Tuesday March 18th

3:15 P.M. - 6:30 P.M.

ROOM CD

Program of the session :

Chairs: Andreas REISCH

HOUR	NAME	TITLE
15:15	**Valérie MARCHI** **ISCR - CNRS**	**Luminescent metal nanoclusters for nanosensing in living environment**
15:45	Regina CHIECHIO Dipartimento di Fisica e Astronomia - Università degli Studi di Catania	Gold Nanoclusters for Ultrasensitive and Label-Free DNA Sensing and Biomolecular Detection
16:00	Zied FERJAOUI UTCBS - CNRS	Improved Sensibility in IgG Detection through Signal Amplification of Persistent Luminescence Nanoparticles
16:15	Ester BUTERA MAcSE, UNIVERSITE DE RENNES	Luminescent metal nanoclusters for labelling of biological vesicles
17:00	Marcelina CARDOSO DOS SANTOS I2BC - CEA	Quantum Dot-Based FRET nanosensors to quantify molecular assembly within focal adhesion
17:15	Omar EL-DAHSHAN LCBM/SyMMES - CEA Grenoble	Synthesis and Advanced Characterization of Silver Sulphide Quantum Dots for Bio-Imaging
17:30	Celina MATUSZEWSKA LCMCP - Sorbonne Université	The study of the mechanism of persistent luminescence enhancement in ZnGa2O4: Cr3+ nanoparticles under H2O2
17:45	Guanyu CAI IRCP	ZGSO persistent nanophosphors for bioimaging in NIR
18:00	Baptiste GRIMAUD LuMIn - École Normale Supérieure Paris-Saclay	Measuring axonal transport using neurotropic fluorescent nanodiamonds
18:15	Kariné HEUZÉ ISM - CNRS	Functionalization of Magnetic Nanoparticle Surfaces for Bio-Immobilization, Detection, and Biocatalysis

Valérie MARCHI (CNRS - ISCR, Rennes)

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Short biography

Valérie Marchi, received her engineer diploma and her Master degree in Physical Chemistry from the Ecole Supérieure de Physique et Chimie Industrielles (ESPCI, Paris) in 1994. She acquired an expertise in Supramolecular Chemistry and Organized Soft Matter during her Ph.D with Prof J.-M. Lehn at the Collège de France (Paris) and during a 6 months doctoral staying in the laboratory of Prof T. Kunitake (Fukuoka, Japan,) in 1997. As postdoc, she worked one year in the laboratory of Biophysik with Prof. Erich Sackmann (TUM Munich, Germany). In 1998, she entered to the CNRS at the Chemistry laboratory of Prof Jean-Marie Lehn at the Collège de France in Paris . She moved to the ISCR (University Rennes, UMR 6226) in 2004 where she developed her research in the field of nanoparticles, surface chemistry and nanomaterials synthesis at the interface with the Organized Soft Matter (vesicles, cells) for biological applications (imaging and sensing).

Luminescent metal nanoclusters for nanosensing in living environment

Gold nanoclusters (AuNCs) are attractive candidate as long-lived luminescence sensors. Their ultrasmall
size (< 2 nm) and large window of luminescence lifetime (from nano to microsecond) as well as their good biocompatibility make them an attractive alternative to fluorescent molecular probes or proteins .
We present the synthesis of original ultra-small luminescent peptidic AuNC sensitive to the pH. The versatility of small peptides permits to adjust the emission wavelength and the sensitivity of the emission intensity as well as the luminescent lifetime to the pH. This chemical plateform provides various charged AuNC with potential sensitivity to the environment for biosensing applications.
Due to their ultra-small size, these nanoprobes are shown to be easily internalized into subcellular compartment such as cell nuclei or deliver to synthetic or biological vesicles . Yet their interaction with plants according to different ways of administration has not yet been explored. Here various peptidic luminescent gold nanoclusters with different surface charge were administrated to photosynthetic living organism Thaliana Arabidopsis, used as a model by different ways through a depositived drop on a leaf or by incubation of the roots in the nutrient buffer. Depending of the administration way, their biodistribution in the leave and roots was investigated by optical confocal microscopy.

Keywords

luminescence, nanoclusters, nanosensor, plants, extracellular vesicles

References

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4.Butera, E., Dupont, A., Aimé, A., Ducarre, S., Chiechio, R. M., Even-Hernandez, P., ... & Marchi, V.In Situ Labeling of the Aqueous Compartment of Extracellular Vesicles with Luminescent Gold Nanoclusters. ACS Applied Materials & Interfaces 2024, 16(17), 21643.

Wednesday March 19th

10:30 A.M. - 12:30 A.M.

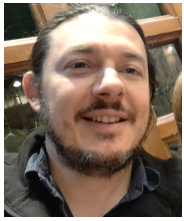
LOUIS ARMAND EST

Program of the session :

Chairs: Nadine MILLOT

HOUR	NAME	TITLE
10:30	**Damien MERTZ** **IPCMS - CNRS**	**Chemical engineering of activable core@shell mesoporous silica nanocomposites for theranostic applications**
11:00	Theo LUCANTE ICPEES - CNRS	Design of surfactant-coated iron oxide nanoparticles for enhancing phosphate removal in the peritoneal dialysis process
11:15	Halima ALEM IJL - Université de Lorraine	Folate-Functionalized Superparamagnetic Core/Shell Nanoparticles for Targeted Drug Delivery and Stealth Behavior Study
11:30	Rafael Gabriel PORRAS GUERRERO ICPEES - UNISTRA	Functionalized Iron Oxide Nanoparticles for targeted imaging of Alzheimer's Disease: Î²-amyloid peptide detection and interaction
11:45	Pierre SARFATI LVTS/INSERM - Université Paris Cité	Hybrid particles for the physical treatment of thrombotic diseases
12:00	Xilling SONG IMAP - ESPCI	MOF-Based Microneedles for Synergistic NO/Â·OH Antibacterial Therapy
12:15	Yang ZHANG LCBPT - Université Paris Cité	Innovative surface functionalization strategy for the design of antioxidant coated-Gold nanoparticles for biomedical applications

Damien MERTZ (CNRS - IPCMS, Strasbourg)



https://www.ipcms.fr/en/equipe/functionalized-nanoparticles/

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Short biography

Damien Mertz is a CNRS researcher in materials chemistry developing his research at the Institut de Physique et Chimie des Matériaux de Strasbourg (IPCMS) since 2013. After a PhD degree in physical chemistry from the University of Strasbourg (2008) focused on the elaboration of mechanotransductive polymer materials, he was a postdoctoral fellow at the University of Melbourne, Australia, working on silica templated protein microparticles for drug delivery applications (2009-2011). At CNRS, he currently works on the chemical engineering of activable mesoporous silica theranostic nanocomposites endowed with treatment functions (drug delivery, magnetic hyperthermia, phototherapy) combined with imaging (MRI or fluorescence imaging).

Chemical engineering of activable core@shell mesoporous silica nanocomposites for theranostic applications.

Designing responsive nanoplatforms for magnetic field- or NIR light-induced hyperthermia coupled with drug delivery still remains a great challenge for nanomedecine applications.[1] Iron oxide nanoparticles (IO NPs) and carbon-based materials are suitable external field-responsive cores respectively for magnetic hyperthermia (MHT) and phototherapy (PTT) while mesoporous silica (MS) shells are well adapted coatings given their biocompatibility, easy surface modification and high drug delivery capability. In our team, we have addressed complementary approaches for the chemical engineering of activable core@shell MS nanocomposites[2], especially tailored with large pore mesoporous silica structures. The first part of this presentation will concern the controlled growth of large pore stellate silica (STMS) shell around IO NPs to afford a range of tuned porous structure denoted IO@STMSx NPs[3]. We investigated in depth the pore structure by nitrogen adsorption, transmission electron microscopy (TEM) and in situ-liquid phase TEM. The influence of this tuned silica shell was evaluated for magnetic resonance imaging (MRI), MHT and NIR-light photothermia applications. In a second part, the chemical engineering of large pore silica around carbon nanotubes will be presented. The large pores are suitable to immobilize a high amount of dephosphorylating enzymes[4] acting as precursors for the self-assembly of peptide fibers providing an in situ architectured hydrogelation from the core@shell nanomaterial (Coll. ICS, Strasbourg[5]). These novel nano-architectured hydrogels were found relevant for drug loading and evaluated for NIR induced-drug release combined with photothermia.

Keywords

nanoplatelets, quantum dots, self-assembly, small angle scattering, twisting

Acknowledgement

These works have been or are currently supported by: IDEX Univ. of Strasbourg, MICA-Carnot Alsace, ANR projects (ANR-19-CE09-0004—CORELMAG and ANR-24-CE18-1966-ISCHeMAG).

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Thursday March 20th

10:30 A.M. - 12:30 A.M.

LOUIS ARMAND OUEST

Program of the session :

Chairs: Stéphane MORNET

HOUR	NAME	TITLE
10:30	**Ariane BOUDIER** **CITHEFOR - Univ. Lorraine**	**Copper nanoclusters : the 1st treatment for menkes disease**
11:00	Henri COSTE ICMCB - CNRS	Tailoring the surface chemistry of nanoparticles to modulate their Protein Corona
11:15	Udara Bimendra Gunatilake KEKULUPOLAGE ICGM - Université de Montpellier	Peroxidase Mimicking Activity of Polyethyleneimine-mediated Prussian Blue Nanoparticles
11:30	Marine SAGASTUY PHENIX - Sorbonne Université	Fusion of Magnetic Liposomes with Model and Plasma Membranes: Towards Cytoplasmic Delivery
11:45	Mustafa GHARIB LVTS - Université Sorbonne Paris Nord	Replicating Nanoparticles-Based Cytosolic Sensing: Challenges and Key Insights from the 1st Replication Initiative in NanoBioscience
12:00	Naseer Haziq KHAN ITODYS - Université Paris Cite	Functionalization of Tobacco Mosaic Virus with Plasmonic Nanoparticles For In-Solution Sensing Applications
12:15	Min-Hui LI IRCP - CNRS	Heavy-metal-free photocatalysts by polymer micelles/vesicles in photobiocatalysis: under aerobic condition in combination with native enzymes and under anaerobic condition for potential hypoxia cancer therapy

Ariane BOUDIER (Univ. Lorraine - CITHEFOR, Nancy)

Reactions and Chemical Engineering Laboratory (LRGP)

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Short biography

Ariane Boudier is Full Professor at the University of Lorraine, teaching Physical and General Chemistry at the Faculty of Pharmacy in nancy. She is a member of the Laboratoire Réactions et Génie des Procédés, LRGP, UMR 7274 CNRS. Since 2009, she has been working on the synthesis and characterisation of metallic nanoparticles for medical applications to develop new drugs or innovative surfaces for medical devices. She is the author/co-author of more than 60 publications and 3 patents. One drug synthesized by her received the Orphan Drug Designation by the European Medicine Agency in 2022 and by the Food and Drug Administration in 2024. She has been a member of the Institut Universitaire de France since 2023 on an innovation project. This project concerns the synthesis and characterisation of copper nanoclusters for application in Menkès disease.

Copper nanoclusters: the 1st treatment for Menkes disease

Menkes' disease is a very rare genetic disorder of copper metabolism with a life expectancy of 3 years [1]. This disease is linked to a deficiency of copper transporter (ATP7A) present in the intestine and in the blood-brain barrier (BBB) inducing a severe copper deficiency with a combined deficiency of essential cuproproteins. This leads to multisystem symptoms and as severe neurodegeneration. The only treatment using copper-histidine complex remains palliative with a poor biodistribution to the brain and unchanged fatal prognosis. Copper nanoclusters (CuNC) were synthetized [2], characterized and tested in Moblo mice (knock down model for ATPase7A transporter). They are characterized by a size of 0.7 nm in diameter, with a metallic core surrounded by biodegradable ligands and can be stored for a long time (>2 years). Subcutaneous injections of CuNC into Moblo mice from 5 days of life saw their life expectancy considerably increased, in correlation with a restoration of the activity of the cuproproteins. Indeed, tyrosinase, a cuproprotein responsible for the production of melanin, showed its activity restored by a darkening of the fur. Images obtained by positron emission tomography after injection of radiolabeled 64CuNC suggested the biodistribution to the brain. The activity of cytochrome C oxidase in the brain showed a restoration of the activity of the brain mitochondrial respiratory chain. Neurobehavioral tests (horizontal scale, open field) showed a drastic improvement in locomotion and coordination of movements in mice, that received CuNC. All of these results allowed the obtention of orphan drug designation from the European Medicine Agency (EMA) and from the Food and Drug Administration (FDA) and the establishment of a pharmaceutical form of the CuNC with the aim of launching clinical trials as soon as possible.

Keywords

Nanoclusters, metabolic disorder, copper, restoration of cuproenzyme activities, neurobehavioral tests

Acknowledgement

IUF for financial support, SATT SAYENS for their support via CuNP2 project, CNRS through the MITI interdisciplinary programs (CopperNiC)

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Thursday March 20th

2:00 P.M. - 4:30 P.M.

ROOM CD

Program of the session :

Chairs: Gaetan BELLOT

HOUR	NAME	TITLE
14:00	**Nesrine AISSAOUI** **Univ. Paris-Cité - CiTCoM**	**DNA Origami-based protein manipulation systems : From structural biology to mechanical regulation**
14:30	Marine LE GOAS Institut Galien Paris-Saclay - CNRS	Demonstration of the impact of flow on protein adsorption on nanoparticles via in situ flow-DDM
14:45	François HENN L2C - Université de Montpellier	Confinement of a Biological Ionic Chanel in a SWCNT
15:00	Julie FINKEL Centre de Biologie Structurale - CNRS	DNA origami self-assembly with complex curved surfaces defined in 3D space
15:15	Manon ROCHEDY ISCR - CNRS	Internal structure evolution of lipoplexes in the presence of surfactants and biological media for nucleic acids delivery
15:30	Olivier SANDRE LCPO - CNRS	Magnetic Polymersome Deformation by a Static Magnetic Field
15:45	Adrien NICOLAÏ ICB - Université Bourgogne	MoS2 Solid-State Nanopores as Single-BioMolecule Sensors
16:00	Marc ZELSMANN LTM - CNRS	On-chip photonic crystal tweezers for bacteria and bacteriophage viruses trapping and susceptibility testing
16:15	Silvia PERAZA KU ISCR - CONACYT	Understanding the spontaneous formation of toroids and other handle topologies in polypeptides self-assembly

Nesrine AISSAOUI (Univ. Paris-Cité - CiTCoM, Paris)

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Short biography

I am a physico-chemist by training, with a great interest in biology. In my research projects, I use « top-down » – « bottom-up » engineering approaches to create highly ordered materials with tailored properties and functions suitable for applications in biology, medicine, and beyond. In this context, the supramolecular assembly of biomolecules was a very interesting approach to create organized bio-synthetic systems, at the nanometer scale. I also use the self-assembly method of DNA, called DNA-origami, to design and construct three-dimensional geometries with nanometer precision. In 2020, I joined the University Paris Cité for an assistant professor position to work in the team « signaling and membrane transport » in developing bio-inspired systems based on DNA origami method which can provide practical advantages to help to better understand fundamental biological questions with potential uses in medicine.

DNA Origami-based protein manipulation systems : From structural biology to mechanical regulation

In this presentation, I will illustrate the bottom-up DNA origami nanotechnology as a tool to build artificial molecular systems and machines sufficiently sophisticated to decipher fundamental aspects of biology. First, as a method we are exploring as a molecular imaging scaffold for single-particle electron microscopy (EM). I will present examples of DNA nanostructures designed (i) to provide a simple, versatile, and straightforward method to enable accurate molecular scale positioning as a fiducial marker for EM [1], (ii) and to improve the cryo-EM sample preparation step which is still the primary limiting factor to guarantee the success of the data processing step [2]. In the second part, I will present our latest progress in constructing a nano-machine that can be programmed to actuate autonomously as a “robot” for the mechanical activation of membrane proteins [3]. This customizable origami provides an instrument-free approach that can be applied to control and explore a diversity of mechanotransduction circuits on living cells.

Keywords

DNA origami nanotechnology; structural biology; physical-chemistry of interfaces; supramolecular assembly

Acknowledgement

We thank financial supports: IDEX UPC of University Paris Cité, ANR JCJC (ANR23CE09-0012-01_REDIRECT).

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Friday March 21th

10:30 A.M. - 12:30 A.M.

LOUIS ARMAND OUEST

Program of the session :

Chairs: Thomas PONS

HOUR	NAME	TITLE
10:30	**Chloé GRAZON** **ISM - CNRS**	**From Quantum Dots to Fluorescent Organic Nanoparticles: bright nanotools for biosensing**
11:00	Eleonore KUREK ISM - Université de Bordeaux	3D Real-Time Single Particle Tracking using two-photon fluorescence from bright dye-based organic nanoparticles
11:15	Riccardo OSSANNA ISMO - CNRS	Control of the optical absorption properties of nanovectors for photoacoustic imaging (CAP-PHOTOAC)
11:30	Mariah HARRIS ISMO - Université Paris-Saclay	Optical Biosensors for the Detection of Bacteria
11:45	Limeng RUAN LP2N - China Scholarship Council	Polarization sensitive single nanoparticle tracking in the near-infrared
12:00	Qilin ZOU LPMC - Ecole Polytechnique	CsxWO3-Î´@NaYF4:Yb,Er heterogeneous nanocrystals for local temperature monitoring during photothermal heating
12:15	Tristan PELLUAU i-CLeHS - ChimieParisTech	Design and Synthesis of Iron-Doped Carbon Dots for Enhanced MRI Imaging Applications

Chloé GRAZON (CNRS - ISM, Bordeaux)

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Short biography

Chloé Grazon is a former student of the University of Rennes I and ESPCI Paris-PSL, graduating in 2009. She completed her PhD at ENS Cachan under the supervision of R. Méallet and G. Clavier, in collaboration with J. Rieger and B. Charleux. Her thesis focused on the synthesis of fluorescent polymer nanoparticles that are perfectly stable in water and extremely bright.
She then worked for nine months at L'Oréal, followed by four years at the startup Nexdot, where she developed ligands for quantum dots used in bioimaging and display technologies. In 2019, she was awarded a Marie Curie fellowship between Boston University with M. W. Grinstaff and the University of Bordeaux with S. Lecommandoux. During this period, she developed progesterone biosensors and designed a new method for synthesizing polypeptide nanoparticles in water (ROPISA).
Building on this experience, she joined CNRS in 2020 at ISM-Bordeaux with M. Blanchard-Desce. Her research focuses on the development of fluorescent organic nanoparticles for use as biosensors. In 2022, she was awarded an ERC Starting Grant for this work.

From Quantum Dots to Fluorescent Organic Nanoparticles: bright nanotools for biosensing

The in situ and real-time detection of analytes in complex biological media demands robust, sensitive, and stable biosensors capable of signal amplification. Luminescent nanoparticles (LNPs) are promising candidates, offering exceptional brightness and photostability compared to traditional dyes.1 These LNPs fall into two main categories: intrinsically luminescent, such as Quantum Dots (QDs), or doped NPs, where dyes are encapsulated within a matrix. For imaging and sensing applications, LNPs aim to achieve excellent brightness, enhanced photostability, and strong colloidal stability in water, outperforming conventional organic dyes. Classical FRET nanosensors typically involve a donor LNP conjugated with bioreceptors that bind to a ligand labeled with an acceptor dye. While bioreceptors optimization has advanced detection limits and dynamic ranges, the roles of dye type and spatial configuration in these systems remained underexplored. In this talk, we will compare organic fluorophores (e.g., Cy5, Texas Red) and QDs as FRET donors or acceptors, identifying key molecular parameters that enhance sensor performance to provide guidelines for FRET-based assays and diagnostics.2-3 Additionally, Fluorescent Organic Nanoparticles (dFONs) will be introduced as metal-free alternatives to QDs, with comparable brightness per volume. Obtained via nanoprecipitation of hydrophobic dyes, dFONs remain underutilized as biosensors due to limited functionalization strategies.4 We demonstrate an innovative maleimide-thiol surface functionalization approach, enabling applications such as intracellular thiol sensing in the µM range5 and biotinylation for biomarker development. These advancements position dFONs as versatile, ultra-bright, and metal-free tools for next-generation diagnostics.

Keywords

fluorescence, biosensors, biomarkers, bioimaging, FRET

Acknowledgement

CG deeply acknowledges her main collaborators who permitted to develop those studies, especially M.W. Grinstaff, J. Gallagan, A. M. Dennis, S. Lecommandoux, M. Chern, O. Dal Pra, J. Daniel and M. Blanchard-Desce. This work received support from the EU under the H2020 program (Marie-Curie Grant 749973) and under the Horizon Europe program (ERC St 101077364).

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Poster Session

NANOCHEMISTRY & NANOPARTICLES/NANOBIOSCIENCES & NANOMEDECINE /NANOMATERIALS FOR ENERGY/ SUSTAINABILITY AND ECO DESIGN OF NANOMATERIALS

N° POSTER	TITLE	NOM	Prénom
31	Plasmon-induced thermo-polymerization of PETA in presence of various thermal initiators	BASTIDE	Mathieu
32	Green synthesis of curcumin based nanoparticle	BASU	Surita
33	Synthesis of Polyvinylpyrrolidone nanocomposite with palygorskite for application in water-based drilling fluids	DALMONEKI	Anna Clara
34	Carbon supported metal oxides nanoparticles and their applications in biomass valorization	DJELLALI	Ali
35	Synthesis of Polyacrylamide/Palygorskite Nanocomposites for Application in Water-Based Drilling Fluids	GOMES	Ana Beatriz
36	Re(CO)-based silica-nanoparticles as multimodal probes for bio-imaging	KAUFFELD	Willem
37	Chiral CdSe/CdS Nanonails	KUZNETSOVA	Vera
38	Towards large-scale production of Cobalt nanorods	LISOIR	Emma
39	Synthesis and Evaluation of PAMAM G0.5 Dendrimer as a Swelling Inhibitor Additive for Clays in Water-Based Drilling Fluids	LOPES/SPINELLI	Grazielle/Luciana
40	Plasmonic nanoclusters synthesized by a multi-step colloidal approach	ROMANUS	Martin
41	Influence of CuInS2 crystalline structure on the synthesis of CuIn1-xFexS2 quantum dot by cation exchange	ROUX-BYL	Céline
42	Chirality in Zinc Oxide nanoparticle synthesis	SARTOR	Valerie
43	Application and evaluation of core-shell nanocomposite using silica nanoparticles and AM/AMPS/DMDAAC/AAC tetrapolymer	SPINELLI	Luciana
44	Design of efficient nanocatalysts for H2 release from boranes and silanes	THIBAULT	Maxime
45	Influence of crystalline structure on the acoustic vibrations of elongated nano-objects	VERNIER	Charles
46	Chemistry and biological effects of germanium oxide nanoparticles	VIKRAMAN	Haribaskar
47	From laser-synthesized nanoparticles to innovative medical devices	AL KATTAN	Ahmed
48	Ultra-small Superparamagnetic Iron Oxide Coated Phosphonate-based Ligand for MRI Application	CHE DJI	Lyns Verel
49	Magnetic hyperthermia tumor ablation and tumor microenvironment modulation monitored by optical imaging	COSTE	Henri
50	Synthesis of iron oxide nanoparticles and magnetic properties tuning by temperature cycling: towards fine control of crystal phase and size distribution	HUEZ	Cecile
51	Hybrid plasmon-semiconductor nanoparticles for charge or resonant energy transfer based dynamic phototherapy	JEFFRIES	Beatrice
52	Re(CO)-based silica-nanoparticles as multimodal probes for bio-imaging	KAUFELD	Willem
53	Force nanosensor development for measuring mechanical stress exerted by living cells	LACROIX	Noemie
54	Combination therapy using nanoheaters and CAR-T immunotherapy on 3D tumor models	LEINEBO	Charlotte Amalie
55	Red-blood-cell-membrane-coated polymer micelles/vesicles as biomimetic nanoassemblies for potential photocatalytic cancer therapy under hypoxia	MA	Yandong
56	Vivoptic, a preclinical optical imaging platform for the evaluation of diagnostic and therapeutic strategies	MORNET	Stéphane
57	On the Roles of Polymer Chemistry, Kinetics, and Mixing in the Assembly of Loaded Polymer Nanoparticles	REISCH	Andreas
58	Digital colorimetric biosensing on gold-DNA origami nanostructures	ZHANG	Zixiao
59	Cu Isotopic Fractionation Following Foliar uptake	CALAS	Aude
60	New process "Multi-Dip Coating" applied for biological statistical analysis of Antimicrobial Surfaces	CHARLIAC	Jérôme
61	One step synthesis using laser pyrolysis of nanostructured carbides molybdenum catalysts for hydrogen production	RIO	Simon
62	Study of the reactivity of Fe(0) nanoparticles towards ammonia	ZAMBLE	Christian Irie
63	Chemical Passivation of GaN Nanowires for the Development of Innovative Photocatalysts	ZORAI	Amel