Bio-inorganic Chemistry at PSL

A series of seminar in bio-inorganic chemistry,
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PSL - BIC Program 2019 – Semester 2

ts, département de chimie de l'ENS, 24 rue Lhomond, 16h30 / 4pm30 — This seminar is founded by PSL (ANR 10-IDEX-0001-02)

	University	**Title**	Short abstract
	Université de Reims Champagne-Ardenne (URCA) gilles.lemercier@univ-reims.fr	**Photophysical properties of 5-substituted-1,10-phenanthroline ligands and related Ru(II) edifices**	A molecular engineering based on Ru(II) complexes was developed. The related metal-to-ligand charge transfer (^{3}MLCT) excited-states characteristics (lifetime and spin-state) are of interest for applications such as optical power limiters or photosensitizer (PS) in photodynamic therapy (PDT). In this domain, two-photon absorption process (2PA) is an interesting way to irradiate in the biological window (700 – 1100 nm) with a high spatial resolution. Synthesis and photophysical characterizations of the compounds will be described, together with strategies developed for the encapsulation or grafting of such PS within (to) multifunctional nanoparticles.
	Department of Medicinal Chemistry and Fine Organic Synthesis, M.V.Lomonosov Moscow State University, Moscow, Russia nazarov@med.chem.msu.ru	**Anticancer Pt and Ru compounds with targeting ligands**	Platinum complexes belong to the most widely applied anticancer chemotherapeutics. One of the biggest drawbacks of these compounds is their low selectivity for tumour tissue. Ruthenium compounds are in the focus of search for new anticancer drugs and it was shown that the ligand sphere strongly influences their anticancer properties. Different approaches have been explored in the design of metal-based anticancer complexes, including synthesis of mono- and bifunctional compounds, specific targeting kinase and proteins. This presentation will focus on targeting of several cellular processes highly specific for the cancer cell. New compounds can interfere with the glycolysis, activity of the retinoid X receptor. The structural modification of targeting ligand, leaving group, and the oxidation state of the metal is discussed. The complexes showed excellent in vitro cytotoxicity and selectivity in the number of the human cancer cell lines and in vivo activity.
	The University of Greenwich, School of Science k.lam@greenwich.ac.uk	**From Analytical Electrochemistry to Bio Organometallic Drugs: A Strange Journey**	Our group has recently discovered, synthesised and patented Cymanquine, a novel organomanganese-containing compound which exhibits promising anticancer and parasitic activities. This talk will take you through a journey across the fields, we will disclose a new approach to drug design that relies on combining electrochemistry with organometallic and medicinal chemistry.
	Department of Chemistry, University of Zurich CH 8057 Zurich, Switzerland spingler@chem.uzh.ch	**Novel photosensitizer for photodynamic therapy and new methods to grow single crystals of small molecules**	The presentation will report about our studies aimed at exploring the possible synergistic effects of combined photo- and chemotoxic moieties within one compound. Additionally, tips and tricks for growing single crystals of small molecules will be given, starting from manual methods till the nano-crystallization, which is performed with the help of robots.
	Service de Chimie Bioorganique et de Maraquage, CEA-Saclay Frederic.taran@cea.fr	**Click chemistry with mesoionics : new tools for heterocyclic chemistry and chemical biology**	The development of bio-orthogonal reactions that can be performed in living systems has long held unique fascination in the field of chemical biology. On the other hand, the discovery of chemical reactions fulfilling the criteria of the click chemistry concept continue to have a huge impact in many research fields including heterocyclic chemistry. Quintessential example is the copper-catalyzed azide-alkyne cycloadditions (CuAAC). Our laboratory is involved in the discovery and use of such reactions with a focus on mesoionic compounds which can act as new interesting dipoles. These reactions were used both for biological and synthetic applications.
	Department of Radiation Oncology-Cancer Biology Duke University Medical Center, Durham, NC 27710, USA ibatinic@duke.edu	**Mn porphyrins, commonly known as SOD mimics, act as radioprotectors of normal tissue and anticancer agents via thiol signaling**	Mn porphyrin (MnP), MnTnBuOE-2-PyP^{5+} (BMX-001) is presently in 4 clinical trials with cancer patients on the radioprotection of normal brain, salivary glands, mouth mucosa and low pelvic region. The 5th clinical trial is on non-cancerous applications of another analog MnTE-2-PyP^{5+} (AEOL10113, BMX-010) – atopical dermatitis and itch. While initially developed as SOD mimics, over 2 decades of research taught us that MnPs are able to interact with numerous biological targets acting as antioxidants and pro-oxidants while producing favorable therapeutic effects. Combined efforts of numerous groups that worked on basic and translational aspects of MnPs demonstrated that MnPs, in the presence of glutathione and H_2O_2, oxidize protein cysteines thereby effecting signaling processes. The most obvious impact of MnP was on the oxidation/S-glutathionylation of NF-kB. Additionally the impact of MnP on Nrf2, MAPK, phosphatase and endogeous antioxidative defenses has been reported also.