PSL Chimie

Bio-inorganic Chemistry at PSL

A series of seminar in bio-inorganic chemistry,
presented by M. Fontecave (CdF), G. Gasser (Chimie Paris-Tech), Clotilde Policar (ENS) and Raphaël Rodriguez (Institut Curie).

PSL - BIC Program 2018

Room E012, salle des éléments, département de chimie de l'ENS, 24 rue Lhomond, 16h30

2018, May 4th James M. Mayer 	Charlotte Fitch Roberts Professor of Chemistry Department of Chemistry, Yale University, *Invited professor P7* james.mayer@yale.edu	**Proton-Coupled Electron Transfer: Fundamentals and Models for a Common Biochemical Mechanism**	Proton-coupled electron transfer (PCET) reactions are ubiquitous, in both biological and non-biological contexts. This presentation will focus on simple model reactions that involve transfer of one electron and one proton, both hydrogen atom transfer reactions and reactions involving transfer of $1e^-$ and $1H^+$ a to (or from) cofactors that are spatially separated. A number of examples will be presented, including cases of O–H and C–H bond activations, and tyrosine oxidation across polyproline linkers.
2018, May, 11th Dani Gibson 	Institute for Drug Research, School of Pharmacy, The Hebrew University, Jerusalem, Israel *Invited professor ENS* dang@ekmd.huji.ac.il	**Multi-Action Platinum Anticancer Agents**	To overcome the drawbacks of the clinically used Pt(II) drugs, we designed muti-action Pt(IV) prodrugs that can release inside the cancer cells two, three or four bioactive moieties that have different cellular targets. This approach enhances the chances of killing the cancer cells. These compounds are very potent cytotoxic agents that were particularly effective against KRAS mutated cancers such as colon and pancreas.
2018, June 22nd David Giedroc 	Department of Chemistry, Indiana University, Bloomington, IN 47405-7102, USA; giedroc@indiana.edu	**Mechanisms of Zinc Metallostasis in Bacterial Pathogens**	First-row late *d*-block transition metals from Mn to Zn play critical and distinct roles in many aspects of cellular metabolism. In bacterial pathogens, metalloregulation of transcription underscores physiological adaptation to host-mediated transition metal starvation and toxicity, required to maintain metal homeostasis (metallostasis). Recent efforts to understand allostery in Zn-regulated repressors using NMR spectroscopy and companion biophysical methods, will be presented primarily focused in the Zn efflux regulator from *Staphylococcus aureus*, CzrA, and a Zn uptake regulator adhesin-competence repressor (AdcR) from the Gram-positive respiratory pathogen, *Streptococcus pneumoniae*.

2018, September 3trd Christian Hartinger 	School of Chemical Sciences, University of Auckland New Zealand; c.hartinger@auckland.ac.nz	**Atnticancer Metallodrug Development: Novel Methods to Elucidate Modes of Action and in Pharmacophore Design**	Since the discovery of cisplatin, a wide variety of metal complexes have been designed for the treatment of cancer and other diseases as well as for diagnostic purposes. Bioorganometallic chemistry is a thriving field of research and in particular the development of anticancer drugs based on organometallic moieties has received a lot of attention in recent years.[1] The modes of action of anticancer metallodrugs are crucially dependent on their interactions with biological molecules. As many established chemotherapeutics have low selectivity for tumor tissue, they cause adverse effects, which limit the dose that can be administered. Therefore, we are aiming for the development of targeted and targeting drugs, using organometallic fragments to interact selectively with a biomolecular target or to be selectively transported to and accumulated in tumor tissue.[1] A brief overview of my groups recent contributions to the field of anticancer bioorganometallics will be given in this lecture, including important advances in our understanding of the modes of action to support future drug design. This presentation will focus on novel metal-based pharmacophores and the application of novel bioanalytical methods and their development, and the translation of these methods to identify new metal-based anticancer agents with promising biological properties.
2018, October 5th Christophe Copéret 	Department of Chemistry and Applied Biosciences, , ETH Zurich, Switzerland ccoperet@inorg.chem.ethz.ch	**Molecular understanding and controlled functionalization of surfaces towards single-site catalysts and beyond**	The rational design and development of functional materials, and catalysts in particular, requires a structure – property relationship approach, hence the need for strategies to control the generation of well-defined surface sites and for the development of characterization techniques with molecular-level precision. Here, we first discuss the method to control and understand the chemistry at the surface of materials towards the development of so-called single-site catalysts and show how this approach can bring about information about industrial catalysts and be used to tailoring multifunctional catalysts.[1,2] In this context, we will show how Dynamic Nuclear Polarization Surface Enhanced NMR spectroscopy can provide insightful information about a broad range of materials,

			which are not available by other characterization techniques.[3] We will also how NMR chemical shifts can be used to predict the reactivity of molecules and how this molecular approach can be used to bridge the gap with other disciplines, such as Magnetic Resonance Imaging (MRI), data storage and microelectronics.
2018, November 9th Joëlle Vinh 	ESPCI, PSL University joelle.vinh@espci.fr	**Mass Spectrometry as an Analytical Tool for Metal Complexes in Biological Samples**	
2018, November 21st Hongjie Dai 	Department of Chemistry, Indiana University, Bloomington, IN 47405-7102, USA hdai1@stanford.edu	**Carbon Based Nanosciences**	This talk will review our work on nanosciences based on carbon. I will first briefly review our earlier work of carbon nanomaterials including carbon nanotubes and graphene nanoribbons, and then focus on fluorescence biological imaging in the newly opened 1000-1700 nm NIR-II window to benefit from greatly suppressed photon scattering at long wavelengths. We show that NIR-II imaging is novel with up to millimeters tissue depth capable of sub-10 micron spatial resolution, using a wide range of fluorescent agents developed in our lab including carbon nanotubes, quantum dots, rare-earth nanoparticles, donor-acceptor conjugated polymers and small organic molecules. The second part of the talk will focus on our work on advancing new types of electrocatalysts for renewable energy applications and the development of novel batteries. I will talk about the development of electrocatalysts for water splitting with high energy efficiency and lifetimes. I will also present our recent work on the development of rechargeable Al ion battery utilizing some of the most abundant materials on earth including graphite, aluminum and urea. The latest results on operando in situ X ray diffraction of anion-graphite intercalation will be presented.
2018, December 7th Paul Dyson	Ecole Polytechnique Fédérale de Lausanne (EPFL),	**The Development of Organometallic**	Following an introduction to the role of metal compounds in the treatment of cancer the seminar will focus on our own research on

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	Switzerland paul.dyson@epfl.ch	**Anticancer Drugs that Operate via Epigenetic Mechanisms**	ruthenium-based organometallic (RAPTA) compounds that are active against chemoresistant and invasive tumours. We show that organometallic RAPTA-type drugs are able to overcome certain types of drug resistance mechanisms as they do not target DNA, but operate via epigenetic mechanisms. Furthermore, their mechanism of action leads to significant changes to the tumor microenvironment, which sensitizes tumors to other cytotoxic (DNA acting) drugs. The study of RAPTA-type compounds in combination with clinically approved compounds will therefore also be discussed.