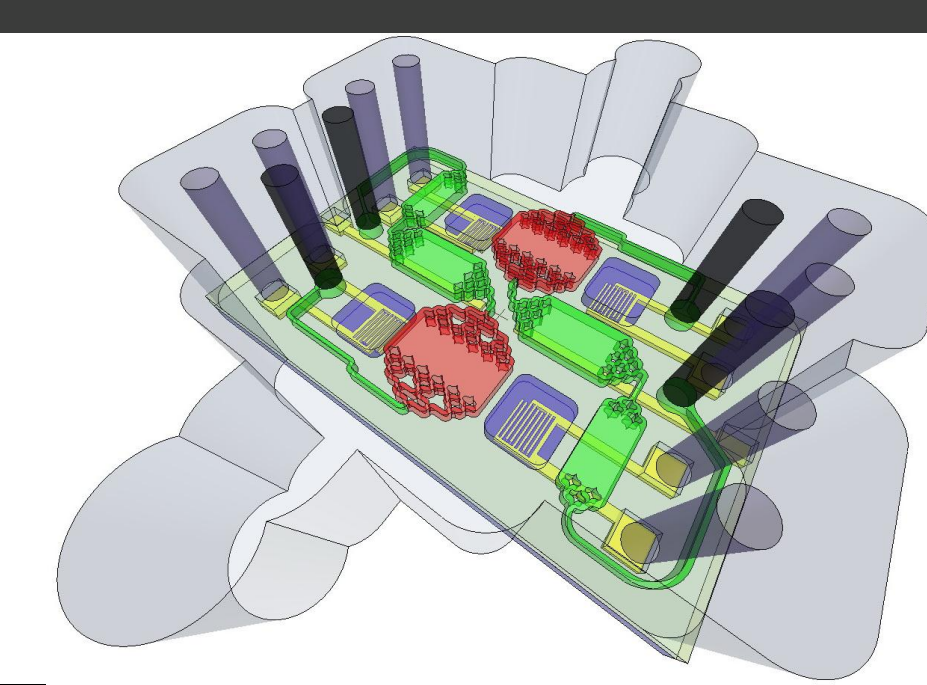
- Facilities for film deposition and surface characterization: spin-coating, dip-coating, spray, thermal evaporation, silkscreen, electrochemical deposition, photolithography equipment, UV ozone cleaning, mechanical, optical, AFM profilometers
- Packaging facilities: microassembling through soldering, wire bonding
- Engineering facilities: CAD tools for the design of electronic systems, facilities for electrical characterization and functional tests of microsensors (basic electronics, network analyzer, real-time spectrum analyzer, programmable syringe pumps, ...)

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of innovative architectures integrating microsensors and digital microfluidics in polymer technology for the rapid diagnosis of diseases
- Molecularly imprinted polymer sensors for rapid detection of modified nucleosides for non-invasive monitoring of cancer therapy
- Development of cell-based biosensors for the detection of heavy metals in water
- Scientific contributions to the shellfish issues of Bassin d'Arcachon (Toxin detection)
- Future : Development of innovative architectures integrating microsensors and microfluidics; applications to detection or material characterization



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PERMANENT STAFF



**Valérie
Desvergues**
Junior Res.



**Yannick
Landais**
*Prof.
Team leader*



**Frédéric
Robert**
Junior Res.

MOBILIZED COMPETENCES

➤ Organic chemistry
+ catalysis
+ radical processes
+ Organometallic processes

- Multicomponent reactions using radical processes
- New methods of activation in organic and polymer chemistry
- Organosilicon chemistry
- New methodologies for the formation of C-C bonds
- Development of new organocatalysts for polymer synthesis
- Asymmetric synthesis
- Synthesis of biologically relevant natural products

MAIN FACILITIES

- Conventional facilities for organic and polymer chemistry and characterization of small organic molecules
- Specific synthesis facilities: **hand closure-opening laboratory modular autoclave to work under CO₂ atmosphere or in scCO₂**, microwave-assisted synthesis, parallel synthesis, glove box, HPLC, GC-MS.
- Specific characterization facilities: NMR, MS,....

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Activation of functional monomers for the application to the green synthesis of new polymeric material.
- Development of latent organocatalysts for polyurethane synthesis
- New approaches toward chiral polymers
- Development of new organocatalysts for the synthesis of bio-sourced polymers



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PERMANENT STAFF



**Stéphane
Arbault**
CNRS Res.



**Laurent
Bouffier**
CNRS Res.



**Alexander
Kuhn**
Prof.



**Valérie
Ravaine**
Ass. Prof.



**Neso
Sojic**
Prof.
Team leader



**Dodzi
Zigah**
Ass. Prof.

MOBILIZED COMPETENCES

➤ Analytical chemistry
+ electrochemistry
+ colloidal chemistry

- Electrochemistry of biosystems (cells, mitochondria, peptides, enzymes, DNA)
- Synthesis of micro/nanogels and applications for drug-delivery
- Biofunctionalized nano-objects (particles, tubes, etc.)
- Electrochemical and optical nanosensors for biomedical applications
- Fabrication and functionalization of nanostructured electrodes
- Microarray technologies for multiplexed detection
- Dissymetric modification of nano-objects by bipolar electrochemistry
- Enhanced coupled electrochemical/optical techniques for bio-imaging

MAIN FACILITIES

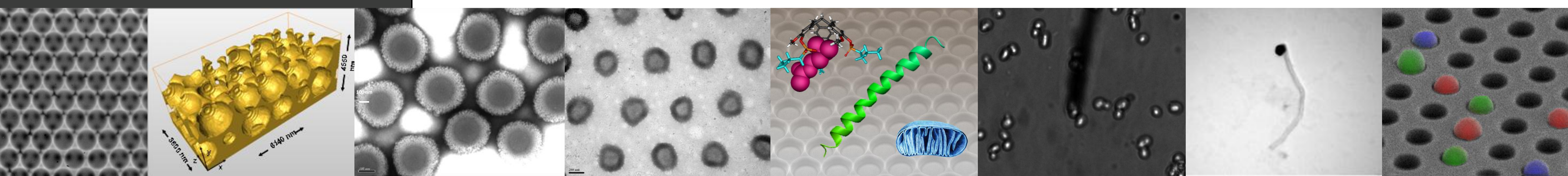
- Electrochemical techniques for fabrication, functionalization and characterization of modified surfaces
- Synthesis and imaging facilities for nano-objects
- Advanced localized electrochemical facilities: bipolar electrochemistry, scanning electrochemical microscopy, scanning tunneling microscopy

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Nano-sensors of metabolic activities at single cells and mitochondria
- Designed nanogels for controlled insulin-release
- Single point DNA/metal nano-hybrids generated by controlled bipolar electrochemistry
- Electrochemical microsensors for nanoparticle detection
- High sensitivity porous microbiosensors
- Nanostructured optical arrays for remote SERS imaging
- Nano-electrochemiluminescence transduction cage: stimuli-responsive gels for cell imaging



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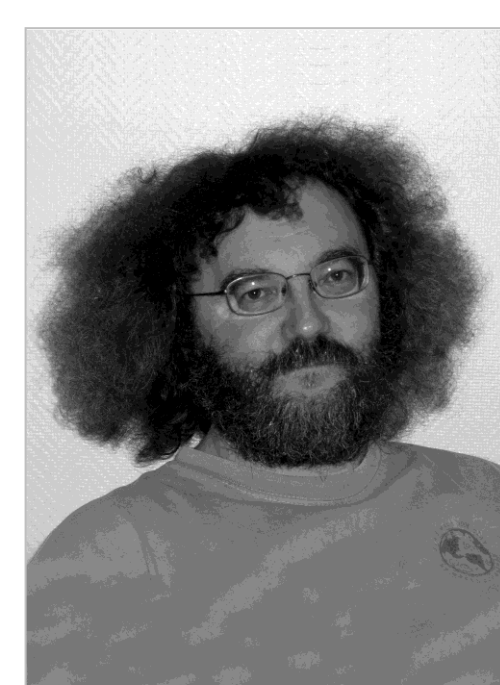
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PERMANENT STAFF

↘ Seven extra permanent researchers/engineers are not (yet) involved in AMADEus-relevant projects



Hervé Deleuze
Ass. Prof.



Karine Heuzé
Junior Res.



Yohann Nicolas
Ass. Prof.



Céline Olivier
Junior Res.



Thierry Toupance
Prof.
Team leader



Luc Vellutini
Ass. Prof.

MOBILIZED COMPETENCES

↘ Molecular sciences
+ polymerization chemistry
+ surface chemistry

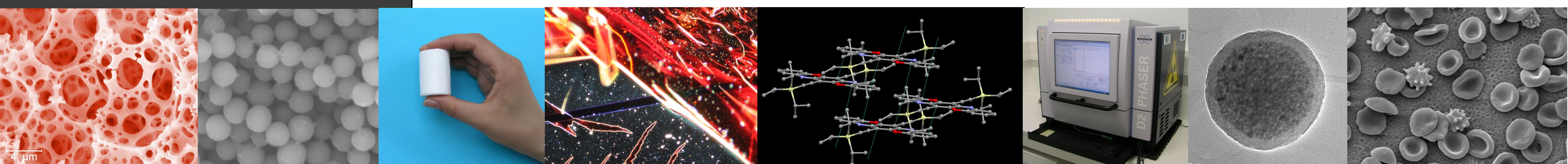
- Design and synthesis of organic chromophores and π -conjugated materials
- Synthesis of organosilylated coupling agents and self-assembled monolayers (SAMs)
- Surface biofunctionalization and dye-sensitization of nanoparticles and metal oxide surfaces
- Synthesis and applications of organic-inorganic hybrid and semi-conducting metal oxide films
- Design and application of emulsion-derived macroporous organic and hybrid monoliths
- Synthesis of porous materials for specific applications in wine chemistry
- Characterization of catalytic, electronic, photovoltaic and sensing properties

MAIN FACILITIES

- Conventional facilities for organic, organometallic, polymer and sol-gel chemistry and routine characterization methods (NMR, FTIR, MS, UV-vis, GC, HPLC, SEC, cyclic voltammetry)
- Specific synthesis facilities: surface functionalization, emulsion polymerization, etc.
- Thin film processing: SAMs, spin-coating, dip-coating, screen-printing, etc.
- Specific characterization facilities: N_2 & Hg porosimetries, DSC, TGA-MS, SEM, XRD, wettability measurements, etc.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of "push-pull" chromophores and multi-dye chains for dye-sensitized solar cells
- Low-temperature preparation route towards porous metal oxide layers for flexible electronics
- Photovoltaic colloids
- Honeycomb architecture from soluble π -conjugated molecules for isotropic semi-conductivity
- Development of analytical tools in the field of environment, health and biotechnology
- Dendritic functionalization of core-shell nanoparticles: biological applications
- Biomass wastes valorization in porous material chemistry
- Design of new scaffolds for tissue engineering
- Development of heterogeneous biocatalysts on continuous flow



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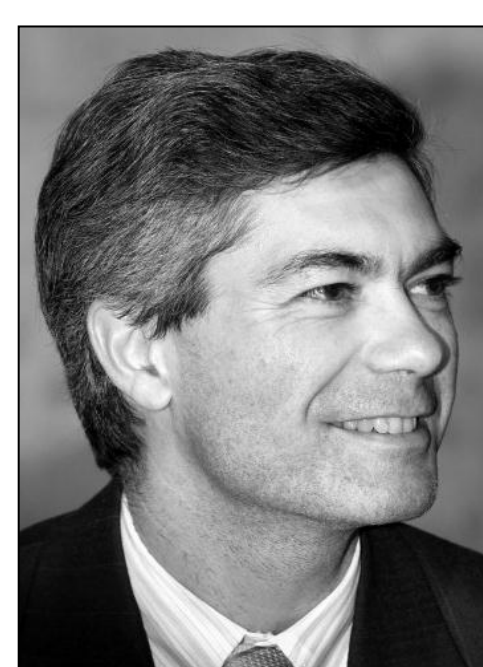
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PERMANENT STAFF

↘ Five extra permanent researchers/engineers are not (yet) involved in AMADEus-relevant projects



Dario Bassani
Senior Res.



Brigitte Bibal
Ass. Prof.



Dominique Lastécouères
Ass. Prof.



Jean-Marc Vincent
Senior Res
Team Leader

MOBILIZED COMPETENCES

↘ Supramolecular chemistry
+ material sciences
+ molecular sciences
+ photochemical nanosciences

- Development and study of molecular and supramolecular architectures
- Nano-imaging, in particular using time-resolved fluorescence microscopy
- Study of fast photoprocesses in supramolecular assemblies/nano-objects
- Design of photocontrolled systems and molecular switches
- Organocatalysis and metal-based catalysis
- Chemistry in/on perfluorinated phases (perfluorocarbon, teflon...)
- Molecular recognition and sensing

MAIN FACILITIES

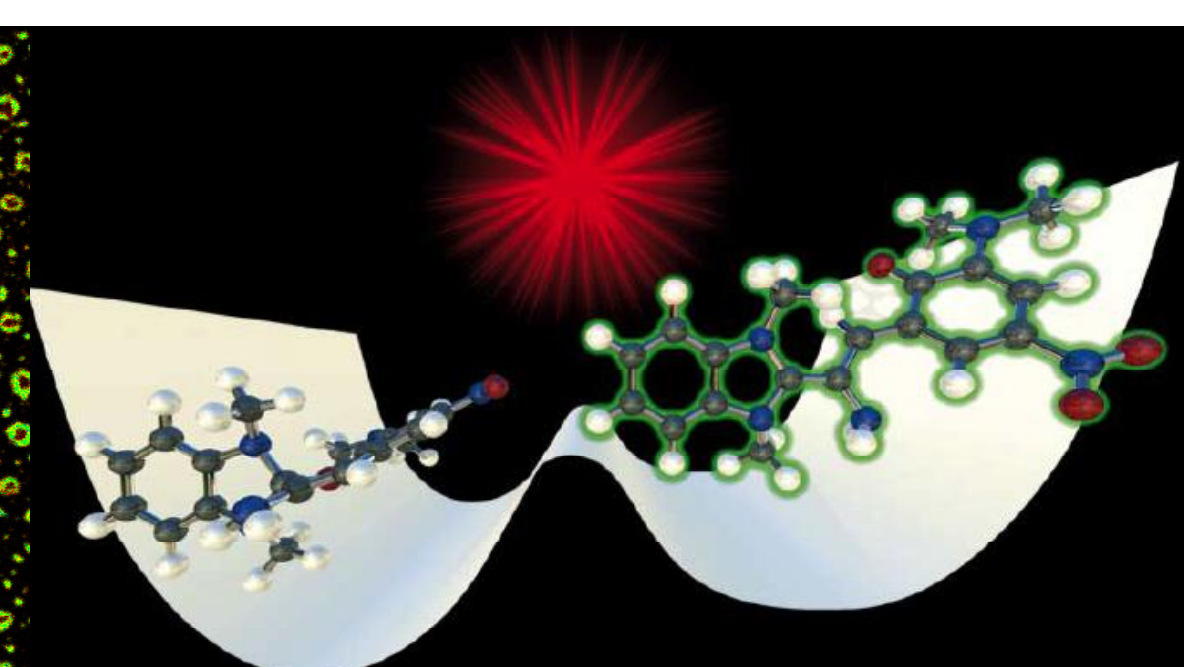
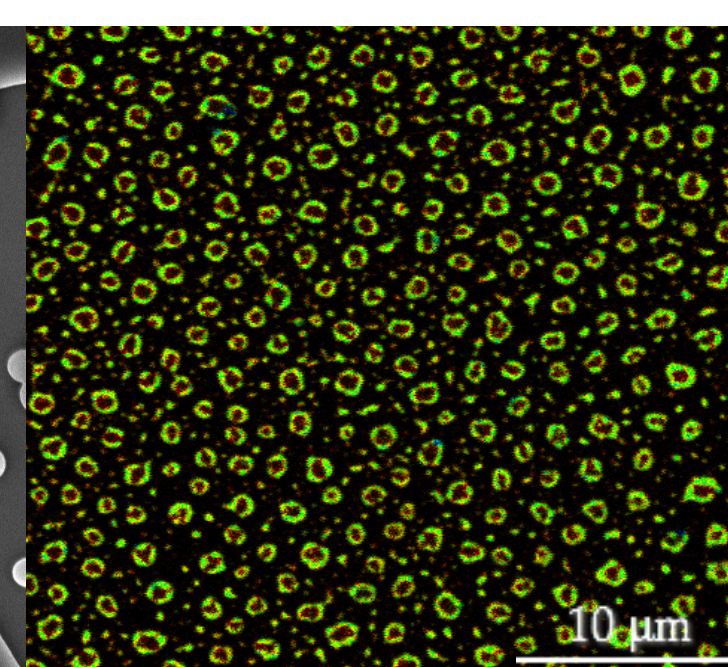
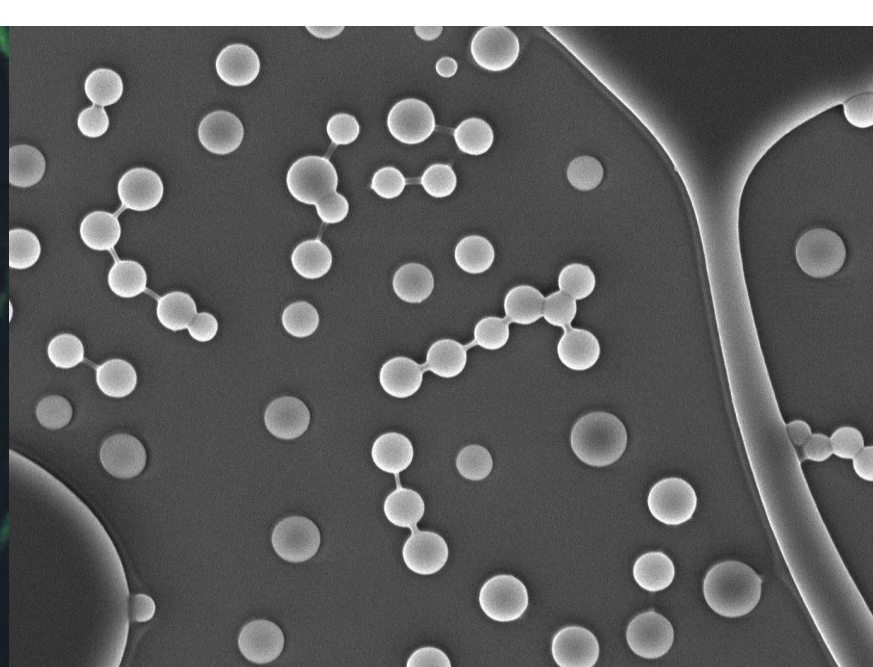
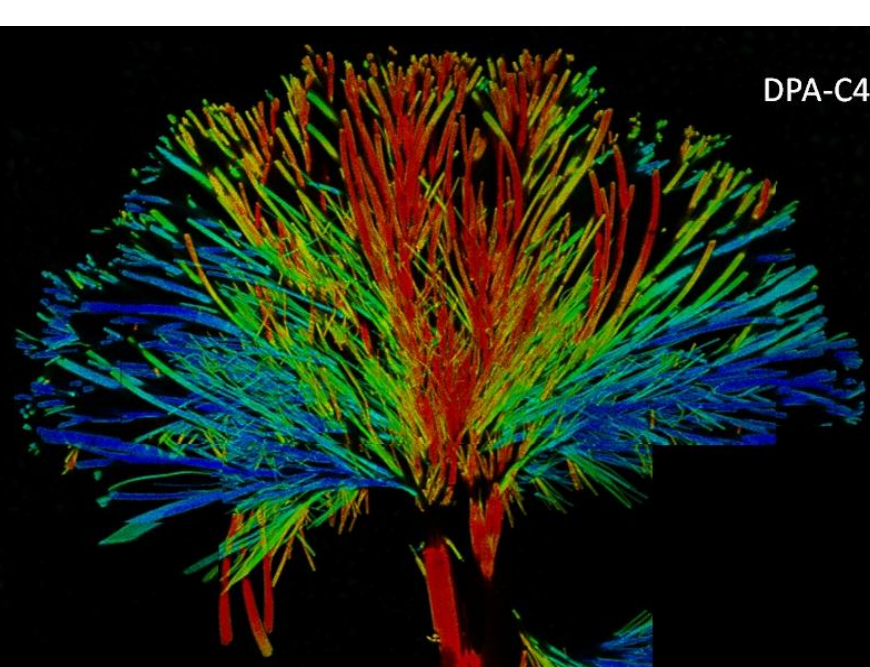
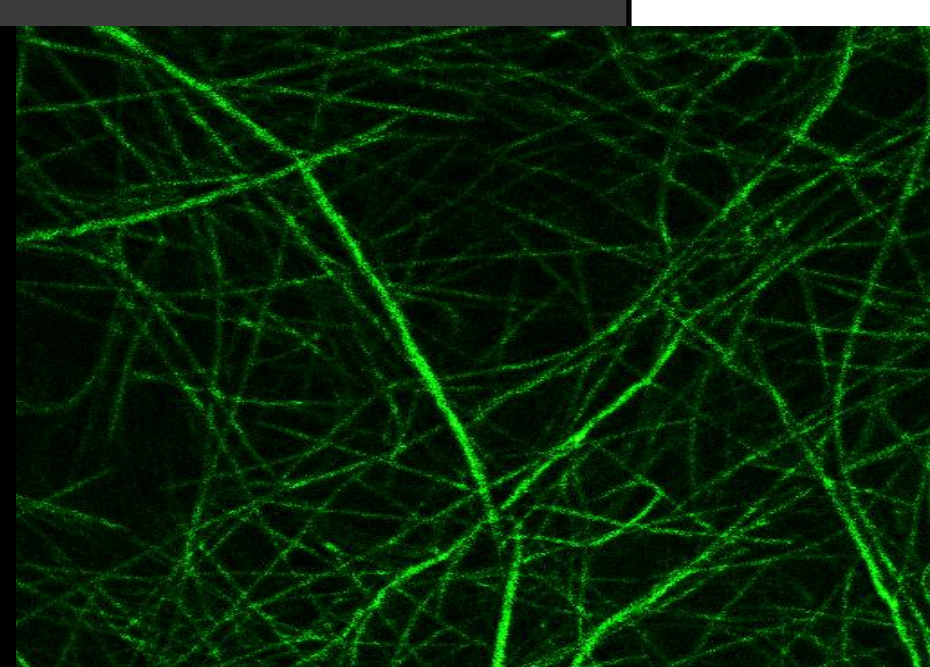
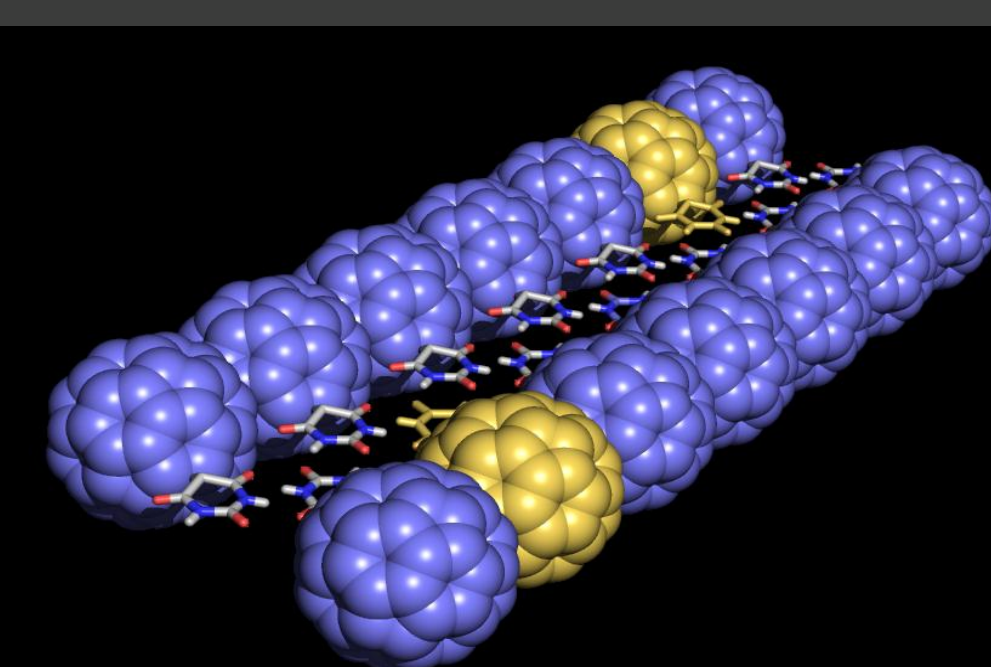
- Conventional facilities for the synthesis and characterization of organic compounds
- Specific characterization facilities: Low temperature UV-vis-NIR and fluorescence spectrophotometers (polarization, single photon counting), fluorescence microscope coupled to AFM, time-resolved (ps-ms) fluorescence, transient absorption spectroscopy, imaging spectroscopic ellipsometer.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of organocatalyzed processes for the preparation of polymers
- Rethinking eco-efficient synthetic processes for sustainable development
- Photo-active/nanostructured components for electronic devices
- Design of organic supramolecular nanostructures for organic photovoltaics
- Read-write-erase molecular printboards



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PERMANENT STAFF



**Alain
Castellan**
Prof.



**Véronique
Coma**
Ass. Prof.



**Henri
Cramail**
*Prof.
Team leader*



**Stéphane
Grelier**
Prof.



**Frédérique
Ham-
Pichavant**
Eng.



**Michèle
Schappacher**
Eng.



**Gilles
Sèbe**
Ass. Prof.

MOBILIZED COMPETENCES

➤ Polymer chemistry &
macromolecular engineering
+ materials sciences
+ molecular sciences

- Bio-based polymers from renewable resources
- Speciality polymers from vegetable oils (polyurethanes, polyepoxides, polycarbonates, polyesters, polyamides) in collaboration with ITERG technical centre
- Oligo/polysaccharidic building blocks for block copolymers
- Controlled catalytic depolymerization of cellulose, lignin and hemicelluloses
- Chemical modification of cellulosic nano-whiskers
- Modification of chitosan for biocid enhancement
- Photo-chemistry of lingo-cellulosic substrates

MAIN FACILITIES

- Conventional facilities for molecular synthesis, macromolecular chemistry and for characterization of polymeric materials at different scales
- Specific characterization facilities (light scattering, GC/MS, DSC, DMA, TGA, Rheometry, etc.)
- Molecular separation facilities (nano-filtration, preparative chromatographies, etc.)
- Xylochem platform for biomass transformation (Equipex Xyloforest)

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Non-isocyanate organo-catalyzed synthetic routes to polyurethanes from vegetable oils
- Co-polyesters from vegetable oils and lactide
- Design of new copolymers combining fatty acid and lingo-cellulosic building blocks
- Enzymatic-assisted depolymerization of lignin toward mono-phenolic compounds
- Enzymatic catalysis depolymerization of cellulose toward oligo-cellobiose

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Laboratoire de Chimie des Polymères Organiques - UMR 5629

Team: Advanced Functional Materials for Emerging Technologies



**Cyril
Brochon**
Ass. Prof.



**Eric
Cloutet**
Researcher



**Guillaume
Fleury**
Ass. Prof.



**Georges
Hadziioannou**
Prof.
Team Leader



**Gilles
Pecastaings**
Eng.

PERMANENT STAFF

➤ Five permanent researchers/engineers as well as twelve non-permanent researchers are involved in AMADEus-relevant projects

MOBILIZED COMPETENCES

➤ Polymer Science & Organic Electronic
+ (macro)molecular engineering
+ physico-chemistry of polymers
+ design of nanostructured materials

- Synthesis of semiconducting polymers and copolymers
- Design of nanostructured functional materials
 - Organic non-volatile memories
 - Thermoelectric devices
 - High density magnetic storage
- Formulation of electronic/magnetic inks
- Process development for nanofabrication of organic electronic devices
 - OPVs & OLEDs
 - E-Paper

MAIN FACILITIES

- State-of-the-art facilities for synthesis and characterization of organic (co)polymers
- Clean room environment for the formulation and the processing of advanced functional materials

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Magnetic nanoparticles/block copolymers patterned media for ultra-high density storage
- Direct self-assembly of block copolymers for lithographic applications in the CMOS industry
- Magneto/electro-phoretic inks for E-paper applications
- Carbon nanotubes/semiconducting copolymers hybrids for transparent conductive electrodes
- Low band gap materials for OPV applications
- Complex copolymer architectures for enhanced properties and stability of OPVs



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Laboratoire de Chimie des Polymères Organiques – UMR 5629

Team: Polymer Nanotechnology for Life Sciences

PERMANENT STAFF



**Emmanuel
Ibarboure**

Engineer



**Elisabeth
Garanger**

Junior Assoc. Res.



**Sébastien
Lecommandoux**

Prof.

Team leader



**Jean-François
Le Meins**

Ass. Prof.



**Olivier
Sandre**

Junior Res.



**Christophe
Schatz**

Ass. Prof.

MOBILIZED COMPETENCES

➤ *Polymer chemistry and physics*
+ *colloid sciences*
+ *self-assembly*
+ *chemistry-biology interface*

- Design of biocompatible amphiphilic block copolymers
- Polypeptide and polysaccharide synthesis and chemical modification
- Self-assembly, stimuli-responsiveness (pH, T, redox, magnetic field)
- Nanoparticle drug loading and controlled release
- Colloidal stabilization of polymer and hybrid nanoparticles in physiological media
- Protein-like polymers and functional peptides synthesis and functionalization
- Nanoparticle characterization (SLS, DLS, SANS, TEM, AFM, Zeta,...)

MAIN FACILITIES

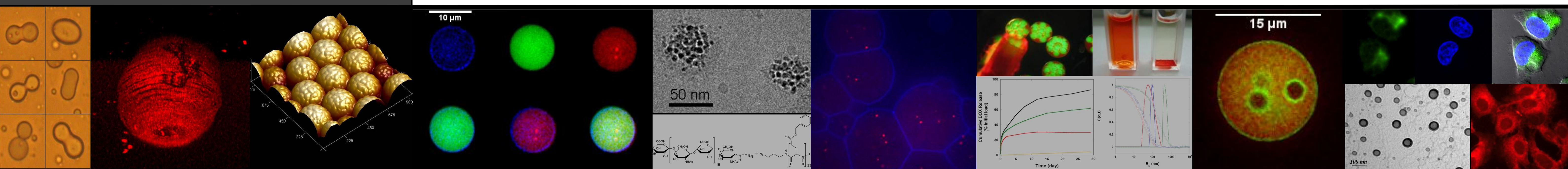
- Facilities for polymer, peptide and protein synthesis, purification and characterization (SEC, HPLC, gel electrophoresis...)
- Nanoparticle production (emulsion, microfluidics, nanoprecipitation,...)
- Colloidal characterization (SLS, DLS, SANS, TEM, AFM, Zeta, ITC)
- Specific characterization facilities: magnetic mobility and hyperthermia *in vitro* and *in vivo*, Isothermal Titration Calorimetry, epi-fluorescence and confocal microscopy, ...

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Design of peptide-polymer and protein-like polymer nanoparticles for active and targeted delivery
- Polymer vesicles (Polymersomes) for therapy and diagnosis
- Magnetic polymersomes for magnetic targeting and controlled release by local hyperthermia
- Loading of fragile biomolecules (therapeutic peptides, proteins, siRNAs)
- Design of polymer nanoparticles for cancer theranostics
- Specific peptide-based polymer design for brain targeting
- Multi-functional polymer nanoparticles



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PERMANENT STAFF

↘ 3 extra researchers/engineers are not (yet) involved in AMADEus projects

Laboratoire de Chimie des Polymères Organiques - UMR 5629

Team: Polymerization Catalyses and Processes



Stéphane Carlotti
Ass. Prof.



Alain Deffieux
Senior Res.



Valérie Héroguez
Senior Res.



Frédéric Peruch
Junior Res.



Michel Schappacher
Eng.



Daniel Taton
Prof.
Team leader



Joan Vignolle
Junior Res.

MOBILIZED COMPETENCES

↘ Polymer chemistry and macromolecular engineering
+ materials sciences
+ molecular sciences

- Synthesis and characterization of “tailor-made” polymers with specific properties
- Organic, organometallic and enzymatic catalysis of polymerization
- Development of environmentally friendly processes in dispersed media
- Investigation into the mechanisms and kinetics of polymerization reactions
- Control of the characteristics of polymers at the molecular and macromolecular scales
- Design of polymeric particles of controlled morphology (size and shape)
- Synthesis and self-assembly into nanoparticles of stimuli-responsive block copolymers
- Design of branched and shape-persistent polymeric architectures

MAIN FACILITIES

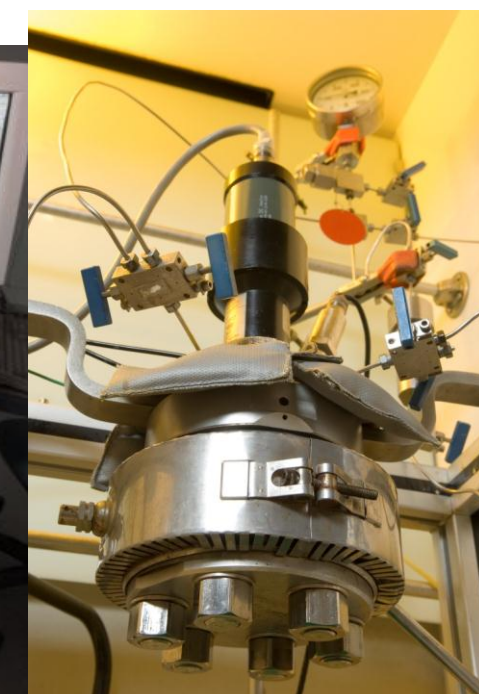
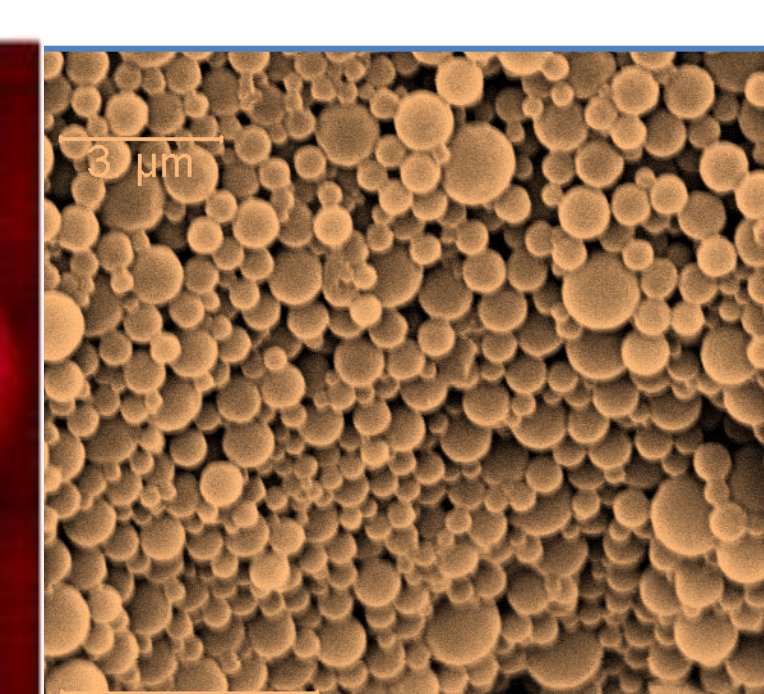
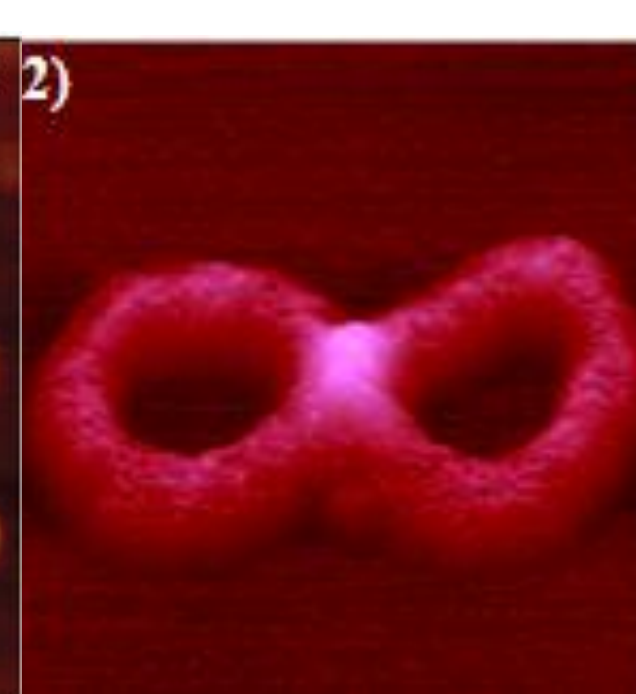
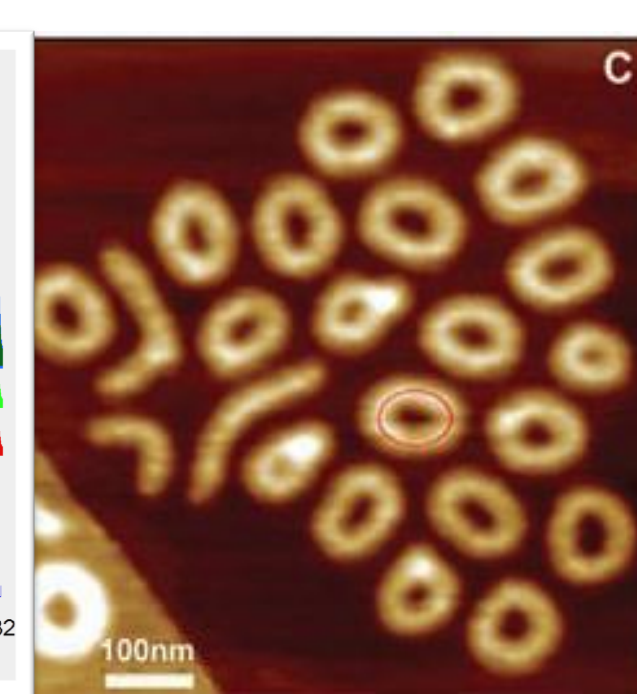
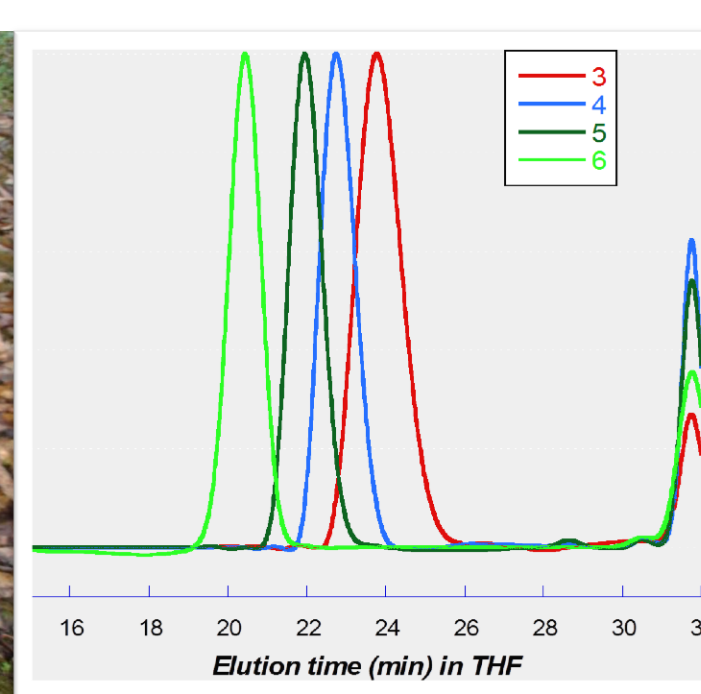
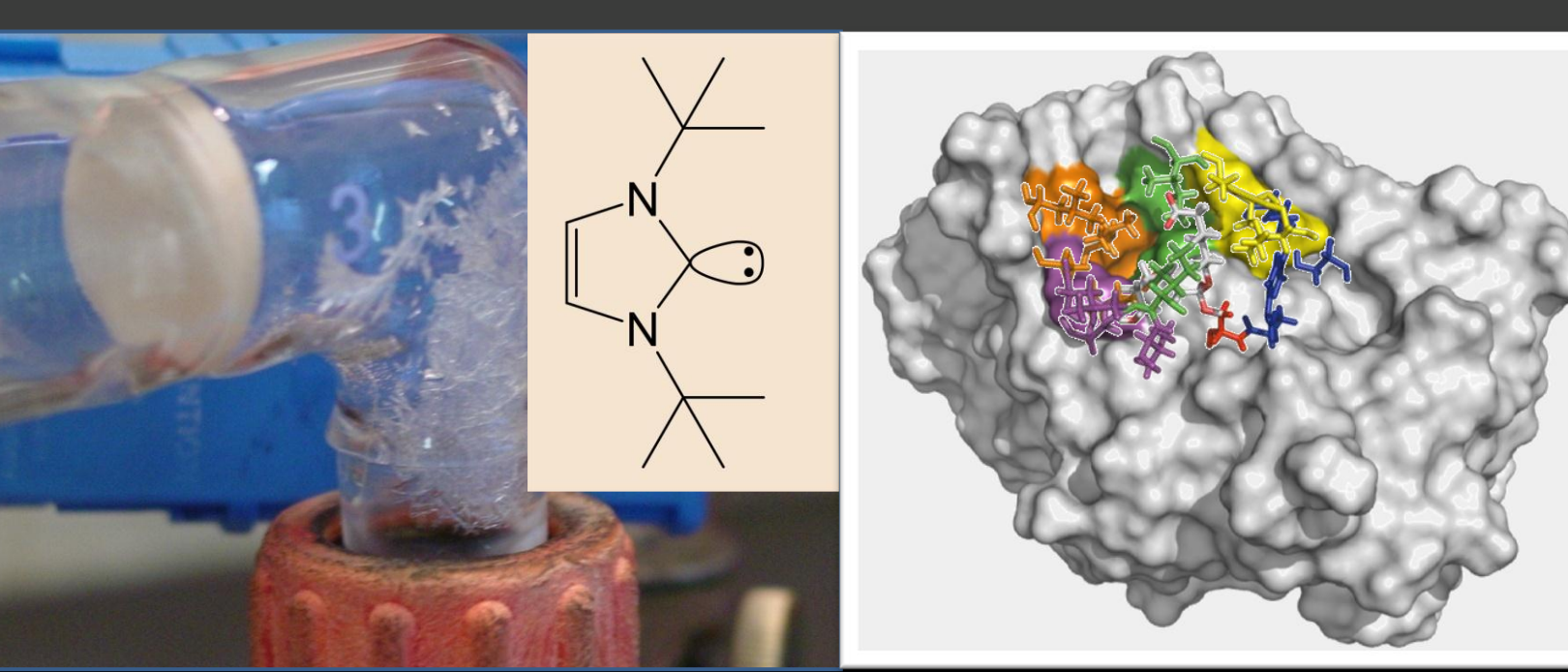
- Conventional facilities for molecular synthesis, macromolecular chemistry and for characterization of polymeric materials at different scales
- Specific equipments for polymer synthesis: in water-borne or under supercritical- CO_2 dispersed media; manipulation of enzymatic catalysts (incubators, PCR, ...)
- Specific characterization facilities: light scattering, imposed stress rheometer, etc.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Organocatalyzed polymerizations: towards a multi-task catalytic platform
- Polymerization using enzymes and bio-inspired catalysts
- Chiral polymers by metal-free asymmetric polymerization
- Bio-inspired synthesis of polymers: polymerization of isoprene derivatives
- Design of functional polymer particles towards specific applications
- Hybrid nanoparticles by concurrent polymerization processes in water-borne dispersing media
- Use of CO_2 as reactant or dispersing medium for sustainable polymer chemistry



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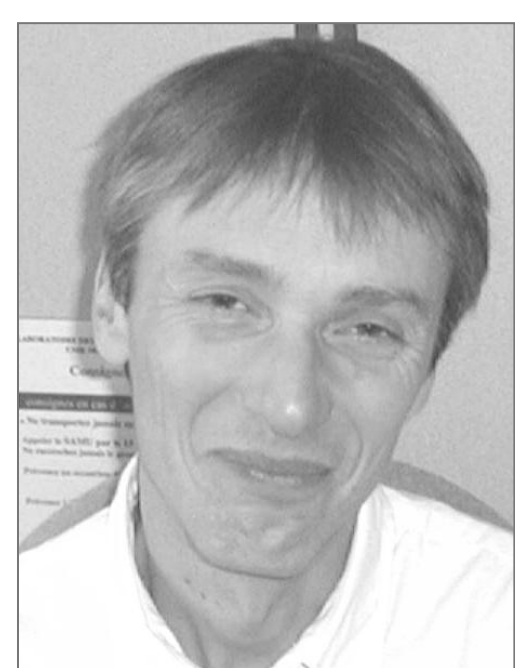
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PERMANENT STAFF

↘ Ten extra permanent researchers/engineers are not (yet) involved in AMADEus-relevant projects



Eric Martin
Prof.



Jean-Marc Leyssale
Junior Res.



Gerard L. Vignoles
Prof.
Team leader

MOBILIZED COMPETENCES

↘ Multiscale modelling
+ physico-chemistry ; mechanics
+ continuum models
+ molecular dynamics
+ Monte-Carlo methods
+ image-based modelling

- Expertise in carbon science
- Physico-chemistry of materials synthesis : reactor scale, pore/grain/fiber scale
- Nanostructure modeling : reverse Monte-Carlo, image-based methods
- Computational chemistry, thermodynamics, reaction kinetics
- Computational mechanics, thermomechanics and heat transfer
- Image-to-mesh translation methods

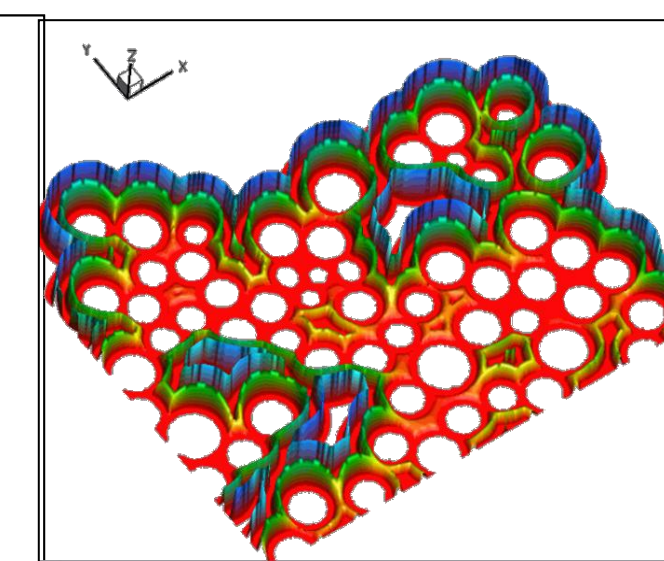
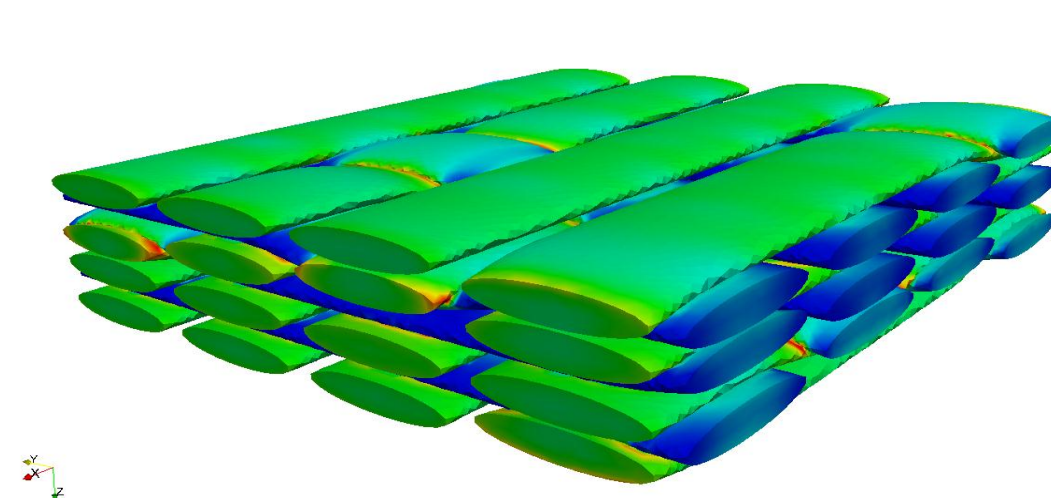
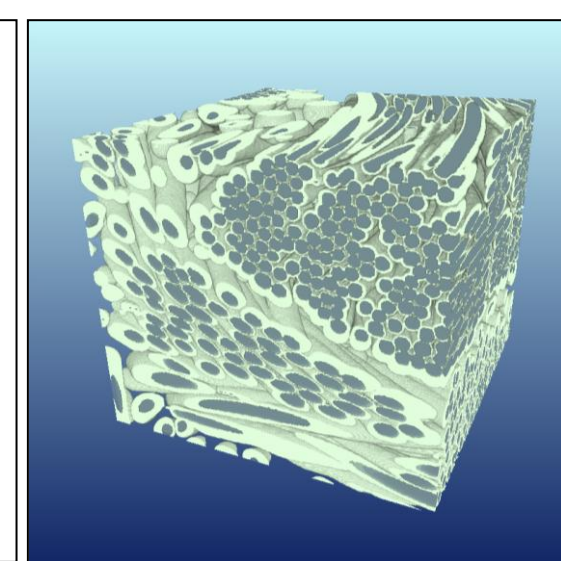
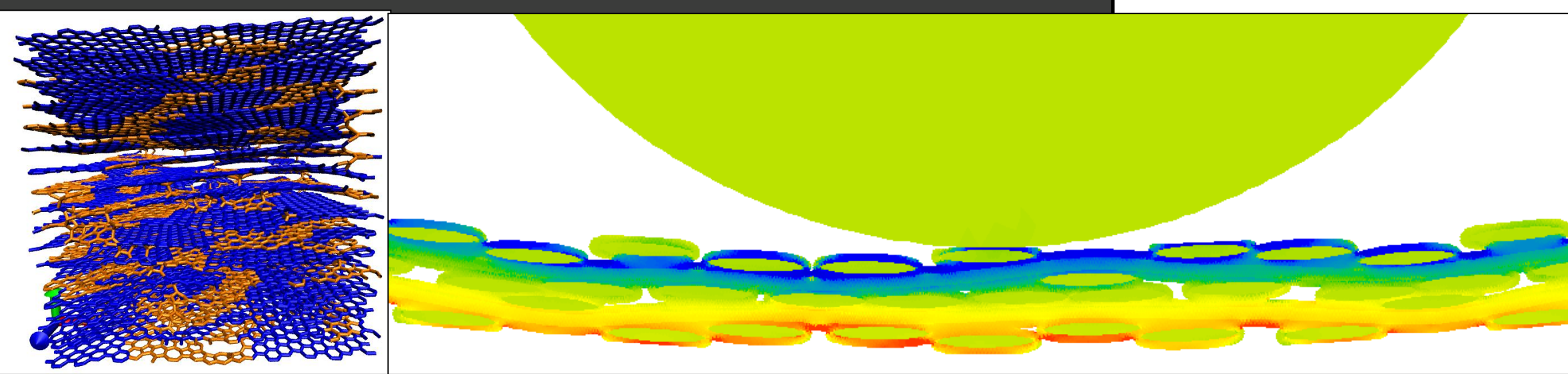
MAIN FACILITIES

↘ Structural characterization
↘ Physical & mechanical characterization

- Conventional facilities for structural materials synthesis and characterization
- Specific characterization facilities: electron microscopies (HRTEM, High-temp. E-SEM), X-ray Computerized Micro Tomography (CMT) Image Processing, Raman spectroscopy, etc.

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Development of multi-scale image-based modeling for material synthesis & behavior
- Development of virtual material approach: integrated software toolbox
- Application to carbon-based materials, biomaterials, metamaterials



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PERMANENT STAFF

➤ Extra Rhodia permanent engineers will be involved in AMADEus-relevant projects as needs appear



Annie Colin

Prof.
Team leader



Jacques Leng

Junior Res.



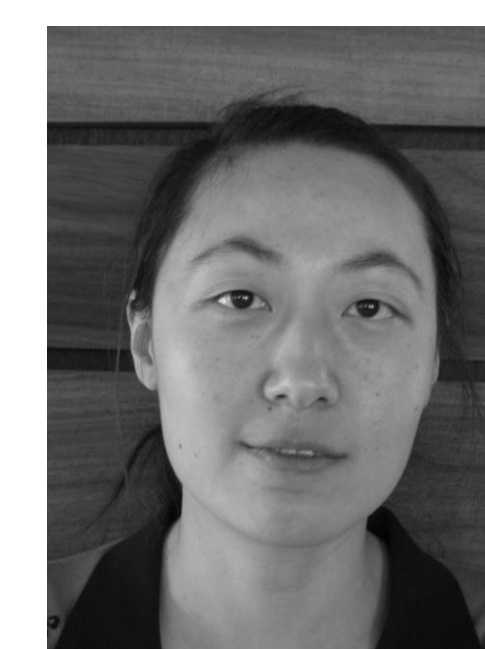
Jean-Baptiste Salmon

Junior Res.



Bertrand Pavageau

Engineer



Ling Qi

Engineer

MOBILIZED COMPETENCES

➤ Soft matter physics
+ microfluidics
+ automation & instrumentation

- Rheology of complex fluids in confined flows
- Two-phase flows in confined geometries
- Self-assembly of colloids
- Evaporation/drying and transport phenomena
- Design/conception/fabrication of microfluidic labs-on-chip
- Microfluidics for data acquisition for sustainable chemical processes
- High-throughput formulation and characterization of complex fluids
- Automated and in-situ micro-instrumentation

MAIN FACILITIES

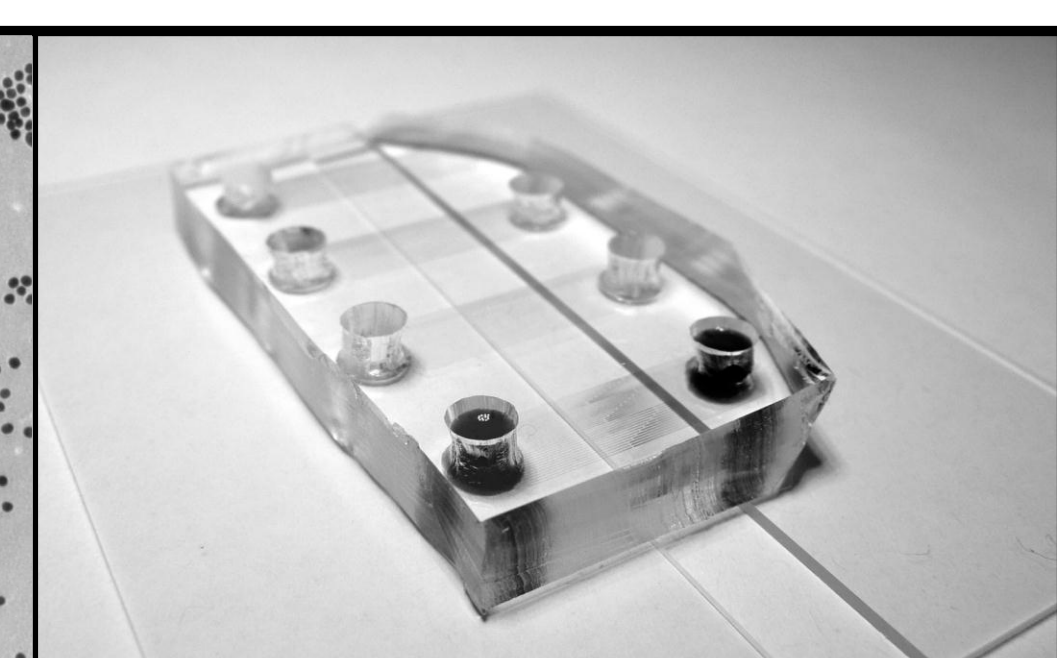
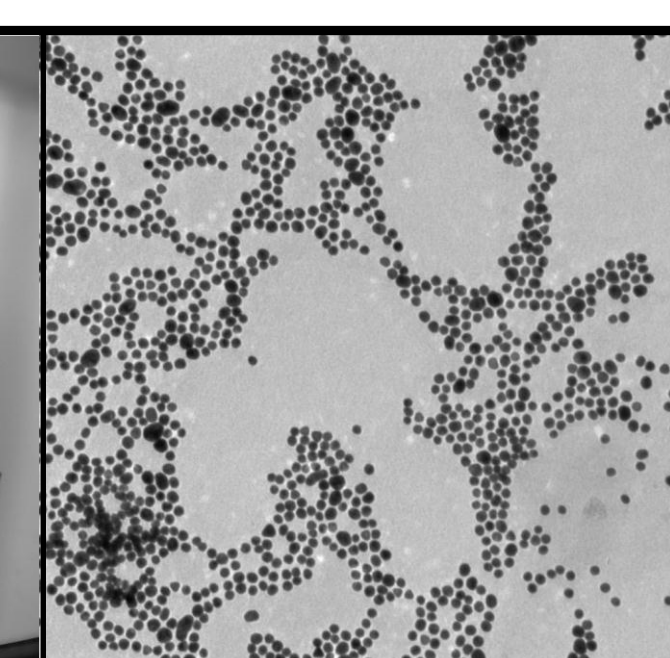
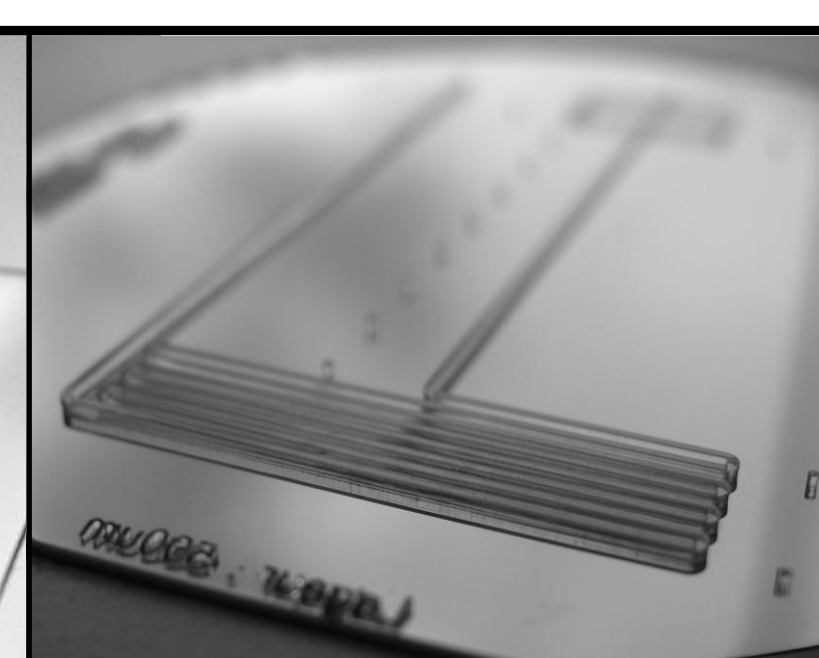
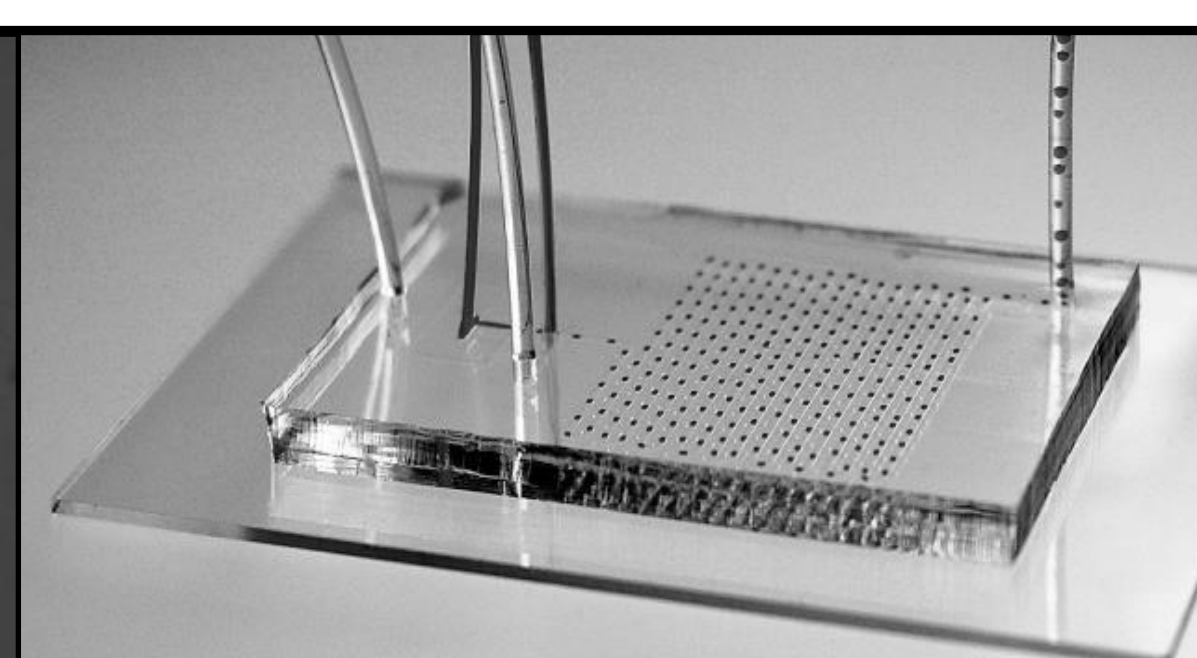
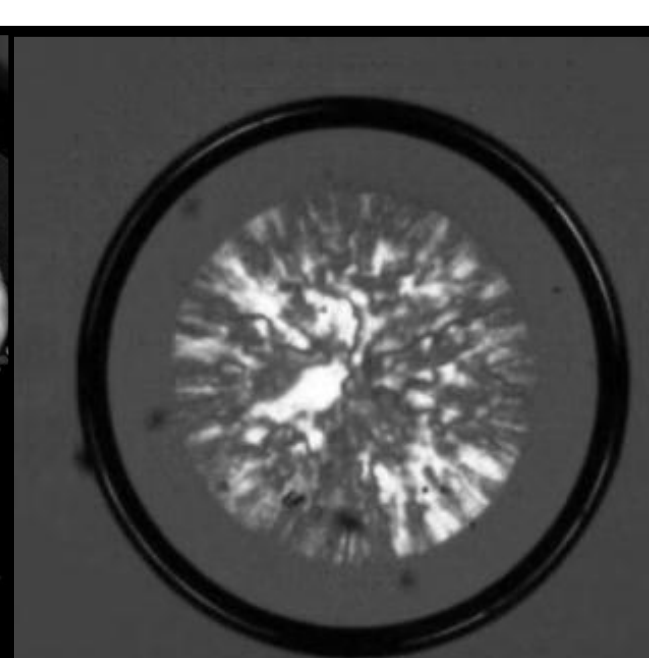
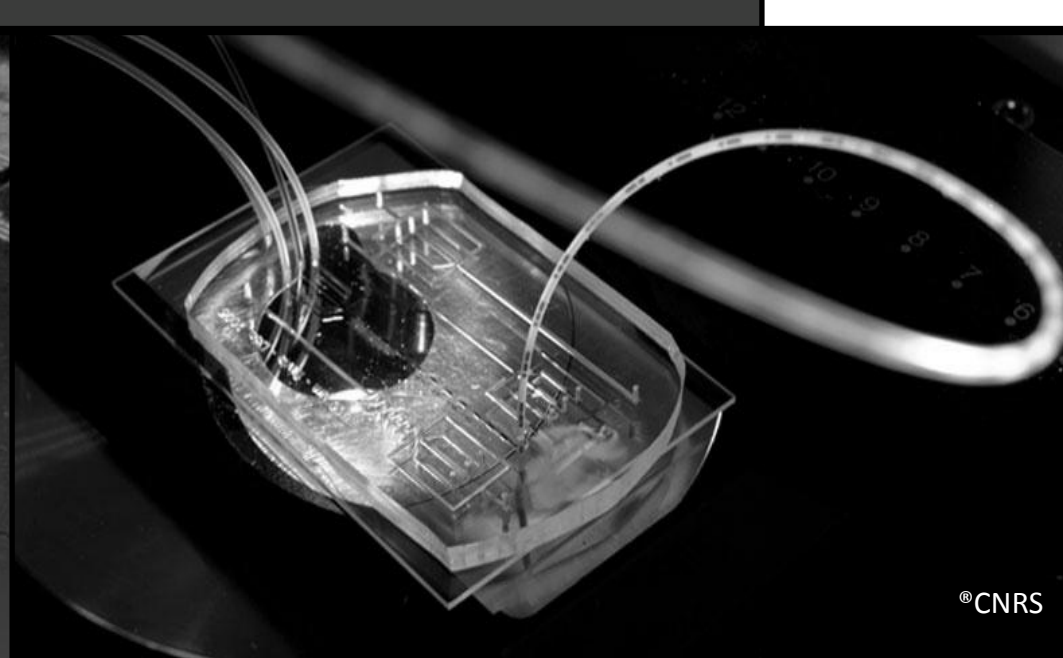
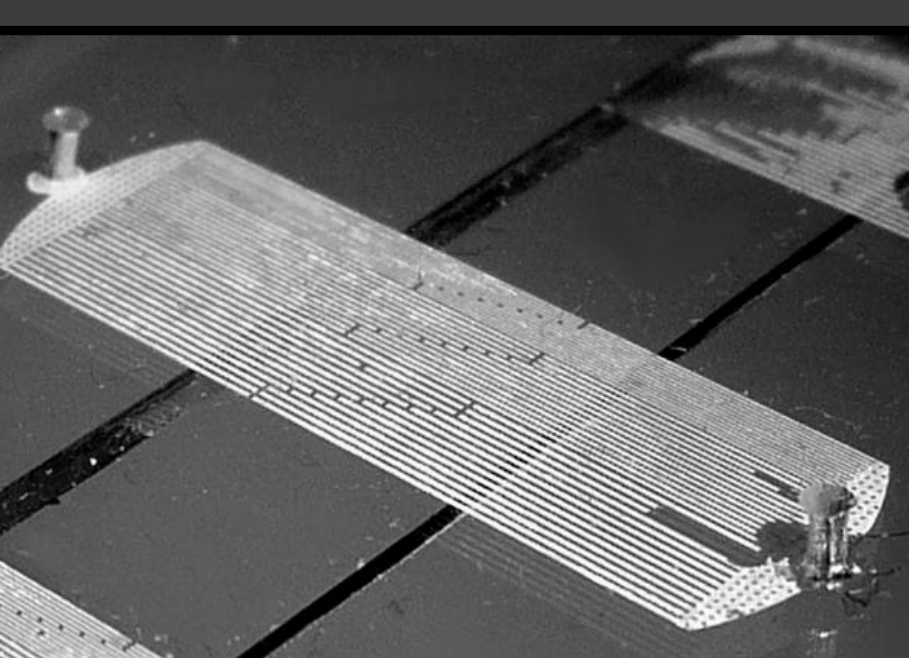
- Microfabrication facilities: clean room for fabrication of microfluidic devices
- Confocal fluorescence & Raman microscopes
- Robotic platforms for high-throughput physical chemistry
- Large range of analytical tools adapted to continuous measurements at small scales

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Microfluidic-assembly of nanostructured materials for metamaterials
- Microfluidic tissue engineering
- Physics of film formation: rheology, evaporation and flows
- Evaluation of formulations for organic electronics, including active colloids
- Self-assembly of block-copolymers containing single DNA strand
- Microfluidic-generation of complex polymersomes
- Physics of drying of colloidal dispersions up to organized materials
- Evaluation and formulation of green surfactants



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PERMANENT STAFF



**Alexandre
Bouzdine**

Prof.
Team leader



**Sebastien
Burdin**

Ass. Prof.



**Jerome
Cayssol**

Ass. Prof.

MOBILIZED COMPETENCES

- Theory of artificially designed materials
- + Magnetism
- + Superconductivity

- Theory of superconductor-ferromagnet heterostructures
- Studies of non-conventional superconductors and nanostructures
- Properties of graphene and topological insulators
- Effects of disorder **and quantum chaos**
- Quantum transitions in bulk and nanostructured materials

MAIN FACILITIES

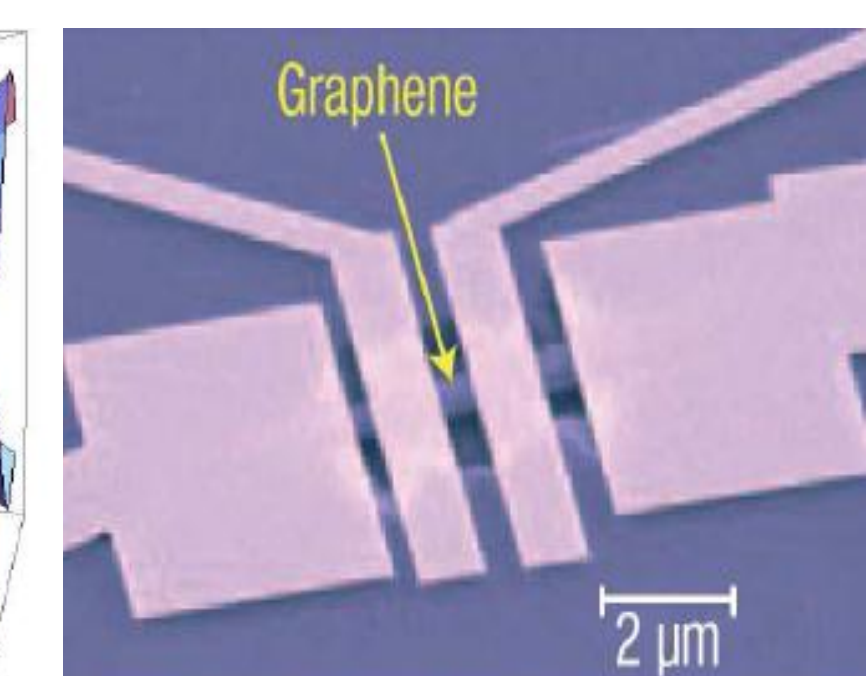
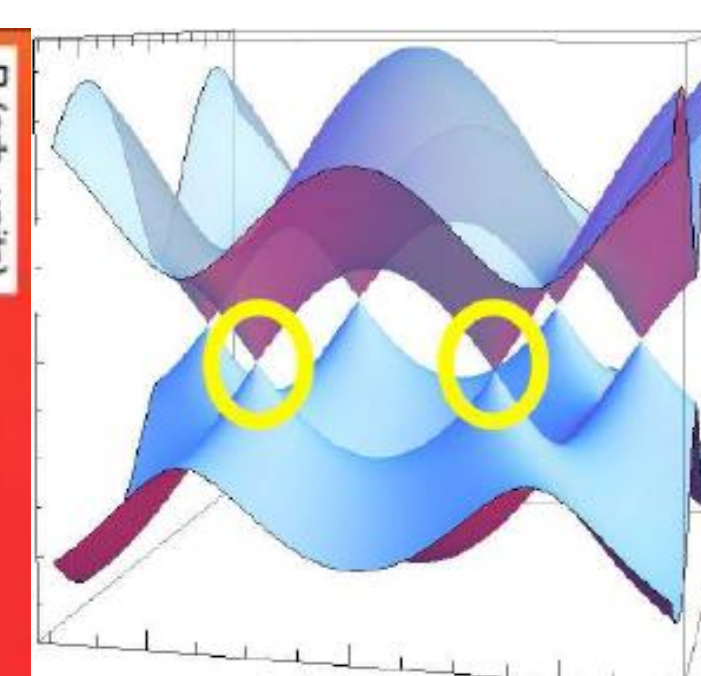
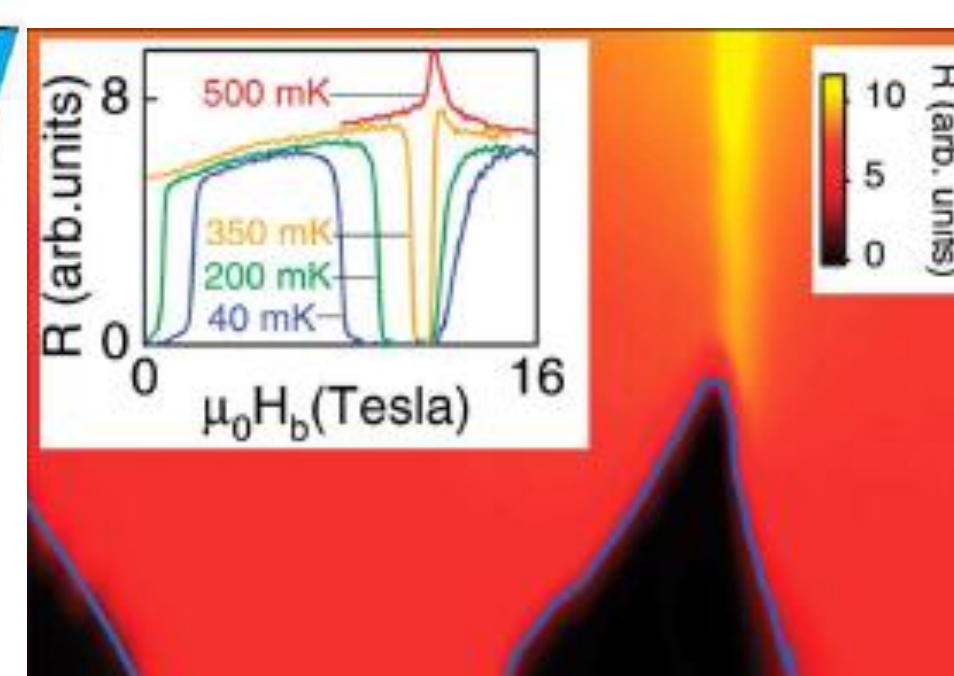
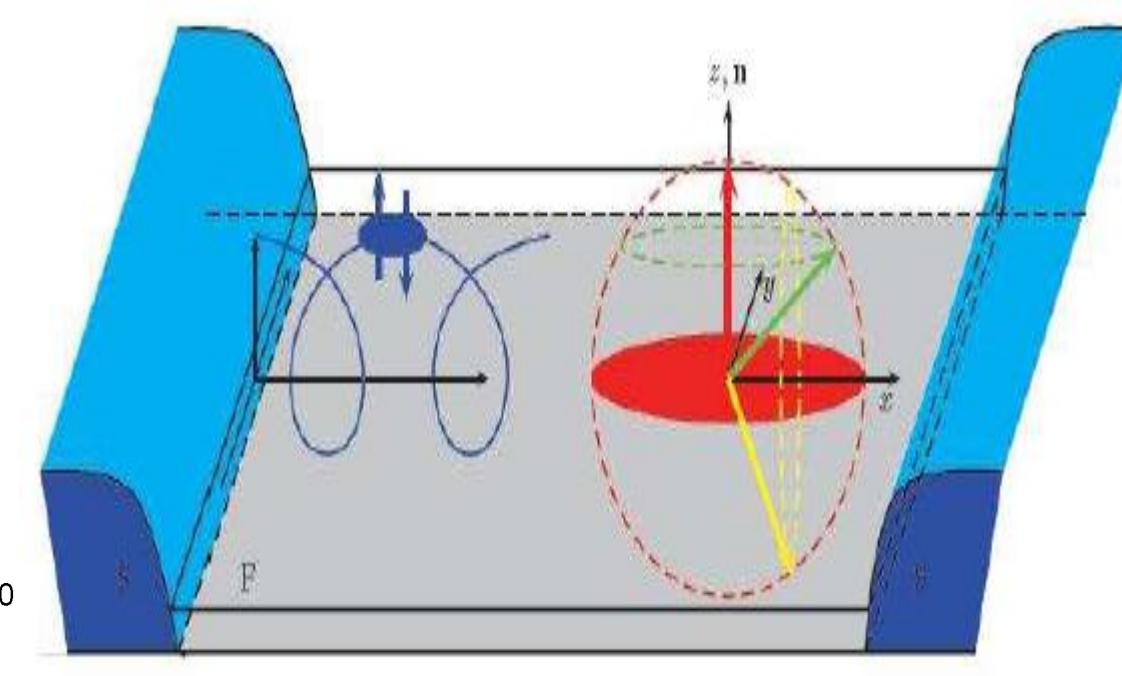
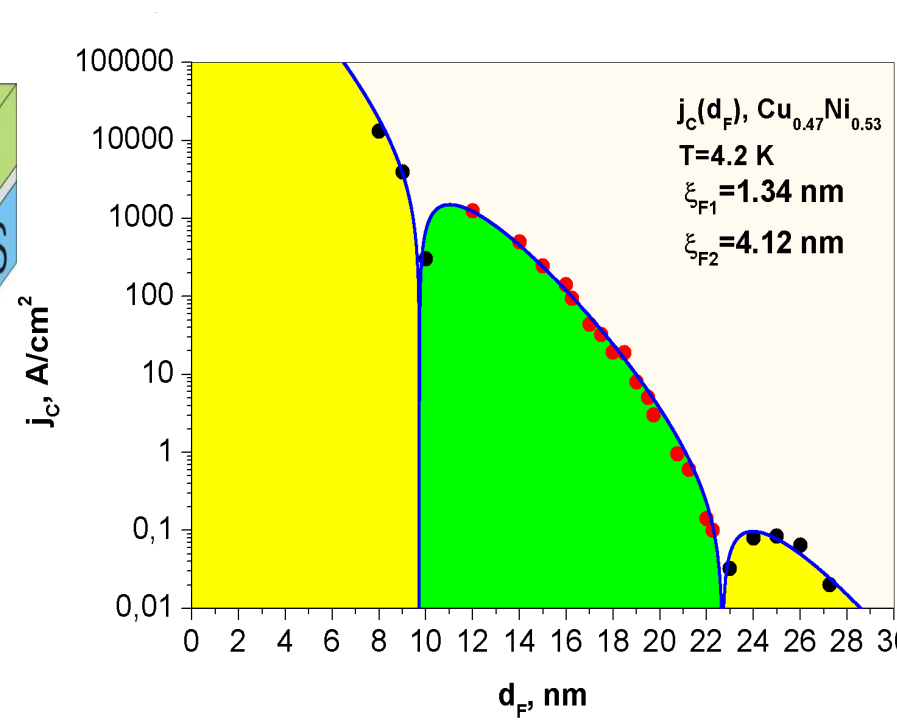
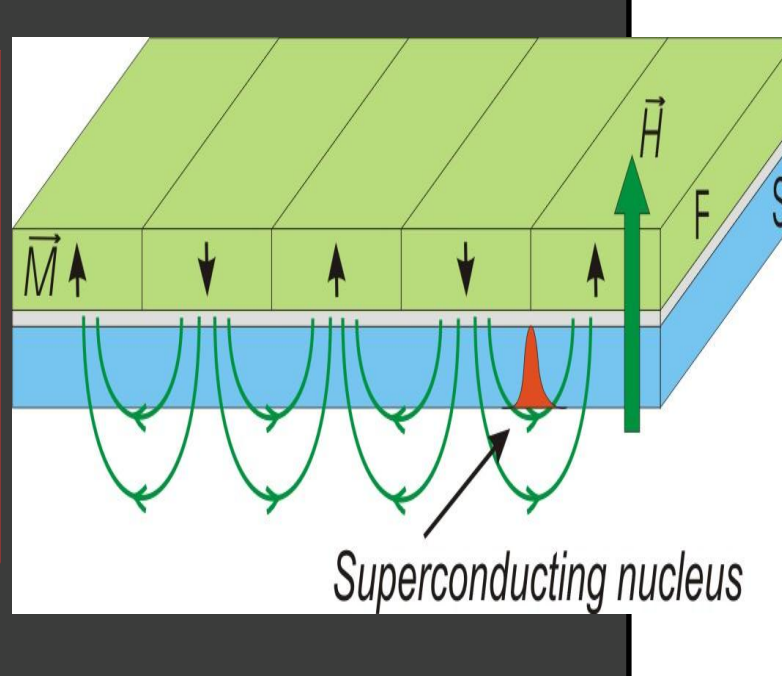
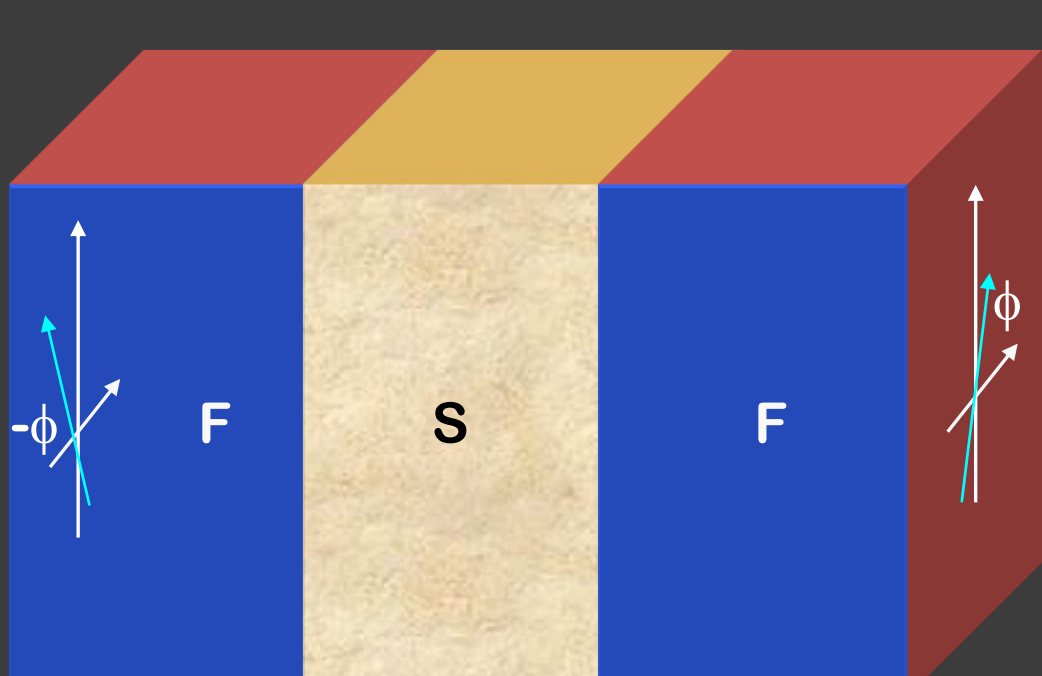
- Computer facilities to perform advanced numerical calculations and modeling

CURRENT AND FUTURE PROJECTS WITHIN AMADEUS FRAMEWORK

- Studies of split-ring resonator electrodynamics
- Calculations of the electromagnetic response of different superconductor/ferromagnet heterostructures
- Modeling of superconducting and normal metal photonic crystals
- Analysis of novel metamaterial structures on the basis of Josephson based metamaterials
- Investigation of the properties of SQUID array nonlinear transmission lines
- Hyperlens in the terahertz domain on the basis of the anisotropic layered high-Tc superconductors and quasi-1d superconductors



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RESEARCH
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Advanced MAterials by DEsign



PERMANENT STAFF



**Etienne
Brasselet**
CR CNRS



**Hamza
Chraibi**
Ass. Prof.



**Ulysse
Delabre**
Ass. Prof.



**Jean-Pierre
Delville**
DR CNRS



**Régis
Wunenburger**
Ass. Prof.

MOBILIZED COMPETENCES

- *Soft Matter Physics*
- *Wave-Matter Interaction*
- *Physical Hydrodynamics*

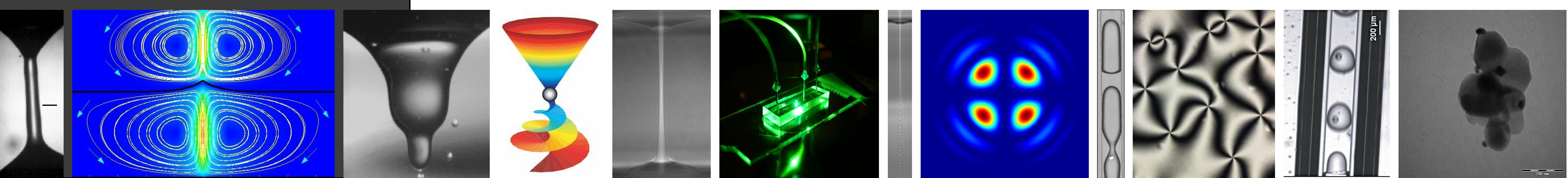
- Fluid structuration by electromagnetic and acoustic waves
- Photostructuration of anisotropic liquids
- Topological defects in liquid crystals
- Laser microfluidics
- Optofluidic synthesis of nanomaterials
- Two-phase and interfacial flows modeling
- Evaporation process modeling
- Nonlinear acoustics in fluids
- Contactless soft matter characterization

MAIN FACILITIES

- **Laser facilities (COLA), nano-spectro-imaging (NSI)**
- Standard soft matter characterization
- **Ultrasonic sources and sensors**
- Computing cluster

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Photo- and sono-structured soft materials
- Acoustic metamaterials
- Smart materials for the control of singular properties of light
- Film patterning by light-controlled evaporation of complex fluids
- Modelling of suspension flows for material assembling



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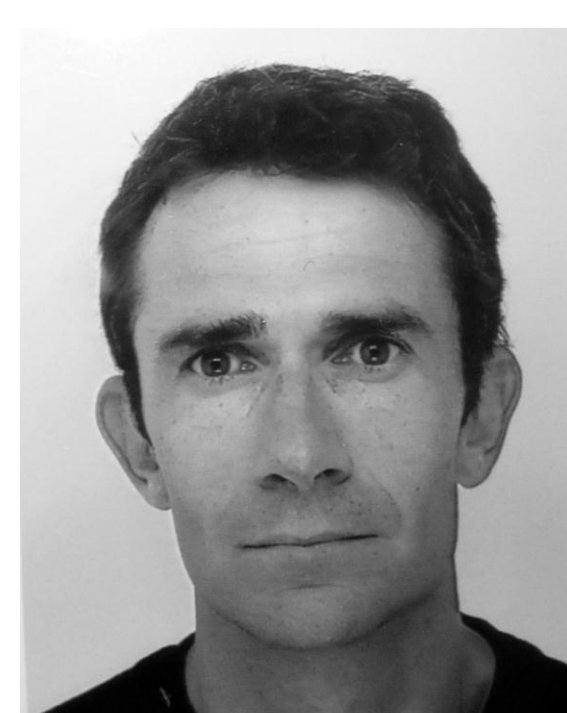
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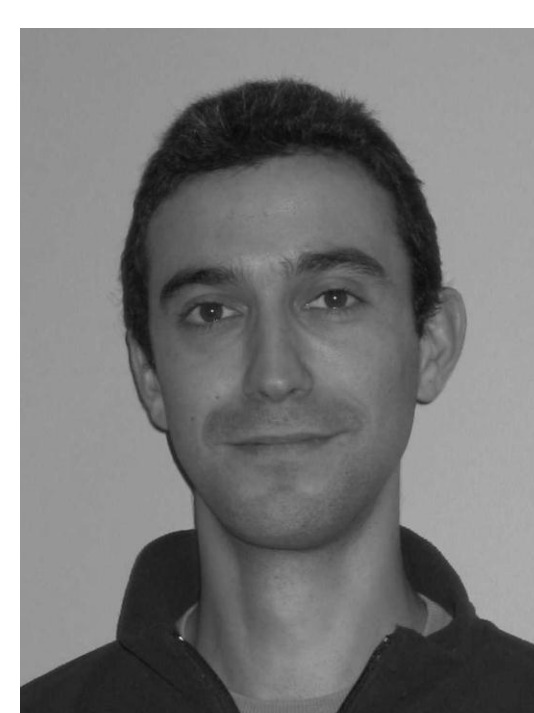
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Team: Photonic & Ultrafast Laser Spectroscopy

PERMANENT STAFF



Emmanuel Abraham
Ass. Prof.



Jérôme Degert
Ass. Prof.



Eric Freysz
*Senior Res.
Team leader*



Gediminas Jonusauskas
Senior Res.



Jean Oberlé
Prof.

Mathias Perrin
Senior Res.

MOBILIZED COMPETENCES

↳ *Linear and nonlinear spectroscopy*
+ *materials sciences*

- Optical characterization of bulky materials, nanoparticles, solutions
- Determination and characterization of the nonlinear optical properties of materials
- Coherent spectroscopy
- Study of time resolved photo-physical process (photo-switching, phase transition, photo-isomerization...)

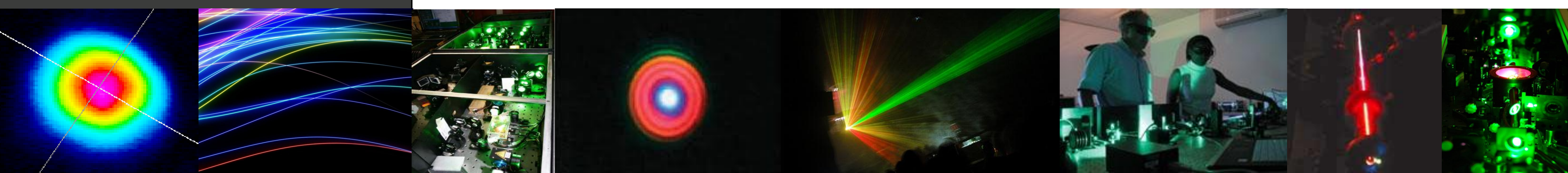
All the studies can be performed in the U.V., visible, I.R. and THz range

MAIN FACILITIES

- COLA and NSI platforms of the LOMA
- Nanosecond and femtosecond oscillators, amplifiers and optical parametric amplifiers
- Streak Camera, pump-probe time resolved experiments
- Time resolved THz spectrometers for the characterization of bulk. materials, nanoparticles, solutions

CURRENT AND FUTURE PROJECTS WITHIN AMADEUS FRAMEWORK

- THz and visible spectroscopy of nano-objects and nanoparticles
- THz spectroscopy of photo-polymers
- Study mechanisms of laser induced spin state transition
- Photo-physical processes of molecules in solution
- Time resolved I.R. spectroscopy of photo-excited molecular crystals
- Study of photo-sensible optical inks



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PERMANENT STAFF



**Yacine
Amarouchene**
Junior Res.



**Jean-François
Boudet**
Assistant. Prof.



**Hamid
Kellay**
*Prof.
Team Leader*

Laboratoire Ondes et Matière d'Aquitaine - UMR 5798

Team: **Turbulence and Instabilities**

MOBILIZED SKILLS

*Soft Matter
Flow Instabilities
Granular Media*

- Flow and interfacial Instabilities of complex fluids
- Interaction between flow and structure of complex fluids
- Mixing and Dispersion
- Drag reduction and statistical properties of random flows
- Flow properties of divided and granular matter
- Flows near surfaces and interfaces
- Microrheology and Microfluidics

MAIN FACILITIES

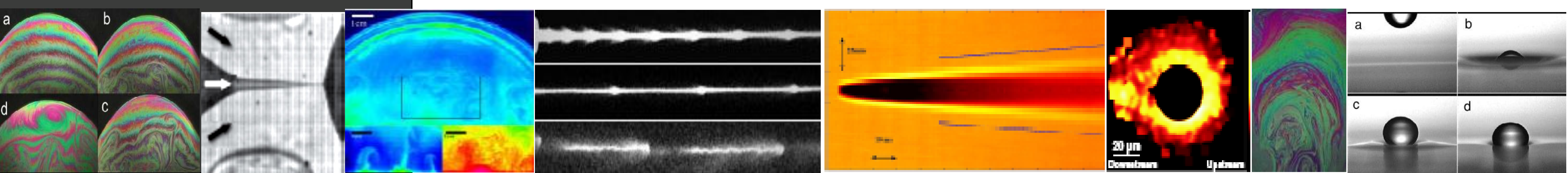
- Velocimetry
- Microscopy
- Image analysis
- *Rheology*
- *Light Scattering*

CURRENT AND FUTURE PROJECTS WITHIN AMADEUs FRAMEWORK

- Low Reynolds number random flows of complex fluids
- Drag and drag reduction of random flows
- Interfacial instabilities in complex fluids
- Instabilities in granular flows
- Microrheology and near-surface flows of complex fluids
- Wetting and spreading



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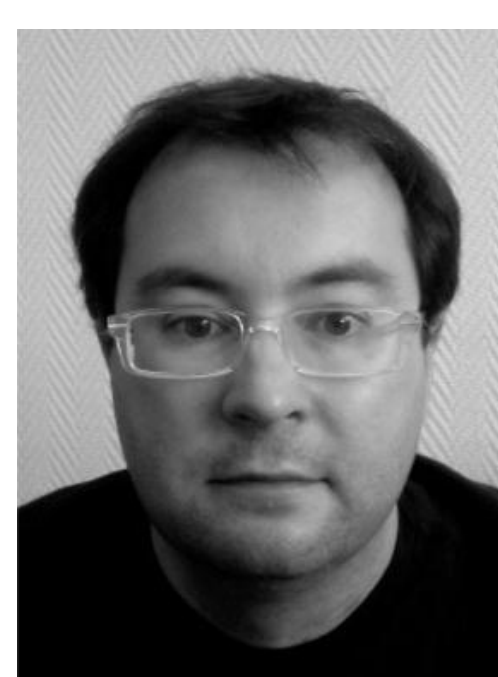


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Team: **Soft Matter Theory**

PERMANENT STAFF

↘ Four extra permanent researchers are not (yet) involved in AMADEus-relevant projects



Thomas Bickel
Ass.Prof.



Alois Würger
Prof.

MOBILIZED COMPETENCES

↘ *Soft Matter
out-of-equilibrium Statistical
Physics*

- Colloidal transport in chemical and thermal gradients
- Electrolyte Seebeck effect
- Thermal creep in gases
- Hydrodynamics in channels and thin films
- Charges at interfaces and membranes
- Interface fluctuations under shear
- Nanoparticle-membrane interactions

CURRENT AND FUTURE PROJECTS WITHIN AMADEus FRAMEWORK

- Anisotropic colloidal diffusion in liquid crystals
- Transverse Knudsen pump in gas micro-devices
- Nonequilibrium fluctuations of membranes and vesicles
- Brownian motion of active nano-objects
- Helicity and chirality in self-assembled systems



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