C'Nano 2020

The Nanoscience Meeting

Nanophotonics . Nanoelectronics . Nanochemistry . Nanomaterials
Nanobioscience . Nanosafety

TOULOUSE

POSTPONED I Nov. 23rd to 25th, 2021

Centre de congrès Pierre Baudis
11 Espl. Compans Caffarelli - 31 000 Toulouse

PLENARY SPEAKERS

Jacqueline BLOCH
CNRS - C2N, France

Jean-Marc CHOMAZ
CNRS – LadHyx, France

Fernand DORIDOT
ICAM Lille - CETS, France

Suzanne GIASSON
Univ. of Montréal - CRMMA & GRUM, Canada

Julie GROLLIER
CNRS - UMPhy Laboratory, France

Francesca MORESCO
TU Dresden – CFAED, Germany

Teresa PELLEGRINO
ITT – Central Research Labs Genova, Italy

Organized by

Sponsored by

In partnership with

With the local contribution of

For more information about the «C'Nano 2020: The Nanoscience Meeting», scan the QR Code below !

To tweet about the Congress please use:

#cnano2020
@CNano_national

Table of content

Organizers p.4

Sponsors & partners p.7

Organizing & scientific commitees p.8

Program

General program p.12

List of oral presentations p.16

Abstract of invited speakers

Plenary speakers p.30

Keynote speakers p.40

Special sessions & Satellite events

Special sessions p.62

Satellite events p.64

PhD Thesis awards p.70

List of posters p.74

Organizers

Forewords

Corinne CHANEAC

Director of C'Nano

For the fourth year, **the French national competency Cluster in Nanoscience of CNRS, C'Nano, organizes its annual scientific congress.** Because of the COVID-19 pandemic situation, the C'Nano 2020 edition has been postponed to 2021. Thus, it will finally take place as a face-to-face meeting in France in the Occitanie region **at the Congress Center Pierre Baudis in Toulouse from November 23rd to 25th, 2021.**

This event aims at gathering various scientific communities displaying research activities **in nanoscience and nanotechnology**. It is dedicated to all **scientists, including academic and industrial researchers**, engineers, PhD Students, post-doctorates…

The program will include **plenary lectures** and **parallel sessions on topics at the interface of various research areas**: nanomaterials, nanobiology, nanophotonics, nanobiomedicine, nanochemistry, nano-engineering, nanosafer by design, nanocomposites, nanoplastics, nano-environment...

In addition, **a poster session** will be opened for contributions and **a exhibition area** will be organized for congress sponsors and partners. **A ceremony will take place to reward the best PhD Thesis 2021 in nanoscience as well as best oral and poster presentations**. Two special sessions will occur: one about the interface between **art and science** and a second will address **innovation issues in nanoscience.**

Last, **3 satellite events will take place simultaneously**. The first one is a workshop on "*Single molecule mechanics on a surface: gears, motors and cars*" organized in the frame of **the European FET OPEN MEMO project** (Mechanics with Molecules) coordinated by Francesca MORESCO at the TU Dresden (Center for Advancing Electronics). The second one is the Plenary of the CNRS research network **(GdR) NAME**. The third one implies the **NS-CPU GdR of CNRS.**

Around 300 attendees from academia and industry are expected!

Corinne Chaneac,
Director of C'Nano

Organizers

C'Nano, the National Competency Cluster in Nanoscience, is a CNRS service unit promoting research in nanoscience. C'Nano structures the French scientific community in "nano" by gathering physicists, chemists, engineers, biologists, physicians, sociologists, economists, jurists, etc. within a national pluridisciplinary network. C'Nano main missions include: promoting interdisciplinary research at the regional and national levels, supporting education and science-society exchanges, stimulating public/private partnerships and technological transfer, and finally implementing prospective studies to sustain the development of nanoscience and nanotechnology. Through these missions, C'Nano aims at contributing to the emergence of common responses to scientific, economic and societal challenges in nanoscience.

National board

The national board organises the implementation of C'Nano actions.

Direction

Corinne CHANEAC
Director

Julie CARIMALO
Administrative Head
& Scientific Coordinator

Administrative team

Nils BALGOBIN
Prospective
& Innovation Officer

Christophe DECILAP
Administrative
& Financial Officer

Marieke MOREL
Communication
& Events Officer

Scientific steering committee

The scientific steering committee is composed of the C'Nano territorial boards coordinators, whose mission is to locally apply and spread the C'Nano activities and strategy.

C'Nano Ile-de-France	**Corinne CHANEAC** Sorbonne Univ. - LCMCP, Paris	**Ariel LEVENSON** CNRS - C2N, Palaiseau	cnano_idf@cnrs.fr
C'Nano Nord-Ouest	**Jean-Luc DUVAIL** Nantes Univ. - IMN, Nantes	**Fabienne GAUFFRE** CNRS - ISCR, Rennes	cnano_no@cnrs.fr
C'Nano Grand-Sud-Ouest	**Xavier BOUJU** CNRS - CEMES, Toulouse	**Yannick GUARI** CNRS - ICGM, Montpellier	cnano_gso@cnrs.fr
C'Nano Provence-Alpes-Côte d'Azur	**Lionel SANTINACCI** CNRS - CINaM, Marseille	**Nicolas BONOD** CNRS - Fresnel Inst. , Marseille	cnano_paca@cnrs.fr
C'Nano Auvergne-Rhône-Alpes	**Bruno MASENELLI** INSA Lyon - INL, Lyon	**Anthony AYARI** CNRS - ILM, Lyon	cnano_aura@cnrs.fr
C'Nano Est	**Michel VERGNAT** Lorraine Univ. - IJL, Nancy	**Nadine MILLOT** Burgundy Univ. - ICB, Dijon	cnano_est@cnrs.fr

Organizing committee

For this **fourth edition**, C'Nano strongly mobilizes its **southwestern board** and works closely with three local research laboratories: CEMES – CNRS, LCC – CNRS and LPCNO (CNRS, University Toulouse Paul Sabatier, INSA of Toulouse).

National organizing committee

Corinne CHANEAC
Head of C'Nano
(Sorbonne University – C'Nano)

Julie CARIMALO
Administrative Head & Scientific Coordinator
(CNRS – C'Nano)

Nils BALGOBIN
Innovation & Prospective Officer
(CNRS – C'Nano)

Christophe DECILAP
Administrative & Financial Officer
(CNRS – C'Nano)

Marieke MOREL
Communication & Events Officer
(CNRS – C'Nano)

Local organizing committee

Xavier BOUJU
(University Toulouse Paul Sabatier – LCC)

Katia FAJERWERG
(University Toulouse Paul Sabatier – LCC)

Myrtil KAHN
(CNRS – LCC)

Bernard LEGRAND
(CNRS – LAAS)

Étienne PALLEAU
(INSA of Toulouse – LPCNO)

Sponsors & Partners

Sponsors

Partners

With the local contribution of

Thematic Sessions - Scientific committees

Nanophotonics & Nano-optics

Anne-Ségolène CALLARD (Ecole Centrale of Lyon – INL, Lyon)
Yannick DE WILDE (CNRS – Langevin Institute, Paris)*
Jean-Luc DUVAIL (University of Nantes – IMN, Nantes)
Erik DUJARDIN (CNRS – CEMES, Toulouse)
Delphine MARRIS-MORINI (University of Paris Sud – C2N, Palaiseau)

Nanomaterials for Energy

In partnership with the CNRS research network GDR NAME

Philippe BEN-ABDALLAH (CNRS – LCF, Gif-sur-Yvette)
Olivier BOURGEOIS (CNRS – Néel Institute, Grenoble)
Maryline GUILLOUX-VIRY (University Rennes 1 – ISCR, Rennes)*
Aline ROUGIER (CNRS – ICMCB, Bordeaux)
Jérôme SAINT-MARTIN (University of Paris Sud – C2N, Gif-sur-Yvette)
Lionel SANTINACCI (CNRS – CINaM, Marseille)
Konstantinos TERMENTZIDIS (CNRS – CETHIL, Lyon)

Nano for Imaging, diagnosis & therapy

Sylvie BEGU (University of Montpeller – ICGM, Montpellier)
Emmanuel GARCION (INSERM ADR Nantes – CRCINA, Nantes)
Fabienne GAUFFRE (CNRS – ISCR, Rennes)*
Jean-Daniel MARTY (University of Toulouse Paul Sabatier – IMRCP, Toulouse)
Nadine MILLOT (University of Bourgogne – ICB, Dijon)*
Stéphane MORNET (CNRS – ICMCB, Bordeaux)

Nano: health, environment & risks

in partnership with the interdisciplinary group for studies in nanotoxicology (GIENS)

Mélanie AUFFAN (CNRS – CEREGE, Aix-en-Provence)
Emmanuel FLAHAUT (CNRS – CIRIMAT, Toulouse)*
Laury GAUTHIER (Université Toulouse Paul Sabatier – ECOLAB, Toulouse)
Eric HOUDEAU (INRA – Toxalim, Toulouse)
Myriam RICAUD (INRS)

Multifunctional Nanocomposites

in partnership with the international CNRS research network GDRI controlled multifunctional Nanomaterials & the CNRS research network GDR Polynano 2

Richard CLERGEREAUX (CNRS – LAPLACE, Toulouse)*
Florent DALMAS (INSA Lyon – MATEIS, Lyon)*
Marc PONCOT (University of Lorraine – IJL, Nancy)
Philippe POULIN (CNRS – CRPP, Bordeaux)

Nanochemistry & Nanoparticles

Benjamin ABECASSIS (CNRS – LCH, Lyon)
Myrtil KAHN (CNRS – LCC, Toulouse)*
Isabelle LISIECKI (CNRS – MONARIS, Paris)
Romuald POTEAU (Université Paul Sabatier – LPCNO, Toulouse)
Katerina SOULANTIKA (CNRS – LPCNO, Toulouse)

Nanoscale Heat Transfer - Measurement

in partnership with Club nanoMétrologie & LNE

Lionel AIGOUY (CNRS – LPM, Paris)
Stephan BRIAUDEAU (CNAM - LCM, Paris)
Nolwenn FLEURENCE (LNE, Paris)
Valentina GIORDANO (CNRS – ILM, Lyon)
Séverine GOMES (CNRS – CETHIL, Lyon)*
Rodolphe VAILLON (CNRS – IES, Montpellier)

1D Nanomaterials

in partnership with the scientific community in nanowires field & French J2N Meeting (Journées Nationales des Nanofils semiconducteurs)

Anthony AYARI (CNRS – ILM, Lyon)*
Bruno GRANDIDIER (CNRS – IEMN, Lille)
Jean-Christophe HARMAND (CNRS – C2N, Palaiseau)
Bruno MASENELLI (INSA of Lyon – INL, Lyon)*

2D Materials

in partnership with the scientific community in nanowires field & French J2N Meeting (Journées Nationales des Nanofils semiconducteurs)

Stéphane BERCIAUD (University of Strasbourg – IPCMS, Strasbourg)
Guillaume CASSABOIS (University of Montpellier – L2C, Montpellier)
Johann CORAUX (CNRS – Néel Institute, Grenoble)
Catherine JOURNET-GAUTIER (Claude Bernard University – LMI, Lyon)
Xavier MARIE (INSA of Toulouse – LPCNO, Toulouse)*
Pierre RENUCCI (INSA of Toulouse – LPCNO, Toulouse)*
Pierre SENEOR (University Paris South – UMphy, Palaiseau)
Bernhard URBASZEK (CNRS – LPCNO, Toulouse)

Nano Gold by young researchers

in partnership with the CNRS research network GDR Or-nano

Katia FAJERWERG (University of Toulouse Paul Sabatier – LCC, Toulouse)*
Hazar GUESMI (CNRS– ICGM, Montpellier)
Laureen MOREAUD (CNRS – CEMES, Toulouse)
Olivier PLUCHERY (Sorbonne University – INSP, Paris)*
Fabienne TESTARD (CEA – NIMBE, Saclay)

** Session Coordinators*

PROGRAM

- General program
- List of oral presentations

General Program

Plenary and keynote speakers

Tuesday, November 23th

8:00 Registration

9:00 OPENING SESSION

Corinne CHANEAC, Director of C'Nano

Constantin VAHLAS, Chief scientific officer of CNRS Institute of chemistry

9:30 PLENARY SESSION

Julie GROLLIER *(CNRS – UMPhy Laboratory, France)*

10:30 Coffee break

10:50 THEMATIC SESSIONS

Nanophotonics & nano-optics	Nano: health, environment & risks	1D & 2D Nanomaterials	Nano Gold by young researchers
Peter WIECHA *CNRS - LAAS, France*	**Bernd NOWACK** *EMPA - St. Gallen, Switzerland*	**Hélène BOUCHIAT** *CNRS - LPS, France*	**Nathalie LIDGI-GUIGUI** *Sorbonne Paris Nord Univ.– LSPM, France*

13:00 Lunch & Posters session

13:15- 14:15 *Art & Science Roundtable** *Latécoère room*

15:00 THEMATIC SESSIONS

Nano for Imaging, diagnosis and therapy	Multifonctional nanocomposites	1D & 2D Nanomaterials	Nano Gold by young researchers
	Normand MOUSSEAU *Univ. Montréal - Dpt of Physics, Canada* **Françoise MASSINES** *CNRS - PROMES, France*	**Erik BAKKERS** *Eindhoven Univ. of Technology- Dpt of Applied Physics, Netherlands*	**Didier BOURISSOU** *CNRS - LHFA, France*

17:10 Coffee break

17:30 PLENARY SESSION

Francesca MORESCO *(TU Dresden - CFAED, Germany)*

18:00 PRESENTATION BY THE 8 TEAMS OFFICIALLY REGISTERED TO NANOCAR RACE II

Chairperson: Christian JOACHIM *(CNRS - CEMES, France)*

19:00 PLENARY SESSION

Jean-Marc CHOMAZ (*CNRS - LadHyX, France*)

19:30 WELCOME COCKTAIL, POSTER SESSION & EXHIBITION

* *special session*

Saint-Exupéry Amphitheater | Spot room | Cassiopée room | Saint-Exupéry foyer

Wednesday, November 24th

8:30 PLENARY SESSION
Jacqueline BLOCH *(CNRS, C2N, France)*

9:30 PLENARY SESSION
Fernand DORIDOT *(ICAM of Lille – CETS, France)*

10:00 SPONSORS PRESENTATIONS

10:30 Coffee break

10:50 THEMATIC SESSIONS

Nanophotonics & nano-optics	1D & 2D nanomaterials	Nanochemistry & nanoparticles	Nanomaterials for Energy	*Innovation in nanoscience**
Patrice GENEVET *CNRS - CRHEA, France*	**Bernard GIL** *CNRS - L2C, France*	**Jong-Wook KIM** *Ecole Polytechnique - LPMC, France*	**David MUNOZ-ROJAS** *CNRS - LMGP, France*	*Latécoère room*

13:00 Lunch & Posters session

13:15- 14:15 *Art & Science Roundtable** *Latécoère room*

15:00 PLENARY SESSION
Suzanne GIASSON *(Univ. of Montréal - CRMMA & GRUM, Canada)*

16:00 THEMATIC SESSIONS

Nanophotonics & nano-optics	Multifonctional nanocomposites	Nanochemistry & nanoparticles	Nano for Imaging, diagnosis and therapy
Gérard COLAS-DES-FRANCS *Univ. Bourgogne - ICB, France*	**Milo SHAFFER** *Imperial College London – Dpt of Chemistry, UK*		**Carmen Isabel ALVAREZ LORENZO** *USC – Pharmaceutical Technology, Santiago de Compostela, Spain*

17:00 Coffee break

17:20 THEMATIC SESSIONS

Nanophotonics & nano-optics	Multifonctional nanocomposites	Nanochemistry & nanoparticles	Nano for Imaging, diagnosis and therapy

18:30 C'NANO & RENATECH PhD AWARDS 2021

20:30 GALA DINNER

** special session*

Saint-Exupéry Amphitheater | Spot room | Cassiopée room | Saint-Exupéry foyer

General Program

Plenary and keynote speakers

Thursday, November 25th

9:00 PLENARY SESSION

Teresa PELLEGRINO *(ITT – Central Research Labs Genova, Italy)*

10:00 Coffee break

10:20 THEMATIC SESSIONS

Nano for Imaging, diagnosis and therapy	Nanoscale heat transfer - Measurement	Nanochemistry & nanoparticles	Nanomaterials for Energy
Laurent COGNET *CNRS - LP2N, France*	**Stefan DILHAIRE** *Bordeaux Univ. - LOMA, France*	**Gaël DE PAEPE** *CEA - CIRIG, France*	**Evelyne MARTIN** *CNRS - ICube, France*

12:30 Lunch & Posters session

14:00 THEMATIC SESSIONS

Nano for Imaging, diagnosis and therapy	Nanoscale heat transfer - Measurement	Nanochemistry & nanoparticles	Nanomaterials for Energy
	Pierre-Olivier CHAPUIS *CNRS - CETHIL, France*		

15:10 Coffee break

15:30 BEST TALKS & POSTERS & SCIENCES IMAGES AWARDS CEREMONY

16:00 CLOSING SESSION

** special session*

Saint-Exupéry Amphitheater | Spot room | Cassiopée room | Saint-Exupéry foyer

List of Oral Presentations

Tuesday, November 23rd

08:00 Registration

09:00 OPENING SESSION

Corinne CHANEAC, Director of C'Nano

Constantin VAHLAS, Chief scientific officer of CNRS Institute of chemistry

09:30 PLENARY SESSION

Julie GROLLIER (CNRS- UMPhy Laboratory, France) - *Spintronic neural networks*

10:30 Coffee break

10:50 THEMATIC SESSIONS

NANOPHOTONICS & NANO-OPTICS

10:50	**Deep learning meets nano-optics**	**Peter WIECHA** • *CNRS - LAAS, France*
11:20	Coherent Perfect Absorption in coupled Nano-Opto-ElectroMechanical Systems	**Gladys JARA-SCHULZ** • *Paris-Saclay Univ. - C2N, France*
11:35	Design of photonic nanostructures via chirality induction	**Emilie POUGET** • *CNRS - CBMN, France*
11:50	Near-Field Photochemical Imaging of Chiral Nanostructures	**Thinhinane AOUDJIT** • *UTT - P2MN, France*
12:05	Sharp spectral variations of the ultrafast transient near-ultraviolet light extinction by bimetallic gold-silver nanoparticles	**Bruno PALPANT** • *CentraleSupélec - LUMIN, France*
12:20	Polarization dependent inelastic light scattering by acoustic vibrational modes of Au nanoparticles	**Mariana TIMM** • *INSA Lyon - ILM, France*
12:35	Single gold bipyramid orientation measured by scattering polarization spectroscopy	**Julien LAVERDANT** • *UCB Lyon 1 - ILM, France*

13:00 Lunch, Poster session & Exhibition

NANO: HEALTH, ENVIRONMENT & RISKS

10:50	**Advances in environmental risk assessment of engineered nanomaterials**	**Bernd NOWACK** • *EMPA - St. Gallen, Switzerland*
11:20	Modeling nanoplastic fate in the Arctic: Mechanisms of transfer from saltwater to ice	**Julien GIGAULT** • *CNRS - TAKUVIK, France*
11:35	Origin, properties, environmental/health concern of plasma-formed polymer nanocomposites traced in natural resources and living organisms	**Marie-Agnès COURTY** • *CNRS - PROMES, France*
11:50	Investigating protein-nanoparticle interactions in 3D cell culture models for the long-term toxicity study of inhaled silver nanoparticles	**Daniel SANCHEZ-GUZMAN** • *Univ. Paris - BFA, France*
12:05	Beyond the paradigm of nanomechanical measurements on cells using AFM: an automated methodology to rapidly analyse thousands of cells	**Etienne DAGUE** • *CNRS - LAAS, France*
12:20	Nano-gold decorated TiO_2, ZnO and WO_3 for NO degradation: new photocatalytic materials for the improvement of the in Indoor Air quality	**Kevin CASTELLO-LUX** • *INSA Toulouse - LMDC & LCC, France*

13:00 Lunch, Poster session & Exhibition

Saint-Exupéry Amphitheater | Spot room | Cassiopée room | Saint-Exupéry foyer

10:50 **THEMATIC SESSIONS**

1D & 2D NANOMATERIALS

10:50	**Revealing the topological nature of transport at mesoscopic scales with quantum interferences**	**Hélène BOUCHIAT** • *CNRS - LPS, France*
11:20	High magnetic field spin-valley-split Shubnikov–de Haas oscillations in a WSe_2 monolayer	**Walter ESCOFFIER** • *INSA Toulouse - LNCMI, France*
11:35	What is the electron behavior in two-dimensional CdSe nanoplatelets?	**Nemanja PERIC** • *CNRS - IEMN, France*
11:50	First-principle approach to multi-wavelength Raman spectroscopy of 2D-nanomaterials	**Anthony IMPELLIZZERI** • *Univ. of Nantes - IMN, France*
12:05	Identifying Protein Sequence Motifs from Peptide Translocation in Silico Experiments through Solid-state Nanopores	**Andreina URQUIOLA HERNANDEZ** • *UBFC - ICB, France*
12:20	Collective Magnetism in 2D Polymer Made of C-doped Triangular Boron Nitride Nanoflakes	**Alain ROCHEFORT** • *Polytechnique Montreal - Engineering Physics Dpt, Canada*
12:35	Intense Raman D band without disorder in flattened carbon nanotubes	**Emmanuel PICHEAU** • *CNRS - CRPP, France*

13:00 **Lunch, Poster session & Exhibition**

NANO GOLD BY YOUNG RESEARCHERS

10:50	**Scientific outreach: why and how ?**	**Nathalie LIDGI-GUIGUI** • *Sorbonne Paris Nord Univ. – LSPM, France*
11:20	Emergence of Mesoionic Carbenes for the Stabilization of Gold Nanoparticles	**Alexandre PORCHERON** • *Sorbonne Univ. - LCMCP, France*
11:35	Photopolymerization at nanoscale on gold nanoparticles followed by plasmon resonance shift	**Amine KHITOUS** • *Univ. of Haute-Alsace - IS2M, France*
11:50	Colloidal assembly of anisotropic gold nanostructures and optical-plasmonic properties	**Antonio CARONE** • *ENS Lyon - LCH Lyon, France*
12:05	Gold nanoclusters synthesis and functionalization aiming at properties enhancement	**Victoire ASILA** • *Sorbonne Univ. - LCMCP, France*

13:00 **Lunch, Poster session & Exhibition**

List of Oral Presentations

Tuesday, November 23rd

15:00 — **THEMATIC SESSIONS**

NANO FOR IMAGING, DIAGNOSIS & THERAPY

15:00	Influence of PEG Spacers on the Cytotoxicity of Titanate Nanotubes-Docetaxel Nanohybrids on a Prostate Cancer Cell Line	**Julien BOUDON** • *Bourgogne Univ. - ICB, France*
15:15	Remote magneto-mechanical destruction of cancer-associated fibroblasts using targeted ultra-small superparamagnetic iron oxide nanoparticles and low frequency magnetic fields	**Véronique GIGOUX** • *INSERM - LPCNO, France*
15:30	Mastering size for the design of innovative theranostic iron oxide based nanoparticles ensuring multimodal therapy	**Barbara FREIS** • *CNRS - IPCMS, France*
15:45	Ag2S nanoparticle-based thermal sensing for hyperthermia therapy	**Lise ABIVEN** • *CNRS - LCMCP, France*
16:00	Hybrid nano-objects of Metal Organic Frameworks and maghemite for theranostic applications	**Heng ZHAO** • *ENS Paris - IMAP, France*
16:15	Thermo-stimulated drug release under alternating magnetic field	**Megi BEJKO** • *Bordeaux Univ. - LCPO, France*
16:30	Optimized Synthesis and Characterization of Magnetic Nanorods	**Sirine EL MOUSLI SAADA** • *Sorbonne Univ. - PHENIX, France*

17:10 **Coffee break**

MULTIFUNCTIONAL NANOCOMPOSITES

15:00	**Understanding the kinetics of formation of nanostructures through energy surfaces**	**Normand MOUSSEAU** • *Univ. Montréal - Dpt of Physics, Canada*
15:30	Spin crossover in Fe(triazole)–Pt nanoparticle self-assembly structured at the sub-5 nm scale	**Simon TRICARD** • *CNRS - LPCNO, France*
15:45	**Plasma based solutions to produce nanocomposite thin film coatings**	**Françoise MASSINES** • *CNRS - PROMES, France*
16:15	Hybrid PECVD / direct liquid injection of a Colloidal Solution for SiO_2:TiO_2 nanocomposite thin film deposition	**Mireille RICHARD** • *CNRS - IMN, France*
16:30	How to avoid nanoparticle aggregation in single step formation of nanocomposites	**Anne-Françoise MINGOTAUD** • *CNRS - IMRCP, France*

17:10 **Coffee break**

Saint-Exupéry Amphitheater | Spot room | Cassiopée room | Saint-Exupéry foyer

15:00 **THEMATIC SESSIONS**

NANO GOLD BY YOUNG RESEARCHERS

15:00	**New basic organometallic reactivity of gold: towards new applications ?**	**Didier BOURISSOU** • *CNRS - LHFA, France*
15:30	Excitation of multipolar surface plasmon modes offers new horizons in nano-localized surface chemistry	**Théo GERONIMI-JOURDAIN** • *Paris Univ. - ITODYS, France*
15:45	Optical monitoring of the switching of diarylethene molecules grafted on gold nanoparticles	**Angeline DILESEIGRES** • *CNRS - INSP, France*
16:00	Reaching a strong coupling regime between fluorescent emitters and a gold plasmonic resonator with DNA	**Jeanne HEINTZ** • *CNRS - Langevin Institute, France*
16:15	Quench Assembly of Gold Nanoparticles With Quaternized Chitosan	**Florent VOISIN** • *Paris Univ. - MSC, France*
16:30	Ultrasmall nanospheres and ultrathin nanowires: growth mechanism study	**Ezgi YILDIRIM** • *INSA Toulouse - LPCNO, France*

17:10 **Coffee break**

1D & 2D NANOMATERIALS

15:00	**Efficient light emission from hexagonal SiGe**	**Erik BAKKERS** • *Eindhoven Univ. of Technology- Dpt of Applied Physics, The Netherlands*
15:30	Transport properties of a highly transparent Al-Ge/Si-Al core/shell nanowire heterostructures	**Jovian DELAFORCE** • *CNRS - Neel Institute, France*
15:45	Opto-magnetic study of Gold@Spin Crossover Nanocomposites	**Nathalie DARO** • *CNRS - ICMCB, France*
16:00	Growth mechanisms and highlights of 15R structure in ZnS nanowires: from VLS to VSS	**Sumit KUMAR** • *UVSQ - GEMaC, France*
16:15	Quantification of the intra-wall electric field in aluminosilicate nanotubes	**Marie-Claire PIGNIE** • *CEA - NIMBE, France*

17:10 **Coffee break**

17:30 **PLENARY SESSION**

Francesca MORESCO (TU Dresden- CFAED, Germany) - *Functional molecules synthetized on surface: gears, nanocars and wires*

18:00 **PRESENTATION BY THE 8 TEAMS OFFICIALLY REGISTERED TO NANOCAR RACE II**

Chairperson: Christian JOACHIM *(CNRS - CEMES, France)*

19:00 **PLENARY SESSION**

Jean-Marc CHOMAZ (CNRS- LadHyX, France) - *The role of the sensitive world in scientific construction*

19:30 **WELCOME COCKTAIL, POSTER SESSION & EXHIBITION**

List of Oral Presentations

Wednesday, November 24th

08:30 PLENARY SESSION

Jacqueline BLOCH (CNRS- C2N, France) - *Emulating condensed matter with Quantum fluids of light*

09:30 PLENARY SESSION

Fernand DORIDOT (ICAM Lille- CETS, France) - *The NanoFabNet Hub for sustainable Nanofabrication*

10:00 SPONSORS PRESENTATIONS HIMT ; Bruker

10:30 Coffee break

10:50 THEMATIC SESSIONS

NANOPHOTONICS & NANO-OPTICS

10:50	**Applications of metasurfaces**	**Patrice GENEVET** • *CNRS - CRHEA, France*
11:20	Challenges in Nanofabrication for Efficient Optical Metasurfaces	**Adelin PATOUX** • *AIRBUS - LAAS, France*
11:35	Hyper doped silicon based tunable mid-IR plasmonic metasurfaces	**Jean-Marie POUMIROL** • *CNRS - CEMES, France*
11:50	2-octaves on-chip mid-infrared supercontinuum generation	**Miguel BALLESTER MONTESINOS** • *Univ. Paris-Saclay - C2N, France*
12:05	UpConverting NanoParticles: from small to Ultrasmall "Nanolamps"	**Christophe COUDRET** • *CNRS - IMRCP, France*
12:20	Three-Dimensional Orientation Analysis of Nanocrystals via Polarized Luminescence of Rare-Earth Dopants	**Thierry GACOIN** • *CNRS - LPMC, France*
12:35	Slow acoustical waves in the GHz for integration of nano-optomechanical oscillators	**Rémy BRAIVE** • *Univ. Paris - C2N, France*

13:00 **Lunch, Poster session & Exhibition**

1D & 2D NANOMATERIALS

10:50	**Intrinsic and Extrinsic Light Matter Interaction Processes in Hexagonal Boron Nitride**	**Bernard GIL** • *CNRS - L2C, France*
11:20	Morphology and band offset in InGaAs/InP nanowires grown by selective area molecular beam epitaxy	**Bruno GRANDIDIER** • *CNRS - IEMN, France*
11:35	Investigating the parameters influencing the light emission of TMD monolayers transferred on dielectric nanoantennas	**Vincent PAILLARD** • *CNRS - CEMES, France*
11:50	Sequential processing of 2D covalent networks on metal substrates	**Frédéric DUMUR** • *AMU - ICR, France*
12:05	Single crystalline Te and Ag2Te nanostructures for thermoelectric conversion	**Karen AL HOKAYEM** • *Univ. of Lorraine - IJL, France*

13:00 **Lunch, Poster session & Exhibition**

10:50 THEMATIC SESSIONS

NANOCHEMISTRY & NANOPARTICLES

10:50	**Tailoring Anisotropies in Nanocrystals**	**Jong-Wook KIM** • *Ecole Polytechnique – LPMC, France*
11:20	Impact of precursor, solvent and ligand on the size and composition of iron oxide nanoparticles	**Sylvie BEGIN** • *Strasbourg Univ. - IPCMS, France*
11:35	«Non-classical» nucleation of oxide nanoparticles in solution: implications on structure control	**David CARRIERE** • *CEA - NIMBE & LIONS, France*
11:50	Controllable synthesis of ultra-small RE_2O_2S and RE_2O_2S@$NaREF_4$ heterogeneous core-shell nanoparticles	**Qilin ZOU** • *Paul Sabatier Univ. - CEMES, France*
12:05	Silver oxide nanoparticles electrosynthesis and characterization at the individual scale	**Mathias MIRANDA VIEIRA** • *Paris Univ. - ITODYS, France*
12:20	Shape-controlled synthesis of ultra-thin indium sulfide nanoribbons	**Lilian GUILLEMENEY** • *ENS Lyon - LCH Lyon, France*
12:35	Controlling the Synthesis of InP Nanocrystals using the Secondary Coordination Sphere	**Fabien DELPECH** • *INSA Toulouse - LPCNO, France*
12:50	One-step microwave synthesis of functionalized magnetic nanoparticles	**Thomas GIRARDET** • *Univ. of Lorraine - IJL, France*

13:00 **Lunch, Poster session & Exhibition**

NANOMATERIALS FOR ENERGY

10:50	**Spatial atomic layer deposition: a high-throughoput, open-air technique allowing the deposition of patterned functional materials**	**David MUNOZ-ROJAS** • *CNRS - LMGP, France*
11:20	Nanopowders Based Transition Metal Oxides for Enhanced Electrochromic Properties	**Brandon FACEIRA** • *CNRS - ICMCB, France*
11:35	Molydenum-Containing Oxysulfide Nanoplates: Characterization of their Structure and Active Sites for Electrocatalysis	**Sophie CARENCO** • *CNRS - LCMCP, France*
11:50	Out of stoichiometry $CuCrO_2$ thin films as Sustainable Hole Transparent Layer in recyclable organic solar cells	**Jean-Luc DESCHANVRES** • *CNRS - LMGP, France*
12:05	Experimental Evidence of the Role of Structural Short-Range Order on the Electrochemical Activity of Iridium Oxide	**Marine ELMAALOUF** • *Univ. de Paris - ITODYS, France*
12:20	3D MnO_2/Ni Network as Electrode Material for High Areal Energy Microsupercapacitors	**Botayna BOUNOR** • *CNRS - LAAS, France*
12:35	Ni-Fe oxide electro-catalysts for the Oxygen Evolution Reaction	**Caterine AMIENS** • *CNRS - LCC, France*

13:00 **Lunch, Poster session & Exhibition**

15:00 PLENARY SESSION

Suzanne GIASSON (Univ. of Montréal- CRMMA & GRUM, Canada) - *Multi-Responsive Two-Dimensional Microgel Arrays as Coatings for Independent and Specific Control of Surface Properties*

List of Oral Presentations

Wednesday, November 24th

16:00 — **THEMATIC SESSIONS**

NANO-OPTICS & NANOPHOTONICS

16:00	**Plasmonics Purcell factor: reconciling classical and cQED approach and downscaling quantum optics to the nanoscale**	**Gérard COLAS DES FRANCS** • *Univ. Bourgogne - ICB, France*
16:30	Polarization can drive light emission from hybrid plasmonic nanosources	**Renaud BACHELOT** • *UTT - LN2, France*
16:45	Controlled positioning of single-photon emitters and coupling to dielectric nanoantennas by AFM-nanoxerography	**Mélodie HUMBERT** • *CNRS - LPCNO, France*
17:00	**Coffee break**	
17:20	Wavelength selective grating fabricated by thin dye local photo-bleaching using laser writer	**Alban GASSENQ** • *UCB - ILM, France*
17:35	Unexpected enhancement of Förster Resonant Energy Transfer thanks to quantum dots aggregation	**Thomas NOBLET** • *Univ. of Liège - CESAM, France*
17:50	Colloidal Aluminum Nanoparticles Synthesis for UV Plasmonic	**Marion CASTILLA** • *UTT - L2N, France*

MULTIFONCTIONAL NANOCOMPOSITES

16:00	**Versatile and scalable approaches to chemical processing of nanocarbons**	**Milo SHAFFER** • *Imperial College London – Dpt of Chemistry, UK*
16:30	Magnetic Stimulation of Phase-Changing Nanocomposites	**Pablo GRIFFITHS** • *INSA Lyon - MATEIS, France*
16:45	Versatile Design of Multifunctional Microgels from Molecular, Nano- and Microscale Building Blocks for Biomedical Applications	**Xiao YU** • *Université de Paris - LCBPT, France*
17:00	**Coffee break**	
17:20	Control of graphene localization in co-continuous PMMA/PS polymer blends via chemical modification for electrical applications	**Thibaut LALIRE** • *IMT Mines Ales - PCH, France*
17:35	Controllable, resilient and efficient artificial muscles based on spin-crossover/polymer nanocomposites	**Mario PIEDRAHITA-BELLO** • *CNRS - LCC, France*
17:50	Easy colorimetric detection of Gadolinium ions based on gold nanoparticles: Key role of phosphine-sulfonate ligands	**Diana CIUCULESCU** • *Univ. Toulouse III - Paul Sabatier - IMRCP, France*
18:05	Nanoscale Mechanical and Electrical Characterization of the Interphase in Polyimide/Si3N4 Nanodielectric Materials	**Nadine LAHOUD-DIGNAT** • *Univ. Toulouse III - Paul Sabatier - LAPLACE, France*

16:00 THEMATIC SESSIONS

NANOCHEMISTRY & NANOPARTICLES

16:00	Ligand Chemistry and Aggregation kinetics of Cs:WO3 Nanocrystals	**Capucine CLERET DE LANGAVANT** • *EP - LCMCP, France*
16:15	MgO nanocatalyst for the valorisation of CO2 in the cycloaddition to epoxides	**Cyprien POUCIN** • *CNRS - LCMCP, France*
16:30	Preparation of nanoparticles in supercritical conditions; interesting insights in the use of supercritical solvents	**Cynthia CIBAKA NDAYA** • *CNRS - ICMCB, France*
16:45	Influence of thiol ligands on the ZnSe magic-sized cluster formation	**David K. WEGNER** • *- BAM - Division Biophotonics, Germany*
17:00	**Coffee break**	
17:20	Synthesis of copper nanoparticles with tunable sizes and shapes	**Armelle OUALI** • *CNRS- ICGM, France*
17:35	Synthesis of cobalt nanorods and self-assembly assisted by magnetophoresise	**Antoine GONON** • *INSA Toulouse - LPCNO*, France
17:50	Eco-friendly Routes to Metallic Bismuth Nanoparticles	**Catherine GOMEZ** • *Cnam - GBCM, France*
18:05	Original functional nanoparticles in molten salts	**David PORTEHAULT** • *CNRS - LCMCP, France*

NANO FOR IMAGING, DIAGNOSIS & THERAPY

16:00	**Polymeric micelles for topical treatment of ocular diseases**	**Carmen Isabel ALVAREZ LORENZO** • *USC – Pharma. Tech., Santiago de Compostela – Spain*
16:30	Carbon nanotubes based composite for non-invasive transdermal drug delivery	**Juliette SIMON** • *Toulouse III Univ. - Paul Sabatier - CIRIMAT, France*
16:45	Effect of the microstructure of n-butyl acrylate/N-isopropylacrylamide copolymers on their thermo-responsiveness, self-organization and gel properties in water	**Fang Yin** • *Toulouse Univ. - IMRCP, France*
17:00	**Coffee break**	
17:20	Synthesis and self-assembly of amphiphilic multi-responsive block copolymers for drug delivery applications	**Clémence NADAL** • *Toulouse III Univ. - Paul Sabatier - CIRIMAT, France*
17:35	Bio-inspired apatite-based nanoparticles: a smart platform for nanomedicine	**Christophe DROUET** • *CNRS - CIRIMAT, France*
17:50	Encapsulation of bio-inspired Mn complexes in mesoporous silica nanoparticles with improved biocompatibility for the regulation of oxidative stress	**Tristan PELLUAU** • *Montpellier Univ. - ICGM, France*

18:30 C'NANO & RENATECH PhD AWARDS 2021

20:30 GALA DINNER

List of Oral Presentations

Thursday, November 25th

9:00 PLENARY SESSION

Teresa PELLEGRINO (ITT- Central Research Labs Genova, Italy) - *Combining magnetic hyperthermia with other therapautic strategies to tackle cancer*

10:00 Coffee break

10:20 THEMATIC SESSIONS

NANO FOR IMAGING, DIAGNOSIS AND THERAPY

10:20	**Nanoscale exploration of live brain tissue based on super-resolution microscopy and near-infrared emitting carbon nanotubes**	**Laurent COGNET** • *CNRS - LP2N, France*
10:50	Influence of polymer micelles in the delivery of a photosensitizer to model membranes and cells	**Clément ROUX** • *Toulouse Paul Sabatier Univ. - IMRCP, France*
11:05	Hafnium Oxyde nanoparticles synthesis for the detection of atherothrombosis through X-ray imaging	**Yasmine SEBTI** • *Sorbonne Paris Nord Univ. - LVTS, France*
11:20	Luminescent Polymer Nanoparticles for Intracellular Imaging	**Andreas REISCH** • *Strasbourg Univ. - LBP, France*
11:35	Molecular Nanocrystals for Bioimaging	**Alain IBANEZ** • *CNRS - NEEL Institute, France*
11:50	Surface engineering of silica nanoparticles with a Gd-PCTA complex for efficient T1-weighted MRI contrast agents	**Catherine AMIENS** • *Toulouse Paul Sabatier Univ. - LCC, France*
12:05	Raman reporters derived from aryl diazonium salts for SERS encoded-nanoparticles	**Yun LUO** • *CNRS - LCBPT, France*

12:30 Lunch, Poster session & Exhibition

NANOSCALE HEAT TRANSFER - MEASUREMENT

10:20	**Ultrafast energy transfer imaged by time domain thermoreflectance**	**Stefan DILHAIRE** • *Bordeaux Univ. - LOMA, France*
10:50	Investigating heat transparency of metal transducers in ThermoReflectance	**Jean-Michel RAMPNOUX** • *Bordeaux Univ. - LOMA, France*
11:05	Synthesis and thermal properties of GO-TiO_2/PEDOT:PSS polymer nanocomposites	**Shivani SHISODIA** • *ULCO - UDSMM, France*
11:20	Evaluation of heat transport in «liquid-nanoporous Si» composite by µ-Raman spectroscopy	**Oksana MAKUKHA** • *CNRS - INL, France*
11:35	Surface temperature mapping and thermal damping properties of spin-crossover molecules	**Karl RIDIER** • *CNRS - LCC, France*
11:50	Hybrid modes in a thermally excited isolated pair of antennas	**Loubnan ABOU-HAMDAN** • *ESPCI Paris - Langevin Institute, France*

12:30 Lunch, Poster session & Exhibition

10:20

THEMATIC SESSIONS

NANOCHEMISTRY & NANOPARTICLES

10:20	**Probing ligand coordination in Zinc oxide nanocrystals enabled by Dynamic Nuclear Polarization enhanced solid-state NMR**	**Gaël DE PAEPE** • *CEA - IRIG, France*
10:50	Fabrication of complex metasurfaces to control visual appearance	**Adrian HEREU** • *CNRS - ICMCB, France*
11:05	Plasmonic hybrid nanoparticles in catalysis	**Clémence QUEFFELEC** • *Nantes Univ. - CEISAM, France*
11:20	Upgrading biomass by bimetallic catalysts	**Miquel CARDONA** • *Paul Sabatier Univ. - LCC, France*
11:35	Flow synthesis of silver nanodisks: mechanisms & rational processing	**Kevin ROGER** • *CNRS - LGC, France*
11:50	The role of pre-nucleation clusters in the crystallization of gold nanoparticles	**Raj Kumar RAMAMOORTHY** • *INP Toulouse - LGC, France*
12:05	Metal nanostructures formed by electrodeposition in microchannels: study of the growth mechanism and application to SERS	**Fabien CHAUVET** • *Toulouse Paul Sabatier Univ. - LGC, France*

12:30 **Lunch, Poster session & Exhibition**

NANOMATERIAL FOR ENERGY

10:20	**Atomistic modeling of heat propagation in nanomaterials**	**Evelyne MARTIN** • *CNRS - ICube, France*
10:50	Ultrafast dynamics of hot carriers in bulk semiconductors and in accumulation layer: energy relaxation and screening effects	**Jelena SJAKSTE** • *CNRS - LSI, France*
11:05	Low-energy bandgap thermophotovoltaic cells for harnessing near-field thermal photons	**Rodolphe VAILLON** • *CNRS - IES, France*
11:20	Influence of silicon nanoinclusions shape and interconnection on thermal conductivity in an amorphous Si matrix	**Paul DESMARCHELIER** • *CNRS - CETHIL, France*
11:35	Radiative sky cooling of solar cells: fundamental modelling and cooling potential of single-junction devices	**Jérémy DUMOULIN** • *INSA Lyon - INL, France*
11:50	MBE-grown GaAs/GaInP nanowire arrays on Silicon for tandem solar cells	**Capucine TONG** • *IPVF - IPVF, France*

12:30 **Lunch, Poster session & Exhibition**

List of Oral Presentations

Thursday, November 25th

14:00 — THEMATIC SESSIONS

NANO FOR IMAGING, DIAGNOSIS AND THERAPY

14:00	Development of innovative nanocomposite hydrogels for the treatment of Glioblastoma	**Amel DJOUDI** • *Angers Univ. - CRCINA, France*
14:15	Biocompatible photoacoustic nanoparticular contrast agents based on BODIPY-scaffold and polylactide polymers	**Jean-Baptiste BODIN** • *Paris-Saclay Univ. - ISMO, France*
14:30	All-organic, intrinsically stealth nanoparticles for single particle tracking and bioimaging	**Morgane ROSENDALE** • *Bordeaux Univ. - ISM, France*
14:45	Hybrid Cationic Elastin-like Polypeptides for Nucleic Acids Delivery	**Monica BRAVO** • *CNRS - ISCR, France*

15:10 Coffee break

NANOSCALE HEAT TRANSFER - MEASUREMENT

14:00	**Scanning thermal microscopy: probing temperature & heat dissipation down to the few-nanometer scale**	**Pierre-Olivier CHAPUIS** • *CNRS - CETHIL, France*
14:30	Traceability of thermal conductivity measurements at nanoscale by SThM technique and associated uncertainties	**Sarah DOURI** • *LNE - CETHIL, France*
14:45	Near-field thermal radiation: material and temperature effects	**Pierre-Olivier CHAPUIS** • *CNRS - CETHIL, France*

15:10 Coffee break

Saint-Exupéry Amphitheater | Spot room | Cassiopée room | Saint-Exupéry foyer

14:00 **THEMATIC SESSIONS**

NANOCHEMISTRY & NANOPARTICLES

14:00	40 years of PDF in Toulouse	**Pierre LECANTE** • *CNRS - CEMES, France*
14:15	Synthesis of SiO2 Nanoparticles as reference material : nanometrology and in situ kinetics in lab by Small angle –X-ray scattering measurements	**Olivier TACHE** • *CEA - NIMBE, France*
14:30	Self-assembled monolayers of CdTe quantum dots: chemisorption versus physisorption	**Thomas NOBLET** • *Liège Univ. - GRASP-Biophotonics, Belgium*
14:45	Bottom-up design and realisation of stable fullerene spin systems	**Chris EWELS** • *CNRS - IMN, France*

15:10 **Coffee break**

NANOMATERIAL FOR ENERGY

14:00	On the UV-visible light synergetic mechanisms in hybrid Au/TiO_2 nanostructures achieving photo-reduction of water	**Maria Isabel MENDOZA DIAZ** • *CNRS - LAAS, France*
14:15	Nb/Ta, N co-doped TiO_2 nanoparticles for broad spectrum solar light activation photocatalysis	**Qingyang XI** • *CNRS - ICPEES, France*
14:30	Fabrication of nanostructured permanent magnet by magnetophoresis for MEMS applications	**Pierre MORITZ** • *CNRS - LAAS, France*
14:45	Growth, structure and dynamics of ferroelastic domains in GeTe thin films on Si(111)	**Boris CROES** • *AMU - CINaM, France*

15:10 **Coffee break**

15:30 **BEST TALKS & POSTERS & SCIENCES IMAGES AWARDS CEREMONY**

16:00 **CLOSING SESSION**

ABSTRACTS OF PLENARY SPEAKERS

Plenary Speakers

Jacqueline BLOCH

CNRS Research Director
C2N Laboratory
Palaiseau, France
http://polaritonquantumfluid.fr/

Biography

Jacqueline Bloch is a CNRS Research Director, Professor lecturer at Ecole Polytechnique and member of the French Academy of Science.

She is an experimentalist, expert in the physics of light-matter interaction in semiconductors, non-linear and quantum optics. After a PhD on semiconductor quantum wires, she started studying hybrid exciton-photon quasi-particles in semiconductor microcavities (cavity polaritons). This photonic platform also referred today to as Quantum Fluids of Light has allowed her group to explore diverse physical phenomena from Bose Einstein condensation, superfluidity, dissipative phase transition to analog gravity. Her group has made ground-breaking contributions in the emulation of linear andnon-linear Hamiltonians, and the exploration of flat band physics, Dirac and topological physics. Jacqueline Bloch's research is fundamental but can also lead to new concepts for innovative optical components.

She has received numerous awards including the 2015 Jean Ricard Prize from the French Physical Society, the 2017 CNRS Silver Medal and the 2019 Ampère Prize from the French Academy of Sciences.

EMULATING CONDENSED MATTER WITH QUANTUM FLUIDS OF LIGHT

Photonic resonators, coupled within a lattice, have appeared in the recent years as a powerful synthetic platform to imprint on light some of the fascinating physical properties that can emerge in condensed matter, or even to go beyond what exists in nature. For instance, light can become superfluid, present spin orbit coupling, spin Hall effect or propagate along topologically protected edge states. New physical properties may emerge when drive and dissipation come into play. Such realizations are not only interesting from a fundamental point of view, but also inspire innovative photonic devices.

After a general introduction to the field of quantum simulation with light, I will present some recent experiments performed at C2N. Using lattices of semiconductor microcavities, we explore single and many body physics of photons in 1D or 2D lattices and the emergence of novel physics related to the openness of the system. Interestingly our photonic platform also enables exploring universal scaling related to the Kardar–Parisi–Zhang universality class.

Keywords: cavity polaritons; semiconductor microcavities; bose Einstein condensates; dirac physics; topology.

Jean-Marc CHOMAZ

CNRS Research Director – Professor at École Polytechnique
LadHyX Laboratory
Paris, France
https://www.ladhyx.polytechnique.fr/fr/recherche/art-et-science

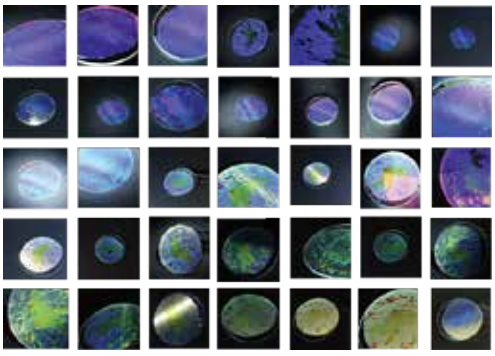
Biography

Jean-Marc Chomaz is an artist-physicist, researcher at the CNRS, co-holder of the Arts & Sciences Chair at the École polytechnique, ÉnsAD-PSL and the Carasso Foundation. He co-founded the hydrodynamics laboratory, the Labex LaSIPS and La Diagonale Paris Saclay. CNRS Silver Medal 2007, Prix Ampère 2012, his research focuses on soap films, instability, geophysical fluids, biomechanics, arts & sciences. Artist, he created the installations Time traces, Terra Bulla, Une solution au problème de raréfaction du Temps-Bogota 2019, with the Duo HeHe, Fleur de Lys, Planète Laboratoire, Absynth, 2018, with A. Tondeur, Lost in Fathoms, 2014, with A Rodado, Basic Transmutation 2016, with E Domnitch & D Gelfand, Luminiferous drift, EP=EPR, 2017. With L Karst and F-E Chanfrault, he founded Labofactory with the works Infraespace, Fluxus, Wave, Exoplanet, 2080, Infinite, Redshift, Soundstream, Blackout, Soleil irrésolu, Sky presented in Amsterdam, Moscow, Paris, Boston, Berlin, Bogota, Atlanta 2019.

THE ROLE OF THE SENSITIVE WORLD IN SCIENTIFIC CONSTRUCTION

Since its creation in 1990, the Laboratoire d'Hydrodynamique has been involved in arts, science and citizen projects, in collaboration with artists from all disciplines: theater, circus, design, music... This activity has led to the creation of the Arts & Science Chair of the École Polytechnique, the École des Arts Décoratifs- PSL and the Daniel and Nina Carasso Foundation. The works proposed to the public are artistic constructions realized on the basis of scientific concepts by involving scientists from all fields, not to demonstrate, but to make sense. They present a human and sensitive dimension of physics, which allows transgressions, metaphors, counter-sense and winks. The spectator then finds himself in a universe where he can invent his own path, and feel the emotion of science.

This approach aims to change the expert's speech and posture. It opens up other paths not limited to proof, which leave room for intimate conviction and intuition, questioning myths and scientific beliefs. Its importance is decisive for the major issues facing society, such as the climate, living organisms and new technologies, which are far too complex for science to answer alone. Art then becomes a means of redefining our concerns and reformulating the questions posed by science. It shifts our gaze, without confusion with proof, and without prescription.



This research approach affirms that innovation in science is an act of creation and imagination, which is an act in the sensitive space before it can be put to the test of reason. Sharing the imaginary of science allows scientific knowledge to be debated and entered into the narrative. The construction of this complex system of representations is essential for science to be efficient and for a thoughtful and desirable future to emerge from the shared narrative. The presentation will be based on a broad panorama of works from the fields of environment, biology and nanotechnology.

Keywords: arts; sciences.

Plenary Speakers

Fernand DORIDOT

Professor at ICAM Lille
CETS Laboratory
Lille, France
https://www.icam.fr

Biography
Fernand Doridot is researcher in Ethics of Technology. He has been working on the topic of nanotechnology for more than ten years. He has been the coordinator of the "Researchers-Citizen" NANOSCOOPE project (2013-2017) funded by the Hauts-de-France regional council on sustainable development of nanotechnology. He is associated to the works of ANSES (French National Health Agency) on the safety of nanomaterials. He is currently leader of the "*Sustainability*" WP in the H2020 NanoFabNet Project.

THE NANOFABNET HUB FOR SUSTAINABLE NANOFABRICATION

NanoFabNet (*https://nanofabnet.eu*) has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 886171.

The NanoFabNet project aims at creating a strong international Hub for sustainable nanofabrication (in terms of human health, ethics, environment, life cycle analysis, …) that stands for (a) a well-implemented, guided approach to high levels of safety and sustainability, (b) trusted technical reliability and quality, and (c) compliance with and drive of harmonisation, standardisation, and regulation requirements, amongst all of its members and along the nanofabrication value chains. The open structure of the Hub is currently developed, agreed and validated in a step-wise approach specifically supported by the consultation of a wide-range of stakeholder knowledge, view and opinions, laying the foundations for an increased identification of the stakeholders with the NanoFabNet brand they are creating.
Some key points of the NanoFabNet Hub will be the setting up of one of the following services according to the needs expressed by stakeholders:- The Creation of a NanoFabNet brand to improve confidence in products and technologies resulting from nanofabrication, both for a top-down approach (lithography, etc.) and a bottom-up approach (chemical synthesis of nanoparticles/nanoobjects, functionalization, integration into systems, etc.); - The Identification of key players/infrastructures, initiatives & networks at national, European and international level (processes, platforms, methodologies, sustainability, risk assessment tools, metrology, standardization, tools for dialogue with civil society, etc.) for sharing with NanoFabNet members in order to support sustainable nanofabrication (creation of databases); - Technology validation (validation/labeling guides and services, organization of proficiency testing, etc.);- The facilitation of access to infrastructures; - Communication and information sharing (regulations, technologies, standardization, good practices, etc.)- International cooperation (USA, China, Japan, Australia ...) and promotion of European projects;- Identification of the needs in the field and establishment of roadmaps to feed European strategy.

Keywords: sustainable nanoFabrication; International Hub; stakeholders; validation and harmonization; single entry point; community; trust.

Suzanne GIASSON

Professor at Montréal University
Dynamics and Engineering of Molecular Interfaces Laboratory
Montréal, Canada
https://bit.ly/315fvgr

Biography
Suzanne Giasson has an academic background in Chemical Engineering and Materials Science from Université Laval, Canada (B.Sc and M.Sc.), Western University, Canada (PhD), UPMC, France (PhD) and UCSB, USA (Postdoc). She started her academic career at Université Laval in 1995 and joined the Université de Montréal in 2002 where she actually holds a joint position in the Chemistry Department and the Faculty of Pharmacy as full professor. She setup a laboratory which is currently equipped with two state-of-the-art Surface Forces Apparatus developed by Pr. Israelachvili. Prof. Giasson's current research program is on the development and investigation of responsive micro/nano-structured surfaces and coatings whose physical properties and surface chemistry can be tuned reversibly. The hierarchical structures are obtained by approaches using surface chemistry, polymer sciences and self-assembly. Such responsive nanostructured materials enable significant advances in biomedical surface engineering and microfluidics.

MULTI-RESPONSIVE TWO-DIMENSIONAL MICROGEL ARRAYS AS COATINGS FOR INDEPENDENT AND SPECIFIC CONTROL OF SURFACE PROPERTIES

Stimuli-responsive polymer coatings enable surface properties to be tuned by external stimuli (i.e. variations of environmental conditions) via changes in their physical conformation, surface chemistry, or both. This capacity enables their use as functional elements in nanotechnologies such as valves in microfluidic devices, as membranes in biomedical engineering, as substrates for culture of biological tissues or substrates of low friction. However, such coatings usually suffer from major shortcomings such as lack of selectivity and poor environmental stability. The talk will present a new generation of multi-responsive hierarchical and hybrid coatings aiming to overcome some of these limitations. A hierarchical polymer coating, consisting of two-dimensional thermo-responsive poly-(N-isopropylacrylamide) (PNIPAM) microgel arrays and surface-functionalized with non-responsive or pH-responsive polymers, was developed in order to tune independently the surface chemistry and the swelling behavior of the coating using different stimuli. The talk will report results showing how the characteristic dimensions (i.e. layer thickness) can indeed be controlled without affecting the surface properties (i.e. adhesion) of the functionalized microgel arrays. Another multi-responsive coating, made of hybrid microgels incorporating plasmonic gold nanoparticles (AuNPs) in PNIPAM microgels, was developed to tune the swelling behavior of thermo-responsive microgels using light. Unprecedented quantitative responsiveness of these immobilized hybrid microgel layers as a function of the temperature and irradiation will be presented. The responsiveness of both hierarchical and hybrid coatings was investigated using the Surface Forces Apparatus allowing adhesion, friction and layer thickness to be accurately determined under different stimuli.

Keywords: stimuli responsive materials; polymers; hydrogel; surface forces; adhesion; swelling; coatings.

Plenary Speakers

Julie GROLLIER

CNRS Research Director
Mixed Unit of Physics CNRS/ Thales
Palaiseau, France
julie.grollier.free.fr

Biography

Julie Grollier is researcher director in the CNRS/Thales laboratory in France, where she is leading the "*Nanodevices for Bio-Inspired Computing*" team.
Julie completed her Ph.D in the field of spintronics at Pierre and Marie Curie University, under the supervision of Albert Fert. After two years of post-doc, first in Groningen University (Netherlands, group of B.J. van Wees), then in Institut d'Electronique Fondamentale (France, group of C. Chappert), she joined CNRS in 2005. Her current research interests include spintronics and novel nanodevices for neuromorphic computing.
Julie has over 100 publications, and is a frequent invited speaker in international conferences. She is a Fellow of the American Physical Society. In 2010 she was awarded the Jacques Herbrand prize of the French Academy of Science. In 2013, she created the interdisciplinary research network GDR BioComp, which goal is to produce hardware bio-inspired systems, and chaired it for five years. In, 2018 she received the Silver Medal of CNRS in Physics for her pioneering work on spintronics and brain-inspired computing. She is the recipient of two prestigious European Research Council grants: «NanoBrain» project (Memristive Artificial Synapses and their integration in Neural Networks, 2010-2015) and «BioSPINSpired» project (Bio-inspired Spin-Torque Computing Architectures, 2016-2021).

SPINTRONIC NEURAL NETWORKS

Spintronic oscillators are nanoscale devices realized with magnetic tunnel junctions that have the potential to be integrated by hundreds of millions in electronic chips. Their tunable, non-linear dynamical properties can be leveraged to imitate biological neurons. The transient dynamics of coupled spintronic nano-oscillators has been used to perform pattern recognition, such as speech classification (1-4). These demonstrations should now be scaled to deep networks to establish their potential.

A key asset of spintronic nano-oscillators towards this goal is their ability to emit radio-frequency (RF) signals. These oscillators indeed produce microwave voltages with varying amplitude and frequency in response to direct current inputs. They could therefore potentially communicate through radio-frequencies signals, allowing fully parallel operation with minimized wiring, at a speed seven orders of magnitude faster than the brain. But for this, it is necessary to devise radio-frequency synapses that can interconnect the oscillators.

In this talk, I will rapidly review recent results on neuromorphic computing with spintronic nano-oscillators. I will then describe how they can be interconnected layer-wise through RF spintronic nano-synapses, and present our recent simulation results of classification with these novel RF synapses.

References

[1] J. Torrejon *et al., Nature*. **547**, 428–431 (2017).
[2] S. Tsunegi *et al., Appl. Phys. Lett.* **114**, 164101 (2019).
[3] M. Romera *et al., Nature.* **563**, 230 (2018).
[4] M. Romera *et al., arXiv:2001.08044* (2020).

Keywords: spintronics; neuromorphic computing; neural networks; non-linear dynamics.

Francesca MORESCO

Doctor, TU Dresden
Center for Avdancing Electronics
Dresden, Germany
https://cfaed.tu-dresden.de/francesca-moresco-group

Biography

Francesca Moresco got her PhD in in experimental physics in 1998 at the University of Hannover. She is Italian and studied physics at the University of Genova.
From 1999 to 2006, she was research assistant at the Free University in Berlin, starting there her work on molecular switching and manipulation of single molecules. Her habitation work was awarded in 2003 by the Karl-Scheel Prize of the German Physical Society in Berlin.
After an experience in the semiconductor industry, Francesca Moresco joined TU Dresden in 2009 as senior scientist at the Institute of Materials Science. Since October 2017, she leads the Single Molecule Machines research group at the Center for Advancing Electronics Dresden (cfaed), studying electronic and mechanical properties of single molecules at surfaces by scanning tunneling microscopy. Presently, she coordinates the H2020 FET Open European project «Mechanics with Molecules" (MEMO).

FUNCTIONAL MOLECULES SYNTHETIZED ON SURFACE: GEARS, NANOCARS AND WIRES

On-surface synthesis represents a powerful strategy for the generation of complex functional molecules on a surface and opens new perspectives for the development of technology at the atomic scale. In this talk, recent low-temperature scanning tunneling microscopy experiments will be reviewed, where on-surface synthesis is applied to investigate the electronic and mechanical properties of designed molecules.
Mechanical molecular systems can provide an alternative route to transmit information at the nanoscale. To this aim, it is crucial to understand the transmission of motion between molecules anchored on a surface. Furthermore, inelastic tunneling electrons and electric field from the STM tip allow studying fundamental properties of molecules such as dipolar moments and charge transfer to a surface, and their effect on rotational and translational motion. Anchoring strategy for molecular gears based on on-surface reactions and recent examples of manipulation and transmission of motion between molecules will be reviewed [1,2].
In the second part of this talk, I will present the on-surface generation of acenes until the longest acene obtained so far (dodecacene) [3-5]. The acene series represents a unique model system to investigate the intriguing electronic properties of extended π electron structures in the one-dimensional limit, which are important for applications in electronics and spintronics and for the fundamental understanding of electronic transport. I will discuss the evolution with length of the energy gap and of the single tunneling resonances.

References
[1] J. Phys. Chem. Lett. 11, 6892 (2020)
[2] Nanoscale 12, 24471 (2020)
[3] ACS Nano 14, 1011 (2020)
[4] ACS Nano 12, 8506−8511 (2018)
[5] Angew. Chem. Int. Ed. 56, 11945 (2017)

Keywords: Scanning Tunneling Microscopy; single-molecule manipulation.

Plenary Speakers

Teresa PELLEGRINO

Professor at ITT
Central Research Lab
Genoa, Italie
https://www.iit.it/people-details/-/people/teresa-pellegrino

Biography

Teresa Pellegrino received the 'Laurea' degree in Chemistry in 2000 and the PhD in Chemical synthesis in 2005 from the University of Bari, Italy. She started working in nanoscience, after the Master when she was a visiting student for 18 months in the group of Prof. P. Alivisatos at University of Berkeley (California) and later, during her PhD, when she moved for additional 18 months in the group of Prof. W.J. Parak at the Center for Nanoscience in Munich (Germany). After a Post Doc at the National Nanotechnology Laboratory in Lecce (Italy), she became permanent staff scientist at the Nanotech Center of CNR-Lecce. Since 2014, she is Tenured Team Leader of the Nanomaterials for Biomedical Applications group at the Italian Institute of Technology, Genoa (Italy).
Her research group at IIT focuses on the development of organic-inorganic nanostructured materials and their in vitro and in vivo preclinical studies for applications ranging from magnetic hyperthermia, to drug delivery, photo-thermal ablation and radiotherapy.

COMBINING MAGNETIC HYPERTHERMIA WITH OTHER THEREPAUTIC STRATEGIES TO TACKLE CANCER

Magnetic hyperthermia" (MHT) exploits the magnetic heat losses of magnetic nanoparticles under an alternating magnetic fields (AMF) to produce heat and 'burn' tumor cells. This treatment can be applied at magnetic field conditions (100 kHz and up to 24kA/m) that are clinically safe for patients with no tissue-depth attenuation for magnetic nanoparticle actuation. This peculiar feature enables to provide a more selective heat treatment with less side effects.
This talk aims at providing an overview of our last five years research efforts to combine magnetic hyperthermia with chemotherapy and intrinsic nanoparticle cytotoxicity. I will first focus on our progress on non-hydrolytic methods for the preparation of magnetic nanoparticles with optimal heat performance in MHT and our attempt to scale up the production of magnetic materials. Then I will introduce the thermo-responsive polymer coated iron oxide nanocubes as drug carrier for doxorubicin with a heat-mediated drug release mechanism. I will report about our in vitro study on tumor spheroids from colorectal cancer cell model to determine the magnetic hyperthermia effects, with or without the association of chemotherapeutic drugs, on different subpopulations of cancer cells. Finally, I will discuss our preclinical results to evaluate the magnetic hyperthermia efficacy of some of our magnetic materials on xenograft murine tumor model and the bio-distribution study of some of the best performing materials we have developed.

Keywords: magnetic hyperthermia; magnetic nanoparticles; doxorubicin; nanoparticles alignment; in vivo efficacy study; Cu64-radiolabelling.

ABSTRACTS OF KEYNOTE SPEAKERS

Keynote Speakers

Carmen Isabel ALVAREZ LORENZO

Professor at University of Santiago de Compostela
Dept. Pharmacology, Pharmacy and Pharmaceutical Technology
Santiago de Compostela, Spain
https://www.idfarmausc.es/en

Biography

Carmen Alvarez-Lorenzo (PhD Pharmacy, 1998) is Professor of Pharmaceutical Technology at the University of Santiago de Compostela. She was a postdoctoral fellow at Massachusetts Institute of Technology (MIT, USA) (1998-2001) and Ramón y Cajal researcher at the University of Santiago de Compostela (2001-2006). Her research interests include drug and gene nanocarriers, stimuli-responsive and imprinted networks, biomimetic materials, scaffolds, and drug-eluting medical devices. She has coauthored more than 300 papers, 30 book chapters, 17 patents, and +350 contributions to scientific meetings, and co-edited two books. She has supervised 21 PhD students and 8 more are on-going. h-index: 50 (Web of Science Core Collection); 52 (Scopus); 61 (Google Scholar). She is a member of a number of international committees and editorial advisory boards. Activities of her research group can be followed in the web site *https://www.idfarmausc.es/en.*

POLYMERIC MICELLES FOR TOPICAL TREATMENT OF OCULAR DISEASES

The eyes can suffer a variety of diseases, but their treatment is still a challenge due to the numerous anatomical barriers and eye defense mechanisms. The access of drugs through the blood stream is limited by the blood-ocular barriers. Periocular and intraocular injections may allow in situ management of diverse ocular pathologies, but the need of attenuating risks demands the development of more patient-friendly formulations. Topical formulations, mainly eye drops, are comfortable and safe, but only 1-10% of the dose can penetrate into the eye structures. Such poor ocular bioavailability is caused by low cornea permeability, short residence time, rapid tear fluid turnover, and efflux pumps. To overcome these hurdles, a variety of nanocarriers are being investigated. This talk focuses on the advantageous performances that polymeric micelles may offer for both anterior and posterior segments treatments [1]. A variety of amphiphilic polymers exhibit spontaneous self-assembly into nanomicelles that can encapsulate hydrophobic drugs and withstand the sterilization protocols and the subsequent dilution in the lachrymal fluid without premature disassembly. Moreover, polymeric micelles favor drug partition toward the corneal epithelium while the unimers may inhibit efflux pumps. Prolonged permanence on the ocular surface can be achieved through in situ gelling phenomena. The drug-loaded polymeric micelles can penetrate through different pathways into the ocular structures and may reach the posterior segment of the eye through the conjunctival–scleral route. Relevant examples of nanomicelles for lipoic acid, acyclovir [2], cyclosporine and progesterone [3] ocular delivery are discussed, paying attention to the preclinical tests suitable for predicting in vivo performance.

References

[1] M. A. Grimaudo, et al. Expert Opin. Drug Deliv. 16 (2019) 397-413.
[2] A. Varela-Garcia, et al. Int. J. Pharm. 552 (2018) 39-47.
[3] A.M. Alambiaga-Caravaca, et al. Pharmaceutics 12 (2020) 702.

Acknowledgments: This work was supported by MINECO [SAF2017-83118-R], Agencia Estatal de Investigación (AEI) Spain, Xunta de Galicia [AEMAT ED431E 2018/08] and FEDER.

Keywords: nanomicelles; ocular delivery; eye treatment; ex vivo permeability.

Keynote Speakers

Erik BAKKERS

Professor at Eindhoven University of Technology
Eindhoven, The Netherlands
https://www.tue.nl/en/

Biography
After obtaining his PhD in nanoelectrochemistry at the University of Utrecht, Erik started working at Philips Research in Eindhoven in 2000. He started his own research group, and the team focused on nanowires- lines of material with a width of several tens of nanometers- an area he continues to research, looking at integration into semiconductors in particular. In 2010, his growing interest in fundamental research resulted in Erik joining the Technical University of Eindhoven as well as Delft Technical University as part-time professor in the Quantum Transport group. His current interest is in Quantum Materials, to detect and manipulate Majorana states, and in Hexagonal Silicon, to demonstrate and exploit the predicted direct band gap in this material. He has received the Technical Review award from MIT, VICI grant, ERC CoG, ERC AdG, the Science AAAS Newcomb Cleveland Prize 2013, and the 'Breakthrough of the Year 2020 award' by Physics World

EFFICIENT LIGHT EMISSION FROM HEXAGONAL SIGE

E.P.A.M. Bakkers

Department of Applied Physics Eindhoven University of Technology, Eindhoven, The Netherlands

Silicon and germanium cannot emit light efficiently due to their indirect bandgap, hampering the development of Si-based photonics. However, alloys of SiGe in the hexagonal phase are predicted to have a direct band gap. In this work, we exploit the unique feature of the nanowire growth mechanism to control the crystal structure by tuning the contact angle of the catalyst particle and demonstrate the optical properties.[1] We show efficient light emission up to room temperature accompanied by a short radiative life time, the hallmarks of a direct band gap material. The band gap energy is tunable in the range of 0.35 till 0.7eV opening a plethora of new applications. We have found the first signatures of lasing in this material. We finally discuss possible routes to integrate this material in Si- technology.

References

[1] E.M.T. Fadaly *et al.*, ***Nature*** 580, 205 (2020).

Keywords: nanowires; hexagonal SiGe; crystal growth; photonics.

Keynote Speakers

Hélène BOUCHIAT

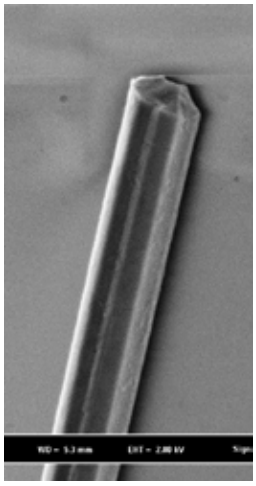
CNRS Research Director
LPS Laboratory
Orsay, France
https://www2.lps.u-psud.fr/

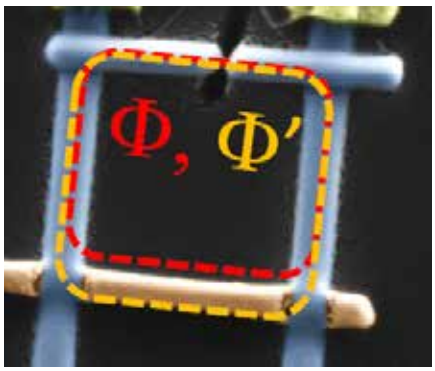
Biography

CNRS Research Director since 1998, Hélène Bouchiat is working in Laboratory of Solid State Physics in Orsay (France). In 2005, she was awarded with CNRS silver medal for her work on quantum electricity. From 2007 to 2012, she was member of the evaluation panel on condensed matter Physics of the European Research Council (ERC). Since 2010, she is a member of French Academy of Science. Her research activity covers the study of electronic properties in mesoscopic physics including mesoscopic Quantum transport, Carbon Nanotubes, Graphene, Topological insulators.

REVEALING THE TOPOLOGICAL NATURE OF TRANSPORT AT MESOSCOPIC SCALES WITH QUANTUM INTERFERENCES

We show that basic fundamental properties of mesoscopic quantum interferences can be used to reveal the existence and the physical location of 1d protected states in topological insulators. This method is illustrated in the case of crystalline bismuth nanowires which were found to belong to a class of newly discovered higher order topological insulators with helical ballistic hinge states coexisting with trivial bulk and surface diffusive states. In particular we discuss SQUID like periodic magnetic oscillations observed in Bi based Josephson junctions.





References

[1] (A. Murani et al, Nature Communications 8, 15941 (2017).
[2] Frank Schindler et al, Nature Physics 14, 918–924 (2018).
[3] A. Murani et al, Phys. Rev. Lett. 122, 076802 (2019).

Keywords: quantum transport; carbon nanotubes; graphene; popological insulators.

Keynote Speakers

Didier BOURISSOU

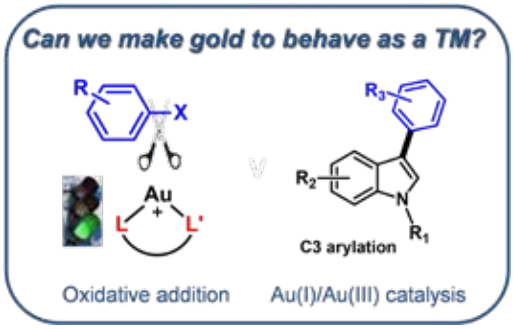
CNRS Research Director
LHFA Laboratory
Toulouse, France
https://www.lhfa.cnrs.fr/index.php/en/teams/lbpb-en/accueil-lbpb-en

Biography

Didier Bourissou studied chemistry at the Ecole Normale Superieure in Paris and obtained a PhD degree from Paul Sabatier University in 1998 under the supervision of G. Bertrand. He then worked with F. Mathey and P. Le Floch at the Ecole Polytechnique in Palaiseau as a research associate. He was appointed as a CNRS junior researcher in 1998. Since 2006, he holds a senior scientist position (Directeur de Recherche) at the CNRS and from 2006 to 2018, he has been Associate Professor at the Ecole Polytechnique in Palaiseau. He is Director of the Laboratory of Fundamental and Applied Heterochemistry at the University Paul Sabatier in Toulouse since 2011. His research interests concern new bonding situations and reactivity patterns arising from the main group elements, the transition metals and their interplay. He has pioneered ambiphilic ligands in the mid 2000's and developed the concept of □-acceptor ligands. Part of his research also deals with non-innocent pincer complexes and unusual behavior of the coinage metals, in particular gold. He is also interested in biodegradable polymers (ring-opening polymerization, organic and dual catalysis, drug delivery systems).

NEW BASIC ORGANOMETALLIC REACTIVITY OF GOLD: TOWARDS NEW APPLICATIONS?

With the aim to open new avenues in gold chemistry, we are exploring the basic structure and reactivity of coordination complexes. In particular, thanks to rationale ligand design, we have isolated key carbene complexes1 and challenged the presumed reluctance of gold to undergo oxidative addition,2 a pivotal transformation in many processes. Chelating (P,P) and hemilabile (P,N) ligands have been shown to readily promote the activation of C–I/Br and C–C bonds. The approach is amenable to Au(I)/Au(III) catalysis, without the need for an external oxidant or photoredox conditions.3 Such fundamental studies combining experimental work and DFT calculations extend the chemical space of gold and advance our understanding of the key factors controlling its behaviour. Besides their own interests, well-defined molecular complexes are also valuable models for nanoparticles, and the parallel with key intermediates and elementary steps presumably involved in heterogeneous catalysis with Au-NPs will be drawn.



References

[1] (a) Zeineddine, A.; Rekhroukh, F.; Mallet-Ladeira, S.; Miqueu, K.; Amgoune, A.; Bourissou, D. *Angew. Chem. Int. Ed*. **2018**, *57*, 1306. (b) Pujol, A.; Lafage, M.; Rekhroukh, F.; Saffon-Merceron, N.; Amgoune, A.; Bourissou, D.; Nebra, N.; Boutignon, M.; Mézailles, N. *Angew. Chem. Int. Ed.* **2017**, *56*, 12264.

[2] (a) Joost, M.; Zeineddine, A.; Estévez, L.; Mallet-Ladeira, S.; Miqueu, K.; Amgoune, A.; Bourissou, D. *J. Am. Chem. Soc*. **2014**, *136*, 14654. (b) Joost, M.; Estevez, L.; Miqueu, K.; Amgoune, A.; Bourissou, D. *Angew. Chem. Int. Ed.* **2015**, *54*, 5236. (c) Zeineddine, A.; Estévez, L.; Mallet-Ladeira, S.; Miqueu, K.; Amgoune, A.; Bourissou, D. *Nat. Commun*. **2017**, *8*, 565.

[3] (a) Rodriguez, J.; Zeineddine, A.; Sosa Carrizo, E. D.; Miqueu, D.; Saffon-Merceron, N.; Amgoune, A.; Bourissou, D. *Chem. Sci*. **2019**, *10*, 7183. (b) Rigoulet, M.; Thillaye du Boullay O.; Amgoune, A.; Bourissou, D. *Angew. Chem. Int. Ed*. **2020**, *59*, 16625.

Keywords: gold; reactivity; ligand; catalysis; bonding.

Keynote Speakers

Pierre-Olivier CHAPUIS

CNRS Researcher
CETHIL Center
Villeurbanne, France
http://cethil.insa-lyon.fr
http://polivier.chapuis.free.fr

Biography
Pierre-Olivier Chapuis (Engineer & MS, 2004, and PhD, 2007, Ecole Centrale Paris) is a CNRS Research Scientist at CETHIL in the Microscale and Nanoscale Heat Transfer (MiNT) group since 2011. He was previously a post-doctoral researcher at the Catalan Institute of Nanotechnology (ICN2) in Barcelona (2008-2011). His interests deal with nanoscale heat transfer and conversion, in particular sub-wavelength thermal radiation and phonon heat conduction, including applications such as thermophotovoltaic energy harvesting or thermal management for electronics. His works involve both theoretical (Boltzmann transport equation, fluctuation electrodynamics) and experimental (scanning thermal microscopy, electro-thermal measurements) aspects.

SCANNING THERMAL MICROSCOPY: PROBING TEMPERATURE AND HEAT DISSIPATION DOWN TO THE FEW-NANOMETER SCALE

Scanning thermal microscopy (SThM) [1], a technique derived from atomic force microscopy aiming at characterizing energy transfer at nanoscale, is applied with different thermoresistive tips, providing down to 10 nm spatial, few mK temperature, and pW.K^{-1} thermal conductance resolutions. Two main applications are highlighted: nanoscale thermal transport property determination and thermometry.

In ambient conditions, we demonstrate ballistic thermal transport in air. In vacuum, the tip-sample exchange before contact is mediated by means of near-field thermal radiation [2] and then by heat conduction across constrictions. SThM is found to be applicable for characterizing materials with thermal conductivity lower than ~3 W.m^{-1}.K^{-1}, but reduced sample area, as in the case of suspended phononic nanomembranes, can allow characterizing thermal conductivity in air up to ~50 W.m^{-1}.K^{-1} [3]. Recent results obtained for various sets of samples are underlined, including thin oxide amorphous films down to the native-oxide case [4]. Thermal transport mechanisms are discussed, in particular when ballistic phonon dissipation takes place.

We also highlight strategies for performing small-scale thermometry and discuss the link between the thermal signal and the actual sample temperature [5], taking examples from the electronics industry.

References
[1] S. Gomès *et al.*, Phys. Stat. Sol. A 212, 477 (2015).
[2] C. Lucchesi *et al*, Nano Lett. 11, 4524 (2021)
[3] A.M. Massoud *et al.*, Appl. Phys. Lett. 111, 063106 (2017).
[4] E. Guen *et al*, J.l Appl. Phys. 128, 235301 (2020)
[5] A. Pic *et al.*, submitted.

This work was performed with E. Guen[1], A.M. Massoud[12], A. Pic[13], C. Lucchesi[1], V. Lacatena[4], M. Haras[4] (PhD students), A. Alkurdi[1] (post-doc), J.F. Robillard[4], J.M. Bluet[2], S. Gallois-Garreignot[3], R. Vaillon[15], S. Gomes[1] (colleagues). [1]CETHIL, [2]INL, [3]ST Micro, [4]IEMN, [5]IES.

Support of projects TIPTOP & DEMO-NFR-TPV (ANR) and QuantiHeat & EFINED (EU) is acknowledged.

Keywords: nanoscale heat transfer; AFM; phonon; thermal radiation; ballistic ; far-field.

Keynote Speakers

Laurent COGNET

CNRS Research Director
LP2N Laboratory
Bordeaux, France
www.cognet-research.com

Biography

Laurent Cognet is CNRS Research Director at Institute of Optics in Bordeaux where he leads a group in nano&biophotonics. After a PhD in atom optics with A. Aspect (Orsay) and a postdoc in biophysics with Th. Schmidt's (Leiden University, NL), he was tenured as CNRS junior researcher in Bordeaux in 2000 to develop the emerging field of single-molecule detection and super-resolution microscopy in the context of biological applications. In 2006-7, he was a Fulbright scholar at Rice University (Houston, TX) and initiated original studies on carbon nanotube optics. He was promoted Research Director in 2009 and actively participated in 2011 to the creation of LP2N at Institute of Optics in Bordeaux. His current research interests include the nanoscale investigation of the biological matter based on innovative nanostructures and high-resolution optical microscopy. He has published over 90 papers totalizing more than 7000 citations and received several prizes of his achievements.

NANOSCALE EXPLORATION OF LIVE BRAIN TISSUE BASED ON SUPER-RESOLUTION MICROSCOPY AND NEAR-INFRARED EMITTING CARBON NANOTUBES

Single-molecule localization microscopy (SMLM) is a key approach used nowadays to study structural and dynamic arrangements of the matter at the nanoscale in a wide range of applications. As a member of the "super-resolution microscopy" family SMLM indeed provides optical images with resolutions well beyond the diffraction limit. Yet, it remains challenging to study more complex systems than isolated nanostructures or isolated living cells in biology with such approaches. For instance, SMLM in thick and intact brain tissues is penalized by the limited brightness of fluorescent emitters, the optical aberrations induced by the samples and/or the poor penetration of the light into biological tissue at visible wavelengths. To circumvent these limitations and investigate live brain tissues at the nanoscale, we developed a framework based on SMLM [1] and single-wall carbon nanotubes imaging [2] which luminesce in the near-infrared. Nanotube detection and tracking at the single nanotube level allow the extracellular space of intact live brain tissues to be revealed at the nanoscale and its modifications to be studied in the context of neurodegenerative diseases [3]. Building on this strategy, I will present how a toolbox of SMLM nanoprobes can be engineered in the near-infrared to study complex biological tissues through (i) the creation of photoswitchable carbon nanotubes [4] and (ii) ultrashort carbon nanotube displaying localized emission centers that could be revealed by super-resolution microscopy of the nanotube themselves [5]. Other applications in life and medical science beyond neurosciences will be presented.

References

[1] Heine et al *Science* (2008), Varela, et al *Nat. Com.* (2016)
[2] Cognet, et al *Science* (2007), Fakhri, et al *Science* (2010), Danné, et al *ACS Photonics* (2018)
[3] Godin, et al *Nat. Nanotechnol.* (2017), Soria et al *Nat. Commun* (2020)
[4] Godin, et al *Adv. Science* (2019)
[5] Danné et al, *ACS Nano,* (2018), Mandal et al, *Sci. Rep* (2020)

See also: *www.cognet-research.com*

Keywords: single molecule detection; carbon nanotube; nanoparticles; superresolution microscopy; neurosciences; near-infrared; tissue imaging; extracellular space.

Keynote Speakers

Gérard COLAS-DES-FRANCS

Professor at Bourgogne University
ICB Institute
Dijon, France
https://icb.u-bourgogne.fr/

Biography

Gérard Colas-des-Francs is full professor at the Université de Bourgogne. Alumni of ENS Cachan (1994). He holds a doctorate in Physics (2002) from the University of Toulouse, where he worked on fluorescence in a surface-tip junction. He then moved to University of Münster (Germany) as a Marie Curie fellow where he investigated highly resolved optical near-field microscopy. He has joined the Laboratoire Interdisciplinaire Carnot de Bourgogne (ICB) in 2004. His current interests are focused on the fundamental aspect of nanophotonics, surface enhanced spectroscopies, and quantum plasmonics. He is currently the head of the submicron optics group at ICB.

PLASMONICS PURCELL FACTOR: RECONCILING CLASSICAL AND CQED APPROACH AND DOWNSCALING QUANTUM OPTICS TO THE NANOSCALE

Optical microcavities can store light for a long time allowing efficient light-matter interaction with important applications such as low threshold laser, or single photon generation. Light-matter interaction is generally quantified thanks to the Purcell factor Q/V where Q and V refer to the quality factor and mode volume of the cavity, respectively. Cavity quantum electrodynamics (cQED) relies on the extremely high quality factor but at the price of diffraction limited sizes. That is why strong efforts have been done since a decade to transpose cQED concepts to nanophotonics and plasmonics, taking benefit from the deeply subwavelength confinement of localized surface plasmon polaritons (LSP).

Therefore, an exact definition of the plasmonic Purcell factor is of strong interest to engineer quantum plasmonics devices but also for a better understanding of the light matter interaction at the nanoscale. I will introduce this concept with particular attention devoted to the role the radiation leakages that prevents to extrapolate standard cQED definition for the mode volume. The Purcell factor also constitutes a simple parameter and permits a scale law approach profiting from the strong maturity of cQED concepts and adapt them to nanophotonics. I will discuss cooperative emission by quantum plasmonic superradiance, paving the way towards ultrafast and extremelly bright optical nanosources.

Keywords: quantum plasmonics; Purcell factor; superradiance.

Keynote Speakers

Gaël DE PAEPE

CEA Research Director
IRIG Institute
Grenoble, France
https://nmr-dnp-grenoble.net/home/

Biography

Gaël De Paëpe is currently leading the NMR-DNP group at IRIG (MEM, CEA/Univ. Grenoble Alpes). He obtained his M.Sc. and Ph.D. at ENS Lyon, France, under the supervision of Prof. L. Emsley. In 2004, he went to MIT for a postdoctoral work with Prof. R. G. Griffin. He returned to France in 2008 with an ANR Chair of Excellence to set up high-field NMR-DNP at CEA Grenoble. He received the Vold Memorial Prize (2013) and a consolidator grant funded by the European Research Council (2015). He is heading the Magnetic Resonance laboratory at IRIG-MEM since 2021. His group focuses on MAS-DNP method and technology development for applications in materials science, chemistry, and biology. More specifically, the NMR-DNP group is specialized in applications ranging from organic and inorganic NCs, energy materials to biomolecular systems (protein-ligand/ protein fibrils). The group is also a global leader in the development of new instrumentation and polarizing agents for MAS DNP at ultra-low temperature.

PROBING LIGAND COORDINATION IN ZINC OXIDE NANOCRYSTALS ENABLED BY DYNAMIC NUCLEAR POLARIZATION ENHANCED SOLID-STATE NMR

ZnO nanocrystals (NCs) have attracted significant research efforts owing to their versatility, with applications in numerous fields including catalysis, semiconductors, and in paint and rubber industries, as well as for their anti-microbial activity. Their shape, size, bulk composition (including the presence of dopant/vacancy), but also the ligand capping of these NCs determine their optoelectronic properties and their suitability for a particular application. Control over these parameters is a long-standing challenge, which implies establishing and optimizing new synthetic approaches. Nevertheless, the unambiguous characterization of the coordination chemistry of NC surfaces produced by wet-chemical synthesis remains a highly challenging issue.

In this presentation, we will show that Dynamic Nuclear Polarization combined with Magic Angle Spinning (MAS-DNP) can provide enough sensitivity to probe the ligand structure through multidimensional NMR experiments, which can be used to extract unprecedented information concerning ligand arrangements on NC surfaces.[1,2] First, we will highlight the vast difference between the organic-inorganic interfaces resulting from two synthetic routes to ZnO NCs capped with organophosphorous ligands: a traditional sol-gel approach and an organometallic approach called OSSOM (One-pot Self-Supporting OrganoMetallic).1 MAS-DNP-enhanced NMR not only supplies a detailed NC surface analysis but also demonstrates the interest of the OSSOM approach for the preparation of highly stable quantum sized ZnO spherical nanocrystals. We will further discuss how MAS-DNP NMR can be used to determine ligand coordination modes and atomic-scale arrangements on faceted hexagonal ZnO nanoplatelets obtained through an organometallic approach.[2] Overall, this work relating ligand-binding modes with particle morphology will contribute to a rational design of tailored nanocrystals.

References

[1] D. Lee, M. Wolska-Pietkiewicz, S. Badoni, A. Grala, J. Lewiński, G. De Paëpe, *Angew. Chemie - Int. Ed.* **2019**, 58 (48), 17163–17168.
[2] M. Terlecki, S. Badoni, M. K. Leszczyński, S. Gierlotka, I. Justyniak, H. Okuno, M. Wolska-Pietkiewicz, D. Lee, G. De Paëpe, J. Lewiński, *Adv. Funct. Mater.* **2021**, 2105318.

Keywords: ZnO nanocrystals; dynamic Nuclear Polarization; solid-state NMR; ligand-NC interaction.

Keynote Speakers

Stefan DILHAIRE

Professor at University of Bordeaux
LOMA Loboratory
Talence, France
https://www.loma.cnrs.fr/stefan-dilhaire/

Biography
Stefan Dilhaire is Professor at University of Bordeaux. At LOMA (Laboratoire Ondes et Matière d'Aquitaine) Stefan Dilhaire's group studies mutual interaction of heat, light and electricity in micro-systems and nano-materials and its applications in renewable energy, in microelectronics, in nano-plasmonics, and biology.

ULTRAFAST ENERGY TRANSFER IMAGED BY TIME DOMAIN THERMOREFLECTANCE

The reduction of the size of nano-objects or nano-materials down to the nanoscale leads to strong modifications of its transport properties depending then on its size, shape, structure and obviously on its environment. Carrier confinement combined to interface effects gives rise to new transport properties. That is the case in absorption and emission of light where the new properties are given by electromagnetic near field coupling between the nano-objects included in the material. Concerning phonon transport, a frequency dependence of thermal conductivity can be observed. Plasmons confined in a tapered wave guide slow down producing hot carriers. This hot electron lifetime increases in a hot spot. All these processes occurring at time scales from femtoseconds up to nanoseconds are routinely accessible with ultrafast pump-probe techniques. i.e. heterodyne optical sampling allows to access to the energy transfer and understand the heat propagation into nano-objects themselves. The comprehension of energy transport mechanisms had been initiated by the study of a collection of nano-objects in solution without any coupling between them. We will describe different situations where the energy deposited by a femtosecond flash can be converted into phonons or plasmons traveling respectively at the speed of sound and speed of light in nano-materials. Our ultrafast imaging technique enables to record movies at 20 Tera image per second. Plasmons travelling at speed of light in metallic structures are revealed via the hot electron tail they leave behind them.

References
[1] Lalanne, P., Coudert, S., Duchateau, G., Dilhaire, S., Vynck, K. Structural Slow Waves: Parallels between Photonic Crystals and Plasmonic Waveguides, ACS Photonics, 2019, 6 (1), pp 4–17
[2] Lozan, O., Sundararaman, R., Ea-Kim, B., Rampnoux, J.-M., Narang, P., Dilhaire, S., Lalanne, P., Increased rise time of electron temperature during adiabatic plasmon focusing, Nature Communications, 8 (1), art. no. 1656, . (2017)
[3] D'Acremont, Q., Pernot, G., Rampnoux, J.-M., Furlan, A., Lacroix, D., Ludwig, A., Dilhaire, S., High-throughput heterodyne thermoreflectance: Application to thermal conductivity measurements of a Fe-Si-Ge thin film alloy library, Review of Scientific Instruments, 88 (7), art. no. 074902, (2017)
[4] Dehoux, T., Ghanem, M.A., Zouani, O.F., Rampnoux, J.-M., Guillet, Y., Dilhaire, S., Durrieu, M.-C., Audoin, B. All-optical broadband ultrasonography of single cells (2015) Scientific Reports, 5, art. no. 8650

This work was performed in the framework of the ANR SPIDERMAN project (No. ANR-18-CE42-0006) funded by the French Agence Nationale de la Recherche and of the "Nano Thermal Imaging" project supported by the CRNA (Conseil Regional de Nouvelle Aquitaine, No. 2018-1R50303). This work was also supported by the Labex Laphia in the framework of the Nano-Imaging project (2018–2020).

Keywords: time domain thermoreflectance; hot electrons; plasmon; phonons.

Keynote Speakers

Patrice GENEVET

CNRS Researcher
CRHEA Laboratory
Sophia-Antipolis, France
http://www.crhea.cnrs.fr/
https://2dphotonics.weebly.com/

Biography

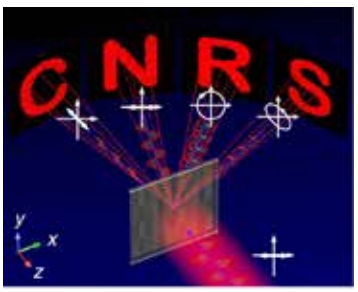
Patrice Genevet received his Ph. D. degree at the université Côte d'Azur, France in 2009 on localized spatial solitons in semiconductor lasers and amplifiers.He did five years as a research fellow (2009– 2014) in the Capasso group (SEAS, Harvard University) in collaboration with Prof. Scully (Texas A& M University). In 2014, he obtained the position of senior research scientist at A⋆STAR, Singapore. In 2015, He joined CNRS as permanent 'Chargé de Recherche'.He is the recipient of the 2017 Aimé-Cotton Price from the French Physical Society, the ERC starting Grant 2015 on Functional flat optical components and applications and the 2019 ERC proof of Concept. P. Genevet research activities concern the development of optical metamaterials, metasurfaces and their applications.

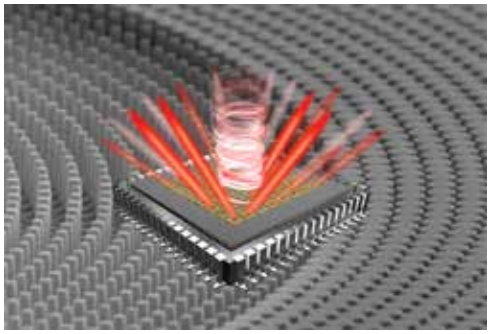
APPLICATIONS OF METASURFACES

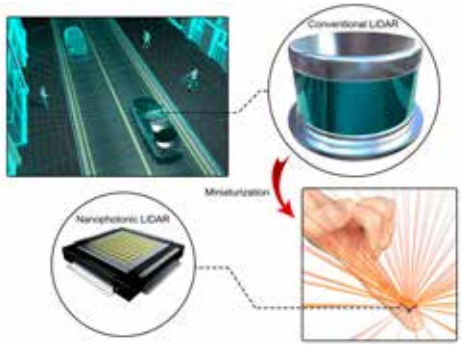
A class of planar and wavelength-thick optical components exhibiting exceptional optical properties have emerged in recent years. These artificial interfaces, known as metasurfaces, can manipulate the wavefront of light in almost any desired manner, leveraging on the scattering properties of the subwavelength nanostructures. Currently, this technology is creating new application opportunities and efforts to realize dynamic tuning, broadband applications and industrial production are proposed.

In this presentation, I will discuss basic designs and fabrication methods of metasurfaces and summarize various applications for beam steering, polarization control and monolithic integration of metasurfaces in opto-electronic systems. As an alternative of conventional bulky, the development of this technology is expected to create a positive disruption in modern optical technologies, in particular in the fields of imaging, holography, 3D dynamic image rendering, AR/VR and LiDAR systems.

Keywords: nanophotonics; metamaterials; metasurfaces; LiDAR; Vectorial Beam shaping; holography.







Keynote Speakers

Bernard GIL

CNRS Research Director
L2C Laboratory
Montpellier, France
https://www.umontpellier.fr/recherche/unites-de-recherche/laboratoire-charles-coulomb-l2c

Biography

Bernard Gil, born 1957, is Director of Research of Exceptional Class at CNRS. He is an experimentalist working on light-matter interaction processes in III-V and II-VI semiconductor compounds. After some years spent working on cubic semiconductors, he shifted his interest in 1994 to wurtzite wide bandgap semiconductors for understanding the emission of light in compact solid-state diodes based on nitrides. Since 2015 he is more intensively focused to boron nitride and other two-dimensional semiconductors of the III-VI family, namely InSe, GaSe and GaTe. Gil contributed to the organization of tens of international events and contributed to the launching of several series semiconductor conferences: Int. Conf. on Nitride Sem., Int. Workshop on Nitride Sem., Phys. of Light Matt.Coupling in Nanostructures, ... Gil is Doctor Honoris Causa of the Saint Petersburg Univ. and of the Meijo Univ.of Nagoya. He was awarded the Welker Prize (*wikipedia.org/wiki/Welker_Award*) in 2018.

INTRINSIC AND EXTRINSIC LIGHT MATTER INTERACTION PROCESSES IN HEXAGONAL BORON NITRIDE

Boron nitride is a fascinating material, today found to be particularly useful for conceiving advanced optoelectronic devices as well for hyper-lensing applications in the far infra-red thanks to the marked hyperbolic nature of the phonon-polariton [1], to antiviral applications in line with its efficient emission of an ultraviolet radiation at wavelengths near 200 nm [2], the condition for optimal sterilization from aggressive pathological biological agents that are under the lime lights of the information. Boron nitride is also an excellent platform for quantum technologies with a lot of efficient single photon emitters [2,3]. The fundamental bandgap of this semiconductor exhibits a cross over from indirect between **~K** valence state and **M** conduction state to a direct one at **K**, from a bulk stacking to a single monolayer [4-7]. The exceptional radiative recombination rate of about 50% at room temperature, comparable to what is found for the direct wide bandgap semiconductor ZnO [8] is partly correlated to the efficient exciton-phonon interaction [9-12]. Besides many photoluminescence studies, complementary reflectance and transmission experiments have recently revealed a huge oscillator strength (and thus a particularly broad Reststrahlen band) for the optical transition at the energy of the direct bandgap of BN. This seems to be related to the high internal quantum efficiency alluded to earlier [13].

References

[1] J. Caldwell et al. Nat. Rev. Mater. **4**, 552 (2019)
[2] B. Gil et al. Nanophotonics **9**, 3483 (2020)
[3} Ji Jun Zhang et al., J. Appl. Phys. **128**, 100902 (2020)
[4] G.Cassabois et al., Nat. Photonics, 10, 262 (2016)
[5] P. Vuong et al. 2D Mater. **4**, 011004 (2017)
[6] P. Vuong et al. Nat. Mater. **17**, 152 (2018)
[7] C. Elias et al. Nat. Commun. **10**, 2639 (2019)
[8] L. Schué et al. Phys. Rev. Lett. **122**, 067401 (2019)
[9] J. Koskelo, et al. Phys. Rev. B **95**, 035125 (2017)
[10] E. Cannuccia et al., Phys. Rev. B **99**, 081109 (2019)
[11] F. Paleari, et al. Phys. Rev. Lett. **122**, 187401 (2019)
[12] Hsiao-Yi Chen, et al. Phys. Rev. Lett. **125**, 107401 (2020)
[13] C. Elias, G. Fugallo, P. Valvin, C.l'Hénoret, J. Li, J. H. Edgar, F. Sottile, M. Lazzeri, A. Ouerghi, B. Gil,and G. Cassabois , unpublished

Keywords: boron nitride; wide bandgap; 2D semiconductors.

Keynote Speakers

Jongwook KIM

Assistant Professor at Ecole Polytechnique
LPMC Laboratory
Palaiseau, France
https://pmc.polytechnique.fr

Biography
J. Kim did his undergraduate study at KAIST (2006), master study at Ecole Central Paris (2009), and PhD at Ecole Polytechnique (2013) on the topic of 'Colloidal dynamics of luminescent anisotropic nanocrystals'. Then he did a post-doctoral research at Lawrence Berkeley National Laboratory (LBNL) (2014~2015) and Univ. of Texas at Austin (2015) on the topic of 'Plasmonic semiconductor nanocrystals and their application to electrochromic smart windows'. Since 2016, he has been continuing his professional career at the condensed matter physics lab (LPMC) at Ecole Polytechnique. He is developing both the chemical synthesis of various types of nanocrystals and their in-situ micro-spectroscopy in biomedical environments and for applications to sustainable energy.

TAILORING ANISOTROPIES IN NANOCRYSTALS

Recent nanocrystal research has discovered the new material properties emerging from size, shape, surface, and interface, which provided a variety of novel functionalities in high-tech devices. Contrarily, the principal impacts of the intrinsic structure of materials, especially the anisotropic physico-chemical properties, are more and more underestimated. Many of the profound earlier studies on bulk materials are overlooked while investigating the same compositions in nanoscale. Such a tendency limits rational understanding of the nanomaterials and their benefits.

In this presentation, it will be discussed the strategies to redesign anisotropic nanomaterials for their nano-properties and intrinsic properties to synergistically collaborate in order to achieve unprecedented functionalities. As a first example, plasmonic semiconductor nanocrystals are presented. The localized surface plasmon resonance (LSPR), commonly investigated with metal nanoparticles, has been controlled with the particle size and shape. Instead of metal, we use semiconductor that allows to synthetically tune the doping level and the structure of matrix. By deliberately controlling the crystal phase and morphology of the semiconductor nanocrystals, we achieve a wide spectral range (from VIS to IR) and post-synthetic modulation of LSPR [1,2]. The second example is the anisotropic rare-earth phosphor nanocrystals. Rare-earths are extensively used for energy sustainability (e.g. windmills, electric cars, batteries, catalysts, and lightings). Their unique properties originate from the protected f-orbital electrons so that the bulk properties are unchanged even in nanoscale. We combine such a stability of the polarized rare-earth luminescence with the dynamic behavior of anisotropically shaped nanocrystals. As-designed rare-earth nanocrystal phosphors can be used to monitor complex motions of micro-biosystems and also for microfluidic analysis essential for health care [3,4].

References
[1] Nano Lett. 15, 5574-5579 (2015)
[2] Nano Lett. 16, 3879-3884 (2016)
[3] Nature Nanotechnology. 12, 914-919 (2017)
[4] JACS. 140, 9512-9517 (2018)

Keywords: synthesis; tungsten oxide; plasmon; lanthanide; phosphor; polarization.

Keynote Speakers

Nathalie LIDGI-GUIGUI

Associate Professor (maîtresse de conférences) at University Sorbonne Paris Nord
LSPM Laboratory
Villetaneuse, France
nathalie.lidgi.guigui.fr
Twitter: @nlidgi

Biography
Nathalie Lidgi-Guigui is a nano-material researcher at the LSPM laboratory of the University Sorbonne Paris Nord. Her main interests go toward molecular plasmonics and contaminant detection.
She received her Ph.D. in 2005 followed by several post-doctoral experiences between 2006 and 2010. During the beginning of her research, she studied the growth of metallic nanostructures and used AFM to measure their interaction with (bio)molecules.
In 2011 she was awarded a lecturer position at the CSPBAT laboratory where she developed ultra-sensitive sensors based on Surface Enhanced Raman Scattering. In 2019 she joined the LSPM where she is working on nanostructuration processes for large scale surface enhanced Raman and Brillouin spectroscopy.

She has a long and enthusiastic experience in innovative teaching and outreach. To mention just a few of her project : «Recrue des Sciences» where the students were asked to make outreach projects. More recently, in 2018 she was invited in the team of «La Physique Autrement» where she developed an original project on clean rooms and nanofabrication. «The nano factory» soon became a board game. Her last project «The metamorphosis of materials» was designed with the purpose of explaining what a process is.

SCIENTIFIC OUTREACH: WHY AND HOW?

Teaching and educating to science are quite an old story. When looking back at how it was done in the past, an important split is observed in France. Before the 19th century, science was part of a general knowledge together with art and literature. Starting around 1850's science was not only separated from humanities but often opposed.

Science was seen as a universal language that could gather everyone when literature was reserved to highly educated people. Paradoxically science teaching was built in a highly discriminatory way, as shown by the low number of students in STEM fields coming from the working classes. This observation led to the development of science outreach.
In the first part of this talk we will see the reason why science outreach started. The second part of the talk will be focused on nowadays motivations for outreach. The diversity of media available in the 21st century offers a wide range of possibilities to communicate. We will consider some examples of recent outreach projects using traditional media such as books, newspaper or exhibition and more moderns one like social media, videos, games, art or smartphones.

Keywords: outreach; science education; media; gamification.

Keynote Speakers

Evelyne MARTIN

CNRS Research Director
ICube Laboratory
Strasbourg, France
macepv.icube.unistra.fr

Biography

Evelyne Martin is Research Director at the ICube laboratory in Strasbourg. Her interest lies in the modeling of phenomena related to nanotechnologies by atomic-scale simulations. She is currently studying heat conduction at the nanoscale for applications in the thermal management of devices and for thermoelectricity. She is the main developer of the approach-to-equilibrium molecular dynamics (AEMD) methodology aimed at studying thermal transport on atomic trajectories substantially shorter than in earlier molecular dynamics methods. This approach was originally applied to silicon nanostructures described by interatomic potentials. AEMD is currently used to investigate heat propagation in amorphous materials and through molecular layers by resorting to first-principles molecular dynamics (DFT-based) simulations. Evelyne Martin has authored more than 50 articles in peer-reviewed international journals. She is currently coordinator of two ANR projects in the field of thermal properties.

ATOMISTIC MODELING OF HEAT PROPAGATION IN NANOMATERIALS

In the present talk, I will report on the use of first-principles molecular dynamics (FPMD) to model heat propagation in nanomaterials. FPMD enables the calculation of atomic trajectories accounting for the electronic structure, obtained from density-functional theory (DFT). Therefore, FPMD can handle bonding situations quantitatively inaccessible to interatomic potentials, such as organic/inorganic interfaces or network-forming disordered materials. Despite the computational cost required by DFT, FPMD has been fruitfully applied to study thermal properties by resorting to the approach-to-equilibrium molecular dynamics (AEMD) strategy [1]. AEMD aims at studying thermal transport by exploiting affordable time trajectories corresponding to transient regimes. After a presentation of the methodology, I will focus on two applications. The first one is an interfacial molecular layer in between heat reservoirs. The thermal resistance of the layer is obtained under the verified assumption that the heat transport is driven by the transfer at the interface. The thermal resistance has two contributions, the first one corresponding to the bond between the molecules and the reservoirs, and the second attributed to heat conduction in the diffusive regime along the molecular chains [2]. Then, I will consider amorphous materials and the search for propagative modes in these systems. To this purpose, the thermal conductivity of two glasses, $GeTe_4$ [3] and $Ge_2Sb_2Te_5$ [4] (a standard material for non-volatile phase-change memories), has been determined as a function of the length in the direction of the heat transport. Our results are substantiated by an extrapolation at large sizes in quantitative agreement with experiments. The length dependence is a compelling evidence of the existence of propagative modes, expected to extend up to 30-50 nm, well above extended range order. Our results have profound implications on the reduction of thermal conductivity at the nanoscale and the thermal management of relevant devices.

References

[1] 1E. Lampin et al, J. Appl. Phys. 114, 033525 (2013)
[2] T.-Q. Duong et al, J. Chem. Phys. 153, 074704 (2020)
[3} T.-Q. Duong et al, soumis à J. Phys. Chem. Lett.
[4] T.-Q. Duong et al, Phys. Rev. Mat. 3, 105401 (2019)

Keywords: thermal properties; first-principles molecular dynamics; transients; molecular layer; disordered materials.

Keynote Speakers

Françoise MASSINES

CNRS Research Director
PROMES Laboratory
Perpignan, France
https://www.promes.cnrs.fr/

Biography

Françoise Massines is a senior scientist at the CNRS Processes, Materials and Solar Energy (PROMES) laboratory located in Perpignan, France. She received a doctorate in Physics from the University of Toulouse (1987). After five years of studying polymer physics at the Canadian National Research Council (CNRC) Industrial Materials Institute (IMI), she joined CNRS in 1989. Since that time her research activities have been devoted to atmospheric pressure plasma surface treatment. Her team at the Toulouse Electrical Engineering Laboratory (LGET- LAPLACE) was initially involved in polymer surface activation studies and later focused on the development of polymer thin film coatings. In 2007, she joined the PROMES laboratory and oriented her activities to atmospheric pressure plasma enhanced chemical vapor deposition (AP-PECVD) for photovoltaic applications focusing on nanocomposite thin film AP-PECVD. She was instrumental in the development of novel large area plasma sources. She is a coordinator of the IRN-NMC [1].

PLASMA BASED SOLUTIONS TO PRODUCE NANOCOMPOSITE THIN FILM COATINGS

As part of the Franco-Canadian network on controlled nanomaterials (IRN NMC)1, different plasma-solutions to produce nanocomposite thin films are investigated. The aim is to embed nanoparticles (NPs) in a plasma polymerized thin film. Different composites are considered: TiO2/polymer, TiO2/SiO2, ZnO/DLC, Porous SiO2/polymer, Au/polymer… The challenge is to form or inject the NPs avoiding their aggregations and to control their quantity and organization in the thin film. The key point is the control of the NPs size, quantity and dispersion in the thin film. Different plasma sources are studied; however, the presentation will be focused on DBD (dielectric barrier discharges) which are atmospheric pressure plasma useful for in-line coating of large surfaces.

Three different configurations are considered: the injection into the plasma of an aerosol of a dispersion of NPs in a polymerisable solvent, in-line formation of NPs upstream of the plasma and NPs formation in the plasma. The aggregation of the NPs contained in an aerosol droplet when the solvent evaporates limits the interest of the first solution even if the functionalization of the NPs avoid this drawback. However, this study allowed to develop simple solutions to control the proportion of NPs in the nanocomposite based on DBD frequency alternation [2-3]. Upstream formation of the NPs is a more promising solution first used in low pressure plasma. It allows the production and the spraying of isolated nanoparticles in a pulsed regime [4]. This concept of reactor-injector is under investigation at atmospheric pressure. Finally, the production of NPs directly in the plasma, during the thin film polymerization appears like a useful and easy to set up solution. Metal/polymer nanocomposite with non-aggregated NPs are made from a spray of metallic salt dissolved in a polymerisable solvent.
To conclude promising safe by design processes to produce controlled nanocomposite on large surfaces are under development and applied to various materials and properties.

References

[1] *https://www.gdri-nanomateriaux.org/*
[2] Brunet P. *et al*., Langmuir, 2018, 34 (5), pp 1865–1872
[3] Profili J. *et al* Journal of Applied Physics **120**, 053302 (2016); *https://doi.org/10.1063/1.4959994*

Keywords: safe by design hybrid process; in line plasma process; nanocomposite; thin film; atmospheric pressure.

Keynote Speakers

Normand MOUSSEAU

Professor at Université of Montréal
Energy Trottier Institute - Department of Physics
Montréal, Canada
normandmousseau.com

Biography

Normand Mousseau is professor of physics at Université de Montréal and academic director of the Trottier Energy Institute. He holds a Ph.D. in physics from Michigan State University and he pursued post-doctoral studies at the University of Oxford and Université de Montréal. He was professor at Ohio University before moving to his current position in 2001. His work focuses on the atomistic kinetics of complex materials and biomolecules, with more than 180 scientific articles. Over the years, he has developed numerous simulation methods, such as the activation-relaxation technique (ARTn) and kinetic ART, for exploring the energy landscape of these materials and accessing experimental time scales. His codes are used by tens of groups from around the world.

He intervenes regularly on energy, climate and questions regarding science and society and has authors numerous books on these topics. In 2013, he co-chaired Quebec's Commission on energy issues. His latest book « Pandémie. Quand la raison tombe malade» was published by Éditions du Boréal in Novembre 2020.

UNDERSTANDING THE KINETICS OF FORMATION OF NANOSTRUCTURES THROUGH ENERGY SURFACES

Atoms move and assemble following local rules that can be understood, in a collective sense, as a walk of a system on an energy surface that describes its physics. While this concept is a useful way to approach often complex atomistic kinetics, this high-dimensional construction remains challenging to fully picture and characterize quantitatively. In recent years, many tools have been developed to explore, describe and classify the energy landscape of complex materials. For example, using various exploration methods, such as the activation and relaxation technique (ART nouveau) — a very efficient open-ended transition-point search method— and kinetic ART — an off-lattice kinetic Monte Carlo algorithm with on-the-fly catalog building, we have attempted to conduct exhaustive sampling in various systems, ranging from crystalline metals with amorphous semiconductors. The results of these studies allow us to better understand the diversity of diffusion mechanisms .In this presentation, I will rapidly provide an overview of these and other numerical and theoretical approaches developed to characterize the energy landscape of complex systems and nanostructures.

Building on our recent work that explains the correlations between the diffusion barrier and the prefactor, a correlation called "compensation law" or "Meyer-Neldel law", I will also discuss why it is necessary to go beyond the energy mapping to include entropic effects to provide a more accurate description of the atomistic kinetics of nanostructured materials.

Keywords: atomistic kinetics; energy surface; activation-relaxation technique; kinetic ART; kinetic Monte Carlo; Meyer Neldel Law; formation of nanostructures; disordered materials.

Keynote Speakers

David MUÑOZ-ROJAS

CNRS Research Director
LMGP Laboratory
Grenoble, *France*
https://sites.google.com/site/workdmr/

Biography

David Muñoz-Rojas received his degree in Organic Chemistry at the Instituto Químico de Sarrià (IQS, 1999) and his PhD in Materials Science (2004) at the Instituto de Ciencia de Materiales de Barcelona. Thereafter, he worked as a postdoc at the Laboratoire de Réactivité et Chimie des Solides in Amiens, the Research Centre for Nanoscience and Nanotechnology in Barcelona and at the University of Cambridge. He is currently a CNRS researcher at Laboratoire des Matériaux et du Génie Physique in Grenoble. His research focuses on using and developing cheap and scalable chemical approaches for the fabrication of novel functional materials for electronic and optoelectronic applications. In particular, he has pioneered the development of the novel SALD technique for the deposition of active components for optoelectronic devices. He is currently developing SALD further to extend the possibilities and fields of application of this exciting technique through several ANRs (one as coordinator), regional and local projects, and a FET Open project that he coordinates. He (co)authored 78 publications, 6 book chapters, coedited a book and is (co)inventor of 6 patents.

SPATIAL ATOMIC LAYER DEPOSITION: A HIGH-THROUGHOPUT, OPEN-AIR TECHNIQUE ALLOWING THE DEPOSITION OF PATTTERNED FUNCTIONAL MATERIALS

Within the materials deposition techniques, Spatial Atomic Layer Deposition (SALD) is gaining momentum since it is a high throughput and low-cost alternative to conventional ALD. SALD relies on a physical separation (rather than temporal separation, as is the case in conventional ALD) of gas-diluted reactants over the surface of the substrate by a region containing an inert gas.[1] Thus, fluid dynamics play a role in SALD since precursor intermixing must be avoided in order to have surface-limited reactions leading to ALD growth, as opposed to CVD growth. Fluid dynamics in SALD mainly depend on the geometry of the reactor and its components.

While care is normally taken to prevent precursor crosstalk when using SALD, we have shown that the spatial separation principle can also be applied to perform CVD reactions (SCVD), i.e. growth not limited to the surface, yielding yet faster deposition rates while maintain the film quality and conformality typical of ALD and SALD. [2,3] We have also shown that selective deposition can be achieved by working in SCVD mode. In this new approach to area-selective deposition (ASD), the depositions are performed in static mode (i.e. no relative movement between the reactor and the substrate), and Computational Fluid Dynamics (CFD) simulations are used to control de effect of the differnt deosition parameters on the SCVD mode. [4]

In this presentation we will show how close-proximity SALD based on a manifold injection head working in the open air can be tuned to deposit custom patterns without the need of pre-patterning steps. This is achieved by using the system in static SCVD mode and by a proper design of the injection head using 3D printing. We will also show other new approaches to ASD developed with our SALD system and how it can be tuned to perform 3D printing of functional materials

References

[1] 1. Muñoz-Rojas, et al. Spatial Atomic Layer Deposition. *in Intech open 1* (2019). doi:10.5772/32009
[2] Musselman KP, Muñoz-Rojas et al. Rapid open-air deposition of uniform, nanoscale, functional coatings on nanorod arrays. Nanoscale Horiz. 2017 2(2):110–7.
[3] Hoye RLZ, Muñoz-Rojas D, et al.Modeling of Uniform Complex Metal Oxides by Close-Proximity Atmospheric Pressure Chemical Vapor Deposition. ACS Appl Mater Interfaces 2015;7:10684–10694.
[4] Masse de la Huerta, C., et al. Influence of the Geometric Parameters on the Deposition Mode in Spatial Atomic Layer Deposition : A Novel Approach to Area-Selective Deposition. Coatings 9, 5 (2018).

Keywords: thin films ; transparent conductive materials; energy materials; spatial atomic layer deposition; 3D printing; functional materials.

Keynote Speakers

Bernd NOWACK

Professor at EMPA Laboratory
TSL Laboratory
St. Gallen, Switzerland
www.empa.ch/nowack

Biography

Prof. Dr. Bernd Nowack holds a MSc. (1992) and a PhD (1995) in environmental sciences from ETH Zürich. After research stays at the Johns Hopkins University in Baltimore, USA, Eawag and ETH Zürich, he is leading since 2007 the «Environmental Risk Assessment and Management» group at Empa, the Swiss Federal Laboratories for Materials Science and Technology. He is also adjunct professor in the Department of Environmental Systems Science at ETH Zurich. His current research deals with the environmental risks of engineered nanomaterials, nanobiomaterials and microplastics, comprising a wide spectrum of different approaches, e.g. material flow modeling, environmental risk assessment; experimental studies about release from products. He has published 185 peer-reviewed publications and has an h-factor of 68. He acted as co-advisor of 25 PhD projects, is co-Editor-in-Chief of NanoImpact and Associate Editor of *Environmental Pollution*. He is listed since 2014 each year as "Highly Cited Researcher".

ADVANCES IN ENVIRONMENTAL RISK ASSESSMENT OF ENGINEERED NANOMATERIALS

For a quantification of the environmental risks of engineered nanomaterials (ENM), information on both hazard and exposure needs to be available. Whereas many ecotoxicological studies provide data for hazard assessment, no specific measurements of ENM in environmental systems are available. Modeling has therefore been used since many years to obtain environmental exposure information. Recently several improvements of material flow models have increased our confidence in the results of these models: the inclusion of dynamic aspects and the separation of the flows into different forms of ENM. Dynamic material flow analysis is able to quantify the accumulated ENM amount in environmental sinks and can be used to predict future emission scenarios. Most existing models for assessing the releases of ENMs into the environment are based on the assumption that ENM remain in their pristine forms during their whole life cycle. It is known, however, that this is not always the case as ENMs are often embedded into solid matrices during manufacturing and can undergo physical or chemical transformations during their life cycle, e.g. upon release to wastewater. We therefore developed a method to systematically assess the forms in which ENM exist throughout their life cycle.
The improved material flow models provide a starting point for quantitative environmental risk assessments. A form-specific assessment resulted in predicted environmental concentrations for anatase vs. rutile nano-TiO_2, single-wall vs. multi-wall CNTs and α- vs. γ-nano-Al_2O_3 that varied by a factor of 2 to 13. Additionally, the material-specific predicted no-effect concentrations for the nano-forms were derived.
For nanocellulose, a prospective environmental risk assessment was performed, indicating that by 2025 there is no environmental risk within the surface water compartment, even assuming a compound annual growth rate of 19% for nanocellulose production in upcoming years.
Coupling the form-specific flow assessment with form-specific hazard assessments, a first specific risk assessment for different released forms of nano-Ag, nano-ZnO and nano-TiO_2 could be obtained, i.e. considering pristine, dissolved, transformed, and matrix-embedded forms.

Keywords: engineered nanomaterials; environmental exposure; environmental risk assesment.

Keynote Speakers

Milo SHAFFER

Professor at Imperial College London
Departments of Materials and Chemistry
London, United Kingdom
www.imperial.ac.uk/people/m.shaffer

Biography

Professor Milo Shaffer is Professor of Materials Chemistry at Imperial College and was co-Director of the London Centre for Nanotechnology (2010-2020). He is a leader in nanomaterials synthesis, modification, and hierarchical assembly, for applications including composites and electrochemical devices. He has pioneered the development of redox methods for nanocarbon processing, and at a larger scale, he developed new hierarchical combinations of nanocarbons as structural electrochemical energy storage electrodes (*www.sorcerer.eu*). He was an investigator on a major UK Programme Grant developing high performance ductile composites (*www.hiperduct.ac.uk*), and now leads the UK NextCOMP program on next generation composites in compression (*www.nextcomp.ac.uk*). He was awarded the RSC Meldola Medal (2005) and the RSC Corday-Morgan Prize (2014). He has published around 240 peer reviewed journal papers and 30 patents, with 26700 citations, and an h-index (GS) of 72.

VERSATILE AND SCALABLE APPROACHES TO CHEMICAL PROCESSING OF NANOCARBONS

Individual perfect nanocarbon structures have exceptional properties; the challenge is often how to exploit their potential in real macroscopic systems. Chemical functionalisation is critical to a wide range of nanocarbon technologies, but needs to be versatile and applicable at scale. Existing approaches tend to rely on liquid phase reactions, often requiring damaging sonication or lengthy work up through filtration or centrifugation. The formation of individualized functionalised single wall nanotubes (SWNTs) and graphenes is a particular challenge.

One particularly promising approach, relies on reductive charging to form pure charged nanocarbon anions which can be redissolved, purified, or optionally functionalised, whist avoiding the damage typically associated with sonication and oxidation based processing. This simple system is effective for a host of nanocarbon materials including MWCNTs, ultralong SWCNTs, carbon blacks, graphenes, and related materials. The resulting nanocarbon ions can be readily chemically grafted for a variety of applications. The chemistry of these discrete nanions raises interesting fundamental questions, but is also practically useful. Dispersed nanocarbon related materials can be assembled, by electrophoresis, cryogel formation, or direct cross-linking to form Joule heatable networks, protein nucleants, supercapacitor electrodes, and catalyst supports, particularly suited to combination with other 2d materials, such as layered double hydroxides. Comparative studies allow the response of nanocarbons with different dimensionalities to be assessed to identify fundamental trends and the most appropriate form for specific situations. The use of nanostructured materials often provides opportunities to simultaneously address otherwise conflicting materials property requirements, such as high ionic conductivity with high stiffness, or self-healing with high absolute strength.

References

Clancy, Shaffer, et al, Charged Carbon Nanomaterials: Redox Chemistries of Fullerenes,Carbon Nanotubes, and Graphenes, Chem.Rev., 118, 7363−7408, 2018

Keywords: nanocarbon; nanotubes; graphene.

Keynote Speakers

Peter Wiecha

CNRS Researcher
LAAS Laboratory
Toulouse, *France*
https://pmc.polytechnique.fr

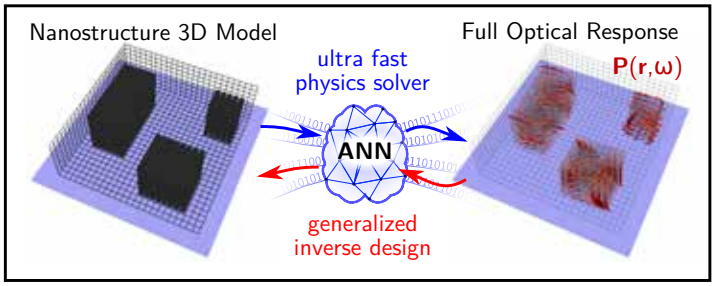
Biography

Peter Wiecha's main research interests are the interaction of light with subwavelength small structures, and applications of artificial intelligence in nano-optics and photonics. He studied physics at the Technical University of Munich in Germany where he wrote his Diploma thesis at the Walter Schottky Institute. In 2016 he obtained his PhD from the Université Paul Sabatier of Toulouse for a work on non-linear optical processes in nanostructures. After a postdoc at CEMES-CNRS Toulouse on the interaction of magnetic quantum emitters with non-magnetic nanostructures, he held a German DFG research fellowship between 2018 and the beginning of 2020, working with Prof. Otto Muskens at the University of Southampton on deep learning for nano-photonics. Since 2020 he is a permanent CNRS researcher (CRCN) at LAAS in Toulouse.

DEEP LEARNING MEETS NANO-OPTICS

Deep artificial neural networks (ANNs) have shown tremendous potential in solving problems that are very difficult to approach with conventional algorithms. Therefore, researchers from manifold areas including medicine, biology and physics increasingly use methods of AI to approach problems that were formerly hard or even impossible to solve [1]. ANNs can be very efficient in the analysis of large (scientific) datasets from simulations, microscopy, tomography or spectroscopy among others [2-5]. ANNs can learn to phenomenologically solve physical models with unprecendented speed and have proven to be able to predict approximate solutions to notoriously hard inverse problems [3-4]. In several proof-of-principle studies ANNs have been recently used for the on-demand conception of photonic devices and meta-materials [2].

I will introduce the core concepts of ANNs and how they can be employed to tackle problems in (nano-)optics, allowing to drastically accelerate numerical simulations or to solve inverse problems. I will describe how an ANN can be taught a generalized intuition of nano-scale light-matter interaction [4]. I will also show how ANNs can help in the evaluation of experimental data in nano-optics. An example is the combination of photonic nanostructures with ANNs for optical information storage, allowing to overcome a major constraint for the achievable data-density due to the optical diffraction limit [5].



© Illustration of an artificial neural network predicting the full, complex fields inside nanostructures of arbitrary shape, using as input a 3D discretization of the geometry. The model can be used e.g. as fast surrogate model for accelerated inverse design.
P. Wiecha, 2020

References

[1] Y. LeCun, Y. Bengio, and G. Hinton, Nature, vol. 521, no. 7553, pp. 436–444, 2015
[2] R. S. Hegde, Nanoscale Adv., vol. 2, no. 3, pp. 1007–1023, 2020
[3] U. Kürüm, P. R. Wiecha, R. French, and O. L. Muskens, Opt. Express, vol. 27, no. 15, pp. 20965–20979, 2019
[4] P. R. Wiecha and O. L. Muskens, Nano Lett., vol. 20, no. 1, pp. 329–338, 2020
[5] P. R. Wiecha, A. Lecestre, N. Mallet, and G. Larrieu, Nature Nanotechnology, vol. 14, pp. 237–244, 2019

Keywords: nano-optics; deep learning; numerical methods for photonics; plasmonics.

SPECIAL SESSIONS

- Innovation in Nanoscience
- Art & Science

SATELLITE EVENTS

- Workshop MEMO
- GdR NACRE Plenary 2021
- NS-CPU Meeting 2021

Art & Science Session

When art & science meet

Tuesday November 23rd, 2021

13:15 – 14:15: Round-table*

"***Bringing Science, Art and Society together to question our interdependence and technological risks***"

Sophie CARENCO, CNRS researcher at LCMCP laboratory (Paris)
Jean-Marc CHOMAZ, CNRS research director at LadHyx Laboratory (Plaiseau)
Patrick CHASKIEL, Professor at Univ. Toulouse Jean Jaurès at CERTOP Laboratory (Toulouse)

19:00 – 19:30: Plenary Presentation

Jean-Marc CHOMAZ (CNRS – LadHyX, France)

-

Wednesday November 24th, 2021

13:15 – 14:15: Round table*

"The Dust Museum: illustration of a collaborative project between an artist and scientists"

Giancarlo FAINI, CNRS research Director at C2N Laboratory (Palaiseau)
Michel PAYSANT, plastic artist
Christian ULYSSE, CNRS research Engineer at C2N Laboratory (Palaiseau)

-

Thursday November 25th, 2021

15:30 – 16:00: Best Picture Awards Ceremony

Saint-Exupéry Amphitéâtre

** maximum capacity: 15 attendees - Latécoère Room*

A specific area will be dedicated to discussions on «Art & Science» during the 3-day congress in the posters and exhibition stands area. Come to our stand and vote for your favorite image !!

Innovation in Nanoscience Session

From invention to innovation

Wednesday November 24th, 2021*

11:00 - 12:00: Feedback from an entrepreneur

Denis BARBIER, CEO of Microlight3D

12:00 - 13:00: Roundtable

"The role of the local ecosystem in supporting the technology transfer"

Denis BARBIER, CEO of Miccolight3D
Etienne PALLEAU, Senior Lecturer at INSA Toulouse – LPCNO
Audrey SAINT-LARY, Direction Business Management, Toulouse Tech Transfer
Laure VAILLIER, Business Lawyer – Partnership and Technology Transfer Department – CNRS DR Occitanie Ouest

** maximum capacity: 30 attendees*

A specific area will be dedicated to discussions on Technology Transfer during the 3-day congress in the posters and exhibition stands area.

VISIT OUR STANDS & DISCOVER STAKEHOLDERS INVOLVED IN

- **TECHNOLOGY TRANSFER PROCESS**
- **START-UP IN NANOSCIENCE**
- **NANOTECH INDUSTRY**

C'NANO INNOVATION cnrs TOULOUSE TECH TRANSFER microlight3D

Satellite events

WORKSHOP MEMO

Monday, November 22th & Tuesday, November 23th, 2021

Nanocar Race II – Remote control testing

Remote control connection trial for LT-UHV STM manipulations from CEMES – CNRS Laboratory to the officially registered team's lab.

Location: CEMES – CNRS Laboratory in Toulouse (Saouzelong Subway station)

Tuesday, November 23th, 2021

17:30 – 18:00: Plenary lecture

Francesca MORESCO (TU Dresden - CFAED, Germany), Coordinator of FET OPEN MEMO Project
Presentation entitled "*Mechanics with molecules: motors and gears working under the STM tip*"

18:15 – 19:30: NanoCar Race II official Presentation

Presentation by the 8 teams officially registered to Nanocar Race II (5 to 8 mn each)
Chairperson: Christian JOACHIM (CNRS – CEMES, France)

Location: Pierre Baudis center - Diamant room

19:30: MEMO Dinner among nanocar Race II teams

Location: central Toulouse (*location to be determined*)

Wednesday, November 24th & Thursday, November 25th 2021

Conférence on Single molecule mechanics on a surface: gears, motors and cars

Location: Pierre Baudis center - Diamant room

Satellite events

GdR NACRE PLENARY

Location: Pierre Baudis congress center - Diamant Room

Tuesday November 23rd, 2021

13:00 - 15:00: Poster session

This session is specifically dedicated to PhD students and post-doctorants.

15:00 - 19:00: Invited conferences and discussion

15:00 - 15:05 - Fabrice GOURBILLEAU (CNRS - CIMAP, Caen) - From GdR NACRE to GdR Nano-impact

15:05 - 15:30 - Corinne CHAMPEAUX (Univ. Limoges - IRCER, Limoges)
Nanoparticles Source and Nanocomposites Deposition towards Multifunctional Tunable Materials

15:30 - 15:55 - Ignazio ROPPOLO (Politecnico di Torino- Department of Applied Sciences & Technology, Italy)
Functional nanocomposites obtained via light-activated 3D printing

15:55 - 16:20 - Thierry TALIERCIO (Univ. Montpellier - IEM, Montpellier)
Heavily doped semiconductor for bio-sensing and active plasmonics

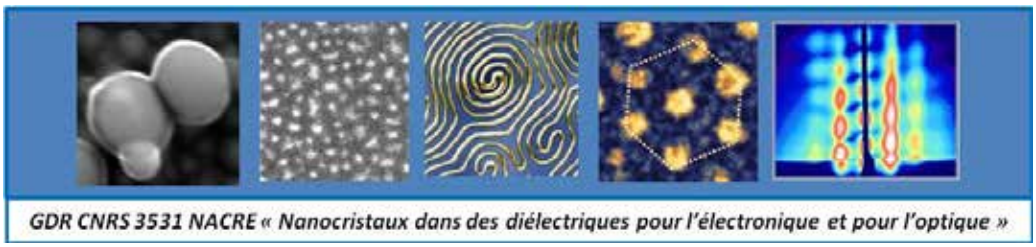
16:20 - 16:45 - Jérome LABILLE (CNRS - CEREGE, Aix en Provence)
Anticipate risk at each stage of the life cycle to design a safe-by-design nanomaterials

16:45 - 17:10 - Thierry BARON (CNRS- LTM, Grenoble)
Sustainable apporaches in IoT devices NEED for IoT

17:10 - 17:30: Coffee Break

17:30 - 17:55 - Patrick CHASKIEL (Univ. Toulouse Jean Jaurès- CERTOP, Toulouse)
Innovating Risks. Characterization or Standardization of Occupational Risks of Nanomaterials?

18:00 - 19:00 - Open Discussion on the project of new GdR Nano-impact



Satellite events

GdR NANOSCIENCES EN CHAMP PROCHE SOUS ULTRA VIDE

Location: Pierre Baudis congress center - Argos Room

<table>
<tr><th></th><th>Tuesday,
November 23rd</th><th>Wednesday,
November 24th</th><th>Thursday,
November 25th</th></tr>
<tr><td>9:00</td><td rowspan="6"></td><td>Axis 3</td><td>Axis 5</td></tr>
<tr><td>9:30</td><td>Axis 4</td><td>Axis 1</td></tr>
<tr><td>10:00</td><td>Axis 5</td><td>Axis 2</td></tr>
<tr><td>10:30</td><td colspan="2">Break</td></tr>
<tr><td>11:00</td><td>Axis 1</td><td>Axis 3</td></tr>
<tr><td>11:30</td><td rowspan="2">Industrial partners session</td><td>Axis 4</td></tr>
<tr><td>12:00</td><td>Closing session</td></tr>
<tr><td>12:30 - 14:00</td><td>Arrival</td><td colspan="2">Lunch</td></tr>
<tr><td>14:00</td><td>GdR Presentation</td><td>Axe 4</td><td rowspan="12">Departure</td></tr>
<tr><td>14:30</td><td>Axis 1</td><td>Axe 5</td></tr>
<tr><td>15:00</td><td>Axis 2</td><td>Axe 1</td></tr>
<tr><td>15:30</td><td>Axis 3</td><td>Axis 2</td></tr>
<tr><td>16:00</td><td colspan="2">Break</td></tr>
<tr><td>16:30</td><td>Axis 4</td><td>Axis 3</td></tr>
<tr><td>17:00</td><td>Flash poster presentation</td><td>Axis 4</td></tr>
<tr><td>17:30</td><td>Plenary session Francesca MORESCO</td><td rowspan="2">CEMES - PicoLab Visit</td></tr>
<tr><td>18:00</td><td rowspan="2">Presentation by the 8 teams of the Nanocar Race II</td></tr>
<tr><td>18:30</td><td></td></tr>
<tr><td>19:00</td><td>Cocktail dinner & posters</td><td>Gala dinner*</td></tr>
</table>

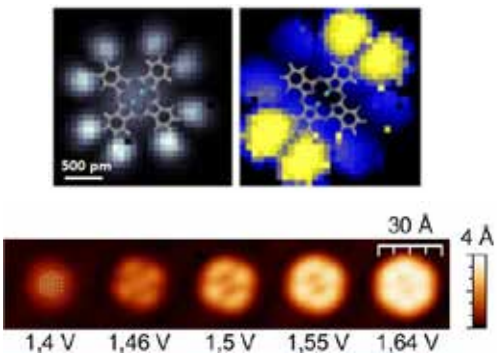
Axis 1 - Electronic and vibrational structure of individual nanostructures and nano-objects

Axis 2 - Light-matter interactions at the nanoscale

Axis 3 - Study of local magnetism and of quantum states

Axis 4 - Electronic and electrostatic properties and charge transfer

Transversal axis - Historical concepts and numerical tools



*The GALA dinner will be held on Wednesday evening at the restaurant « *La cuisine de Jean* », 18 avenue Albert Bedouce, 31400 Toulouse, Metro SAUZELONG (line B)

PhD Thesis Awards C'Nano 2021

PhD Thesis Awards

Fundamental research

Nikita KAVOKINE

PhD from ENS Paris

LPENS Laboratory *(CNRS, ENS Paris, Sorbonne Univ., Univ. Paris)*

Many-body effects in nanoscale fluid transport

PhD thesis director: Lydéric BOCQUET (CNRS)

Ekaterina MAMONTOVA

PhD from University of Montpellier

ICGM Insitute *(CNRS, Univ. Montpellier, ENSC Montpellier)*

Multifunctional nanomaterials based on coordination networks

PhD thesis director: Joulia LARIONOVA (Univ. Montpellier)

PhD thesis supervisor: Jérôme LONG (Univ. Montpellier)

Applied research

Soukaina ES-SAIDI

PhD from Troyes Technology University

L2n Laboratory *(CNRS, UTT)*

Optimization of the Optical Response of Diffractive Metallic Gratings: Application to Plasmogram technology

PhD thesis director: Demetrio MACIAS (UTT)

PhD thesis supervisor: Sylvain BLAIZE (UTT)

PhD Thesis Awards

Interdisciplinary research

Ye WANG

PhD from University of Strasbourg

ISIS Laboratory *(CNRS, Univ. Strasbourg)*

Molecular science and two-dimensional materials: hybrid systems for opto-electronics

PhD thesis director: Paolo SAMORI (Univ. Strasbourg)

Pierre GAFFURI

PhD from Grenoble Alpes University

LMGP Laboratory *(CNRS, Grenoble Alpes Univ.)*

NEEL Institute (CNRS)

New materials for eco-efficient white LEDs : ZnO nanowire-based heterostructures and rare-earth-free aluminium borates phosphors

PhD thesis director: Vincent CONSONNI (CNRS)

PhD thesis supervisor: Estelle APPERT (INP Grenoble) & Mathieu SALÜN (UGA)

Islam ZMERLI

PhD from Paris-Saclay University

IGPS Institute *(CNRS, Paris-Saclay Univ.)*

Conception et caractérisation de nanoparticules bio-inspirées à effet bimodal pour le traitement du cancer de l'oesophage

PhD thesis director: Ali MAKKY (Paris-Saclay Univ.)

PhD thesis supervisor: Jean-Philippe MICHEL (Paris-Saclay Univ.)

LIST OF POSTERS

List of Poster Presentations

P1 - NANO-OPTICS & NANOPHOTONICS

P1-01	Efficient design of mesoscopic self-collimating photonic crystals	Sergio Iván FLORES ESPARZA • *Toulouse Paul Sabatier Univ. - LAAS, France*
P1-02	Ultrafast dynamics of the near-field topography around gold nanoparticles	Syrine GUEFFRACHE • *CentraleSupelec - LuMIn, France*
P1-03	Coupled opto-mechanical oscillators on chip towards applications	Robert HORVATH • *CNRS - C2N, France*
P1-04	Gold Nanocylinders on Gold Film as a Multi-spectral SERS Substrate	Wafa SAFAR • *Le Mans Univ. IMMM, France*
P1-05	Design of a poly-silicon nano-grating for enhancing near-infrared detection of CMOS image sensors	Elie COBO • *ISAE-SUPAERO - DEOS, france*
P1-06	Micro-emitters fabricated by Pulsed Laser Deposition liftoff processing in rare earth doped oxide layers	Alban GASSENQ • *Univ. of Lyon - ILM, France*
P1-07	Single-Particle Tracking with Scanning Non-Linear Microscopy	Théo TRAVERS • *Univ. of Angers - MOLTECH-Anjou, France*

P2 - 1D & 2D NANOMATERIALS

P2-01	Growth and mechanical properties mapping of ZnO nanowires	Vincent SALLET • *CNRS - GeMAC, France*
P2-02	Study of Nanostructural, morphologic, and Optical properties for nanocrystalline La1-xBixNi0.5Ti0.5O3 (x=0.0, x=0.2).	Sirine GHARBI • *Sorbonne Univ. - PHENIX, France*
P2-03	Single crystalline Te and Ag2Te nanostructures for thermoelectric conversion	Karen AL HOKAYEM • *Univ. of Lorraine - IJL, France*
P2-04	Structural characterization, magnetic and magnetocaloric properties of Pr 0.8 K 0.2 MnO 3: A comparison between solid-solid state and sol- gel process	Jamel KHALIFA • *Univ. of Sax - Faculty of Science*
P2-05	Gallium doping of ZnO nanowires by chemical bath deposition	Pierre GAFFURI • *UGA - LMGP & Néel Institute, France*
P2-06	On-surface synthesis of polymeric chains through C-S activation	Nicolas GIACOLETTO • *AMU - ICR, France*

P3 - NANO FOR IMAGING, DIAGNOSIS AND THERAPY

P3-01	Detection of low amount of target pollutants in wastewater samples with dye doped, ECL-active silica nanoparticles	Frederica MELINATO • *CNRS - CEISAM, France*
P3-02	Development of a method to access the interactions between gaz/ liquid and biological interfaces	Irem DEMIR • *INSA Toulouse - TBI, France*
P3-03	Structural study of DNA interaction by Surface Enhanced Raman Scattering	Wafa SAFAR • *Le Mans Univ. - IMMM, France*
P3-04	Bio-functionalized magnetic nanoparticles to study magnetic intra-lysosomal hyperthermia (MILH) on pancreatic endocrine cancer cells	Stéphane MORNET • *CNRS - ICMCB, France*
P3-05	MRI-PET contrast agents based on Iron oxide Nanoparticles	Julien BOUDON • *Univ. Bourgogne - ICB, France*
P3-06	Development of a method to access the interactions between gaz/ liquid and biological interfaces	Céline FORMOSA-DAGUE • *CNRS - TBI, France*
P3-07	Zwitterionic nanoparticles for manipulating chromosomes in living cells	Fanny DELILLE • *CNRS - LPEM, France*
P3-08	Remote magneto-mechanical destruction of cancer-associated fibroblasts using targeted ultra-small superparamagnetic iron oxide nanoparticles and low frequency magnetic fields	Véronique GIGOUX • *INSERM - LPCNO, France*
P3-09	The Nature of Polymeric Glyco-Ligands Controls the Signal Outputs for Plasmonic Gold Nanorods Biosensors in Complex Media	Alessia PANCARO • *University of Hasselt - VITO, Belgium,*
P3-10	Soft fluorescent organic nanoparticles as nanocarriers for PDT	Isabelle SASAKI • *CNRS - ISM, France*
P3-11	Functional Imaging with Higher-Dimensional Electrical Data Sets	Mickael FEBVRE • *Bruker, France*

P4 - NANOCHEMISTRY & NANOPARTICLES

P4-01	Nanoemulsions for biomedical applications: drug-loaded size-controlled biodegradable polymeric nanoparticles	Javid ABDURAHIM • *CNRS - ICS, France*
P4-02	Early Transition Metal Nanocarbides and Nanohydrides by Solid-State Metathesis initiated at Room Temperature	Rémi ANDRE • *CNRS - ICMCP, France*
P4-03	Synthesis, self-assembly and sintering of silver nanocrystals for electronics	Lucien ROACH • *CNRS - ICMCB, France*
P4-03	Liquid-liquid phase separation during the precipitation of cerium oxalate	Maxime DURELLE • *CEA - LIONS, France*
P4-05	Polyvinylpyrrolidone (PVP) impurities drastically impact the outcome of nanoparticle syntheses	Nouha EL AMRI • *INP Toulouse - LGC, France*
P4-06	Molten salts synthesis of Ti4O7 and compositional core-shell V3.7Ti0.3O7 Magneli phases nanoparticles: a novel approach	David PORTEHAULT • *CNRS - LCMCP, France*
P4-07	Synthesis inspired by geology towards new boron-based nanomaterials	Fernando IGOA • *Sorbonne Univ. - LCMCP, France*
P4-08	New platinum-porphyrin self-assembled nanostructures	Nataliia MARCHENKO • *INSA Toulouse - LPCNO, France*
P4-9	Hydrodeoxygenation of biomass-derived molecules using magnetic induction	Irene MUSTIELES MARIN • *CNRS - LPCNO, France*
P4-10	Synthesis of supported FeNi nanocatalysts by an organometallic route	François ROBERT • *CNRS - LCC, France*
P4-11	Ru nanoparticles for photocatalytic hydrogen evolution	Nuria ROMERO • *CNRS - LCC, France*
P4-12	Chain formation by dehydrogenation of curved polyaromatic hydrocarbons	Yuri TANUMA • *French Ambassy in Japan - IMN, France*
P4-13	Study of synthesis condition for pure and compound metal nanoparticle	Flavien VALENSI • *Toulouse Paul Sabatier Univ. - LAPLACE, France*
P4-14	One-step Production of Polyelectrolyte Nanoparticles	Madeline VAUTHIER • *Univ. of Strasbourg - ICS, France*
P4-15	Metal welding at room conditions of Cu@Ni bimetallic nanowire networks	Andela KRIZAN • *CNRS - ICMCB, France*
P4-16	Synthesis of Silicon Nanoparticles from an Azadipyromethene Coordination Complex	Megan PARKER • *CNRS - ICMCB, France*
P4-17	Synthesis of silicon-based nanoparticles by thermal decomposition of a silicon complex in supercritical n-hexane	Alexander CASTRO GRIJALBA • *CNRS - ICMCB, France*
P4-18	Coating cobalt nanorods with gold containing shells	Béatrice MUZZI • *CNRS - ICMCB, France*
P4-19	TiO2 supported catalysts for CO2 hydrogenation to C2+ products	Canio SCARFIELLO • *INSA Toulouse - LPCNO, France*
P4-20	Solvent Viscosity and Surface Tension in the Control of Two Dimensional Convectively Assembled Nanoparticle Films	Lucien ROACH • *CNRS - ICMCB, France*
P4-21	Rh single atoms highly dispersed on g-C3N4 as an alternative to the use of conventional catalysts for hydroformylation reaction	Dolores JURADO FUENTES • *CNRS - LCC, France*
P4-22	Supercrystal assembly by predictive approach	Clémence CHINAUD-CHAIX • *CNRS - LPCNO, France*
P4-23	Design, Production of Carbon Quantum Nanodots for Biotechnological Applications	Serge LEFRANT • *Attonucléi, France*
P4-24	Are the hot electrons in Silver nanoparticles dimer formed near the hot spot ?	Maxime MAURICE • *Perpignan Via Domitia Univ. - PROMES, France*
P4-25	Aerogels and hybrid materials using indium phosphide nanocrystals towards heterogeneous photocatalysis	Kaltoum BAKKOUCHE • *INSA Toulouse - LPCNO, France*
P4-26	Metal nanostructures formed by electrodeposition in microchannels: study of the growth mechanism and application to SERS	Fabien CHAUVET • *Toulouse Paul Sabatier Univ. - LGC, France*
P4-27	Indium amidinate as a novel precursor for the synthesis of indium phosphide nanocrystals	Fabio FERRARI • *INSA Toulouse - LPCNO, France*
P4-28	Synthesis of metallic nanoparticles at the liquid/liquid interface in Ouzo type emulsions	Olivier GAZIL • *Polytechnic Montréal - ISCR, France*

List of Poster Presentations

P4 - NANOCHEMISTRY & NANOPARTICLES (SUITE)

P4-29	Understanding the “Ouzo effect” and the influence of Nanoparticles in Ouzo systems	Déborah IGLICKI • *Univ. Rennes 1 - ISCR, France*
P4-30	Molecular Chemistry Tools for the Rational Development of Nanocatalysts	Laurent PERES • *CNRS - LCC, France*
P4-31	Surface modifications of detonation nanodiamonds and overproduction of hydroxyl radicals and solvated electrons under irradiation	Florent DUCROZET • *Paris-Saclay Univ. ICP, France*

P5 - MULTIFUNCTIONAL NANOCOMPOSITES

P5-01	Effect of pulsed precursor injection on the deposition of pp-HMDSO thin film in a Dielectric Barrier Discharge	Laura CACOT • *Toulouse Paul Sabatier Univ. - LAPLACE, France*
P5-02	Doubly thermo-responsive copolymers in ionic liquid	Nancy LAUTH-DE-VIGUERIE • *Toulouse Paul Sabatier Univ. - IMRCP, France*
P5-03	Toward the photofabrication of functional nanoarchitectures	Florent RODRIGUEZ • *Univ. of Nantes - CEISAM, France*
P5-04	Tying a synthetic molecular knot in solution using an atomic force microscope	Damien SLUYSMANS • *Univ. of Liège - MolSys, Belgium*
P5-05	A multiscale investigation of nanocomposite dielectric permittivity: application to plasma deposited AgNPs-based nanocomposites	Christina VILLENEUVE-FAURE • *Toulouse Paul Sabatier Univ. - LAPLACE, France*
P5-06	Versatile Design of Multifunctional Microgels from Molecular, Nano- and Microscale Building Blocks for Biomedical Applications	Yu XIAO • *Univ. of Paris - LCBPT, France*
P5-07	Efficient doping of highly doped thin SOI layers by Laser Thermal Annealing processes	Nicolas CHERY • *CNRS - CEMES, France*
P5-08	Electro optic nanocomposites for high performance microwave photonic applications	Zahraa JRADI • *AMU - IETR, France*

P6 - NANOMATERIALS FOR ENERGY

P6-01	Zeolite-Templated Carbon : a Promising Material for Supercapacitors	Sara amar • *Univ. of Bordaux - CRPP, France*
P6-02	Characterization of electrocaloric thin films via Frequency-Domain ThermoReflectance	Layla FARHAT • *ULCO - UDSMM, France*
P6-03	Understanding the origin of the enhanced activity of L2NO4 micro-SOFC cathodes at low temperatures	Alexander STANGL • *CNRS - LMGP, France*
P6-04	DFT investigation of electronic and thermal transport properties in Pb2Bi2Te5	Weiliang MA • *AMU - IMN2P, France*
P6-05	Monte Carlo study of thermal transport in polytype nanowires for thermoelectric applications	Jérôme SAINT-MARTIN • *Paris-Saclay Univ. - C2N, France*
P6-06	Screening of the synthesis route on the structural, magnetic and magnetocaloric properties of La0.6Ca0.2Ba0.2MnO3 manganite...	Haithem BEN KHALIFA • *Univ. of Sax - LT2M, France*
P6-07	Syntheses and characterizations nanoparticl of CuIn1-xFexSe2 chalcopyrite	Khedidja BENAMEUR • *Univ. of Anger - MOLTECH Anjou, France*
P6-08	Optimization of porous metamaterials for enhanced solar steam generation	Lan GAO • *Univ. Gustave Eiffel - ESYCOM, France*

P7 - NANOHEALTH ENVIRONMENT & RISKS

P7-01	Antimicrobial applications of carbon-based polymer-matrix	Laure GIRAUD • *Toulouse Paul Sabatier Univ. - CIRIMAT, France*
P7-02	Impact of carbon nanotubes on an emerging cellular organism: Physarum polycephalum	Manon TERNOIS • *Toulouse Paul Sabatier Univ. - CIRIMAT, France*
P7-03	Chemical and Mössbauer Spectroscopy characterization associated to Oxidative Potential of particulate matter from Brake Wear emissions	Laurence CHEVALIER • *CNRS - GPM, France*
P7-04	Analysis of stability and dispersibility of TiO2 nanoparticles in cell culture media by SMLS and SEM	Matthias SENTIS • *Formulaction, France*

P8 - GDR NACRE

P8-01	Structural and vibrational characterization of lamellar SiP thin films	Alix VALDENAIRE • *Univ. of Lorraine - IJL, France*
P8-02	Controlled synthesis of highly doped Si nanocrystals embedded in SiO2 by low energy ion implantation	Meiling ZHANG • *CSC - CEMES, France*
P8-03	Elaboration of new Transparent Conductive Oxides thin films by magnetron sputtering	Nicolas CHERY • *CNRS - CEMES, France*
P8-04	Basal particulate content in term human placenta and meconium	Laurence CHEVALIER • *CNRS - GPM, France*
P8-05	Impedance spectroscopy of hybrid peptidic homopolymers/ platinum nanoparticles	Louis MERLE • *INSA Toulouse - LPCNO, France*
P8-06	Focused cylindrical vector beams for engineering near and far field optical response of silicon nanospheroids	Martin MONTAGNAC • *CNRS - CEMES, France*

P9 - GDR NANOSCIENCES EN CHAMP PROCHE SOUS ULTRA VIDE

P9-01	Resistance measurement of individual Ag nanowires and interconnects	Maxime BERTHE • *CNRS - IEMN, France*
P9-02	The Water Forming Reaction on Palladium Nanoparticles Studied by Kelvin Probe Force Microscopy	Baptiste CHATELAIN • *AMU - CINaM, France*
P9-03	Tuning the charge density waves and band structure in VSe2 by Na intercalation	Ulysse CHAZARIN • *Univ. of Paris - MPQ, France*
P9-04	Laser-combined scanning tunneling microscopy on low-temperature grown GaAs	Yevheniia CHERNUKHA • *CNRS - IEMN, France*
P9-05	Investigating surface magnetism with the quantum spin states of a molecular probe-tip	Alex FETIDA • *Univ. of Strasbourg - IPCMS, France*
P9-06	Nanoprobe study of the electric field driven insulator-to-metal transition in GaMo4S8	Houda KOUSSIR • *CNRS - CEMES, France*
P9-07	Emergent multifractality in two dimensional weakly disordered superconductor	Mathieu LIZEE • *CNRS - INSP, France*
P9-08	Electronic properties of selective area grown semiconductor heterostructures	Nemanja PERIC • *CNRS - IEMN, France*
P9-09	Study by ARPES of the Rashba effect and Berry curvature in the 2D Ferroelectric thin films of GeTe	Calvin TAGNE KAEGOM • *Univ. of Lorraine - IJL, France*
P9-10	Comportement d'un dérivé de l'azobenzène sur Au(111) exposé à la lumière ultraviolette	Hugo THERSSEN • *CNRS - IEMN, France*
P9-11	Localization induced by defects in 2D correlated systems	Mohammadmehdi TORKZADEH • *Sorbonne Univ. - INSP, France*
P9-12	Banc d'essai Nanoplast	Loranne VERNISSE • *Univ. of Poitiers - Pprime, France*
P9-13	Imaging tunable quantum Hall broken-symmetry orders in charge-neutral graphene	David WANDER • *CNRS - Néel, France*
P9-14	Tabletop 100 mK UHV Scanning Tunneling Microscope	David WANDER • *CNRS - Néel, France*
P9-15	Scanning tunneling microscopy combined with high frequency: Recent devellopement and futur prospects	Marie HERVE • *CNRS - Néel, France*
P9-16	MBE Growth and NC-AFM/KPFM characterization of 2D materials under UHV environment: Graphene and Silicene	Hamza HICHOU • *CNRS - INSP, France*
P9-17	Theoretical Study of the Interactions between an STM Tip and Adsorbates on Au(111) Under External Electric Fields	Hassan DENAWI • *CNRS - CEMES, France*