MSCA Postdoctoral Fellowships at Sorbonne University
Call for expression of interest 2024

CHEMISTRY	
Code	**Topics and supervisors / research units**
CHEM1	**Well-defined low-valent 3d transition metal phosphite complexes for a simple synthesis of metal or alloys phosphide nanoparticules** Marc Petit - Institut parisien de chimie moléculaire (IPCM) - Paris
	Transition metal phosphide (TMPs) has recently attracted the attention of researchers because of their high efficiency as electrocatalysts. Thus it appears mandatory to develop sustainable synthesis (lower temperature, reproducible, no mixture of reagents). In this project we proposed to used well-defined 3d transition metals phosphite complexes without any additives to reach TMPs and their alloys. By only varying the ligand we should be able to control the size and shape of TMPs.
CHEM2	**Synthesis of Janus nanoparticles for self-assembly of nanostructured thin films** Laurent Bouteiller - Institut parisien de chimie moléculaire (IPCM) - Paris
	We have developed a versatile route to form Janus nanocylinders by self-assembly of chain-end modified polymers (see Nature Commun 2020, 4760). The objective of the project is to design such particles to obtain nanostructured thin films with enhanced electro-optical properties. Candidates should have a strong expertise in macromolecular synthesis.
CHEM3	**Merging Radical and Organometallic Chemistry for the Synthesis of Organogermanes** Alejandro Perez Luna - Institut parisien de chimie moléculaire (IPCM) - Paris
	Germanium-containing molecules are increasingly important in several fields and the discovery of new methods to prepare original organogermanes is a current major issue in synthetic chemistry. In this area, we aim to exploit the radical chemistry of germanium derivatives in combination with the most recent advances in catalytic radical-based chemistry using sustainable transition metals. This merger will introduce fundamentally different approaches allowing to overcome existing shortcomings.
CHEM4	**Access to polycyclic scaffolds by photoinduced palladium catalysis** Alexandre Pradal - Institut parisien de chimie moléculaire (IPCM) - Paris
	Recent work showed that Pd(0) complexes could be photoexcited and interact with alkyl halides when they are irradiated under monochromatic light. This reaction would lead to an alkylPd(II) salt obtained through a hybrid alkylradical/Pd(I) complex after two single electron transfer steps. This project would take profit of the hybrid alkylradical/Pd(I) complex intermediate formed to initiate radical polycyclization reactions on non-conjugated polyenes to prepare complex molecules in a single step.

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CHEM5	**Photo-Responsive Materials built from Fe4Co4 Switches** Rodrigue Lescouezec - Institut parisien de chimie moléculaire (IPCM) - Paris
	Fast and reversible photo-induced electron transfer in FeCo molecular switches has great potential for applications in molecular memories and switching devices. However, the relaxation temperature of the photo-induced state, and therefore the low working temperature is a strong limit for practical applications. The research associate will work on better understanding the parameters that govern the stability of the photo-induced state to overcome this limitation.
CHEM6	**Switchable molecular tweezers for multifunctional supramolecular gels** Guillaume Vives - Institut parisien de chimie moléculaire (IPCM) - Paris
	We aim to develop stimuli-responsive supramolecular gels by exploiting the mechanical motion of molecular tweezers. The tweezers, consisting of M-salen complexes with gelling groups linked to a switchable terpyridine moiety, undergo a drastic geometric change from open to closed conformation upon coordination. This change is expected to induce a solution-to-gel transition associated with modified properties. Our approach holds great potential for creating smart multifunctional materials..
CHEM7	**Cyclodextrin-based molecular motors** Matthieu Sollogoub - Institut parisien de chimie moléculaire (IPCM) - Paris
	Natural molecular motors such as ATP-synthase or Kinesin play essential roles in cell function. The present project's aim is to build a novel artificial molecular motor. The project will be based on an original design of a cyclodextrin-based molecular information ratchet (Chem 2023, https://doi.org/10.1016/j.chempr.2022.12.017) involving cyclodextrin-based intricated system synthesis and study.
CHEM8	**New self-organized light-emitting (macro)molecular materials as gain media for high-performance organic solid-state lasers** Fabrice Mathevet - Institut parisien de chimie moléculaire (IPCM) - Paris
	The objective of this project is to design, synthesize, characterize and test under real laser conditions new gain media based on novel anisotropic light-emitting (macro)molecular materials. This extremely relevant and timely project will focus on the development of different types of solution-processable liquid crystalline semiconducting polymer or molecular architectures presenting high gain, self-host and self-organization properties to design a new type of high-performance laser dyes.
CHEM9	**NHC-scorpionate** Volodymyr Malytskyi - Institut parisien de chimie moléculaire (IPCM) - Paris
	Our research team is interested in the development of new molecular materials based on 3d-transition metals. Polynuclear assemblies exhibiting remarkable magnetic, optical and electrochemical properties are particularly interesting. These are stabilized by scorpionate ligands of the archetypal trispyrazolylbarate family. In this project, we aim to develop new types of strong-field tridentate ligands based on stabilized carbene (NHC) units and use them for the synthesis of polymetallic assemblies

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CHEM10	**Medicated wound dressings associating polysaccharides based hydrogels and polyesters to promote skin wound healing** Christophe Hélary - Laboratoire de la Chimie de la Matière Condensée (LCMCP) - Paris
	Diabetes can lead to the formation of foot ulcers and eventually leg amputation. In our group, we have developed biomaterials associating collagen and PLGA to deliver lipophilic drug using nanoprecipitation. The present project aims to develop novel biomaterials using this technology to deliver anti inflammatory drugs. We will develop composite hydrogels associating polysaccharides and a polyester to improve skin wound healing.
CHEM11	**Liquid Crystalline Assemblies of 2D Nanomaterials for Printed Electronics** Jinkai Yuan - Laboratoire de la Chimie de la Matière Condensée (LCMCP) - Paris
	Printed electronics are promising for emerging applications. Today, electronic inks are formulated by randomly mixing functional nanoparticles in liquid carriers. The introduced structural disorders during printing create gaps between nanoscale and macroscale features. We propose new approaches that bridge the liquid crystals of 2D materials and additive manufacturing technology, leading to the unprecedented use of the properties of individual 2D materials in printed capacitors and transistors.
CHEM12	**Porous High Entropy Alloys nanomaterials: exploring the chemical space and structural diversity** Marco Faustini - Laboratoire de la Chimie de la Matière Condensée (LCMCP) - Paris
	High-entropy-alloy (HEA) nanomaterials are attractive for several applications in catalysis and energy. We recently demonstrated that HEA can be shaped into complex porous architecture by low-temperature sol-gel processing routes. This project aims at exploring the structural variety and the immense chemical space of porous HEAs shaped as particles or films for energy and optical related applications.
CHEM13	**Design of original inorganic nanoparticles for electrocatalysis** David Portehault - Laboratoire de la Chimie de la Matière Condensée (LCMCP) - Paris
	We want to explore original liquid-phase syntheses to design nanoparticles that will hold new chemical compositions and crystal structures, to trigger electrocatalysis of water splitting and of CO2 reduction into high added-value products. The topic is at the crossroad of nanochemistry, solid-state chemistry and energy research, it encompasses colloidal syntheses, structural, morphological and electrochemical characterization. The focus will be tuned according to the profile of the candidate.
CHEM14	**Mechanistic elucidations by advanced Raman approaches coupled to electrochemistry** Emmanuel Maisonhaute - Laboratoire Interfaces et Systèmes Electrochimiques (LISE) - Paris
	Tailoring new electrocatalytic systems requires to understand their reaction mechanisms. We developped recently several approaches based on Raman spectroscopy and Tip Enhanced Raman Spectroscopy (TERS). A first approach is to use a SERS active substrate (i.e. NPs, tapered tip) and use it as an electrode. This allows to reach potentially submillisecond timescales compatible with turnover frequencies of active catalysts. The second one aims at analyzing the local composition by EC-TERS.

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CHEM15	**Soft Matter at nanometric and molecular scales** Jean Comtet – Sciences et Ingénierie de la Matière Molle (SIMM) - Paris
	We are looking for an independent researcher wiling to develop an original experimental project in the field of soft matter at nanometric and molecular scales. We are equipped with Single-Molecule Fluorescence Microscopy and Atomic-Force microscopy setups, which we use to interrogate the dynamics of interfaces in soft matter. Possible research directions: dynamics of single ions or macromolecules close to surface, nanorheological properties of complex liquids or electrolytes in confinement.