

# DAY 1

Keynote Forum



EuroSciCon Conference on

# Chemistry 2018

February 19-20, 2018

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Paris, France

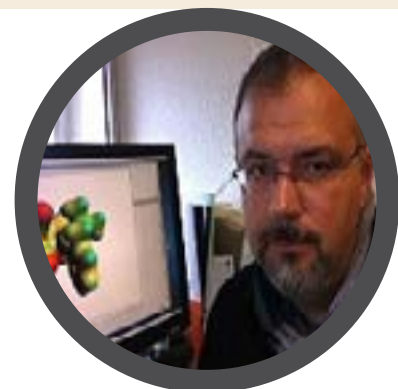
Jean-Pierre Djukic, J Org Inorg Chem 2018, Volume: 4  
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## FROM FUNDAMENTAL ORGANOMETALLICS TO CATALYSIS: THE QUEST FOR “FUZZY” METAL-METAL AND METAL-LIGAND BONDS

**Jean-Pierre Djukic**

Université de Strasbourg, France

**M**etal-promoted catalysis creates a great variety of challenges mostly related to the transient formation of coordinatively unsaturated metal complexes. The latter, long considered as chemical chimeras are central to the rationalization of reaction mechanisms. It will be shown that such species can be isolated in a persistent form, thanks to the stabilization provided by non-covalent interactions (NCIs). The concept of “Hemichelation” relies on the central cohesive role of NCIs and allows the ready isolation of T-shaped metal complexes for instance. Further, proper understanding of metal-ligand interaction is still an important domain of research. It will be shown that, in the field of metal-promoted hydrosilylation, renewed insight into the electronic structure of metal (silane) adducts may clarify the potentials of those key reaction intermediates.



### Biography

Jean-Pierre Djukic is Director of Research at the CNRS in Strasbourg and heads the Laboratory for Organometallic Chemistry and Systemics within the Institute of Chemistry of Strasbourg (UMR CNRS 7177). He obtained a PhD in 1992 from Pierre and Marie Curie University in Paris under the guidance of E Rose, was Associate Researcher with L K Woo at Iowa State University from 1993 to 1994 and an Alexander von Humboldt fellow with K H Dötz at the University of Bonn from 1996 to 1997. He is currently heading a research effort in organometallic chemistry at the CNRS in Strasbourg, which he joined in 1994. Since 2014, he is involved in an interdisciplinary ANR-DFG-funded consortium with the group S Grimme (Bonn, Germany), which deals with cohesion in transition metal chemistry. Since January 2015, he is Chairing the Scientific Council of the Institute of Chemistry of the CNRS.

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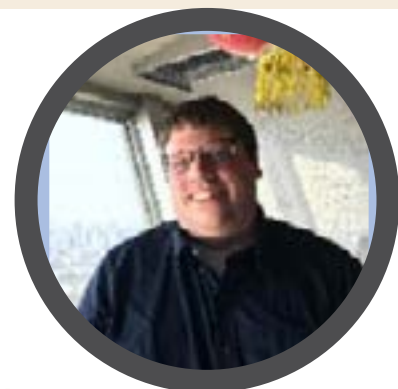
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## PROTEIN CAPSIDS AS MOLECULAR CONTAINERS: CARGO LOADING AND CONTROLLED RELEASE

**Kenneth J Woycechowsky**

Tianjin University, China

**P**rotein capsids form nanometer-scale, closed shell structures via self-assembly that can host various cargo molecules in their hollow interiors. These molecular containers can be useful for applications such as drug delivery, nanoreactors and materials synthesis. These applications often require the encapsulation of cargo molecules followed by their eventual release from the capsid. However, general methods for loading and unloading cargo molecules are lacking. My research aims to endow protein capsids with the ability to encapsulate different cargo molecules and to develop non-denaturing cargo release mechanisms. The capsids formed by bacterial lumazine synthases (LS's) are attractive structures for engineering molecular encapsulation systems. Using DNA mutagenesis and covalent protein modification methods, LS capsids and potential guests were convergently engineered to generate interactions that are localized to the capsid interior and that can potentially be modulated by changing the solution conditions. Structural and functional characterizations of the resulting complexes are carried out using biochemical and biophysical techniques. Using a charge complementarity strategy, engineered LS capsids were loaded with RNA cargoes during bacterial production. Similarly, a natural LS capsid was loaded with a protein bearing a peptide tag derived from its native guest. The protein cargo was released from the capsid by a mild change in the buffer conditions. Lastly, small-molecule cargo was loaded into an intact engineered LS capsid using a covalent capture strategy. The bond linking the cargo to the capsid can be broken by reducing agents, allowing for triggered release of a toxic molecule in cells. These strategies for reversible guest encapsulation extend the functional versatility of the LS capsid as a scaffold for bio-nanotechnology. The ability to control both cargo loading, and release should be particularly useful for the development of new drug delivery systems.



### Biography

Kenneth J Woycechowsky obtained his BS in Chemistry from Penn State University and a PhD in Biochemistry from the University of Wisconsin–Madison. Following Postdoctoral studies at ETH Zurich, he became an Assistant Professor in the Department of Chemistry at the University of Utah. In 2014, he moved to China, where he is currently a Professor in the School of Pharmaceutical Science and Technology at Tianjin University. He has expertise in the assembly, folding, function, and engineering of proteins. His work on protein capsid assembly and the engineering of protein capsids to construct novel molecular encapsulation systems helps lay the ground work for next-generation nanoreactors and drug delivery systems.

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## PRECISION SYNTHESIS OF FUNCTIONAL POLYSACCHARIDES BY ENZYMATIC POLYMERIZATION

**Jun-Ichi Kadokawa**

Kagoshima University, Japan

Natural polysaccharides such as cellulose, starch, and chitin are widely distributed in nature and thus considered as the very important biomass resources. They can also be expected as biomedical materials comparable to proteins, but researches on their practical applications have been still devoted even in recent years. Therefore, the efficient methods for synthesis of functional polysaccharides have attracted much attention to provide new environmentally benign materials. Enzymatic polymerization approach has been identified as a powerful tool to provide polysaccharides with well-defined structure because it is progressed with highly controlled manner in regio and stereo-specificities. Phosphorylase-catalyzed enzymatic polymerization is one of the practically used approaches to synthesize well-defined polysaccharides, which is performed using  $\alpha$ -D-glucose 1-phosphate (Glc-1-P) as a monomer and maltooligosaccharide as a primer to produce  $\alpha(1 \rightarrow 4)$ -glucan, that is amylose. The author has reported the synthesis of amylose-grafted polymeric materials by chemoenzymatic approach, which is a combined method of the phosphorylase-catalyzed enzymatic polymerization with appropriate chemical reactions. The author has also found that by means of the phosphorylase-catalyzed enzymatic polymerization using analog substrates as monomers, well-defined polysaccharides with functional groups, such as amino group, are efficiently synthesized. Furthermore, amphoteric polysaccharides have been synthesized by the phosphorylase-catalyzed enzymatic polymerization. The products showed specific inherent isoelectric points (pIs) and formed large aggregates in water at pH = pI, whereas disassembled at pH shifted from pI. These properties of the present materials are similar as those of proteins.



### Biography

Jun-Ichi Kadokawa has completed his PhD in 1992. He then joined Yamagata University as a Research Associate. From 1996 to 1997, he worked as a Visiting Scientist at the Max-Planck-Institute for Polymer Research in Germany. In 1999, he became an Associate Professor at Yamagata University and moved to Tohoku University in 2002. He was appointed as a Professor of Kagoshima University in 2004. His research interests focus on polysaccharide materials. He received the Award for Encouragement of Research in Polymer Science in 1997 and the Cellulose Society of Japan Award in 2009. He has published more than 200 papers in academic journals.

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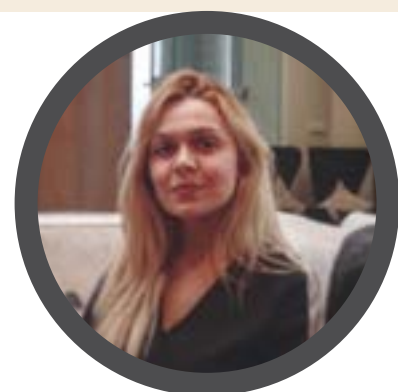
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## APPLICATION OF TAUNIT CARBON NANOTUBES AND ULTRAFINE DISPERSED DIAMONDS IN GALVANOTECHNICS

**Nasraoui Mariem, Litovka Yuri  
Vladimirovich and Dyakov Igor Alekseevich**

Tambov State Technical University, Russia



The creation of electrochemical metal and anodic oxide coatings with improved performance properties is one of the important directions in the development of electroplating. One of the rapidly developing ways to improve the characteristics of coatings is the use of nanomaterials in electrolyte formulations. The aim of the work is to create technologies for the production of nanomodified galvanic coatings with improved quality indicators. To achieve this goal, galvanic electrolytes were supplemented with nanocarbon material registered under the Taunit trademark. For the uniform distribution of nanocarbon in the electrolyte, the electrolyte treatment by ultrasound was used. In addition, the technology of using effervescent soluble tablets has been developed. The properties of coatings obtained by electrodeposition from electrolytes containing carbon nanotubes "Taunit" are studied. It was found that carbon nanotubes turn out to be additional centers of crystallization, as a result, the size of the coating crystal decreases and the coating becomes more wear-resistant, hard and corrosion-resistant. The concentrations of nano-additives "Taunit", at which the best quality indicators are achieved, are revealed. For zinc coating, the addition of 40 mg / l nanoadditives increases corrosion resistance by 4 times. For nickel and chrome plating, the addition of 70 to 80 mg / l nano additives increases wear resistance by 20%. The technology of obtaining nanomodified anodic-oxide coating of aluminum has been developed. The resulting coating has morphology with microprotrusions, as a result of which the coefficient of heat transfer from aluminum to air will increase by 23%. Similar positive results were obtained in many world scientific centers using nanodiamonds as an additive to electrolytes. The next stage of our work is the use of mixtures of nanodiamonds and nanomaterial "Taunit" as additives in electrolytes.

### Biography

Nasraoui Mariem has obtained her License Degree in Industrial Chemistry from National Institute of Applied Sciences and Technologies, Tunisia and Master's degree in Electrochemistry-Nano Chemistry from Tambov State University Tambov, Russia. She is pursuing her PhD degree in automated control of galvanic processes in Tambov State Technical University Tambov, Russia.

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# DAY 2

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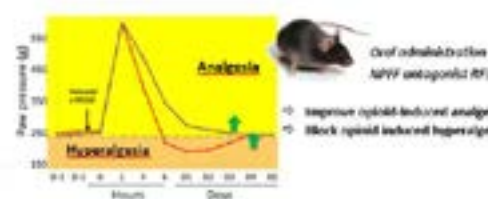
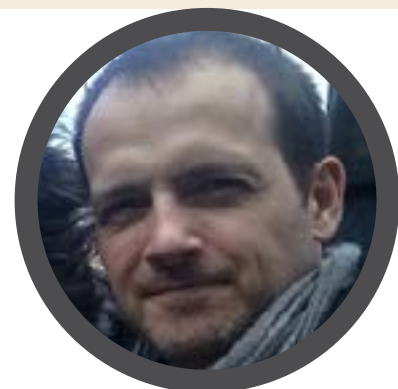
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## NOVEL ORALLY-ACTIVE NPFF RECEPTOR ANTAGONISTS PREVENTING OPIOID-INDUCED HYPERALGESIA DURING THE TREATMENT OF ACUTE OR CHRONIC PAINS

**F Bihel**

University of Strasbourg - CNRS, France

The development of drugs that can more effectively and safely treat both acute and chronic pain remains a major unmet challenge in pharmaceutical industry. Opiate analgesics, such as morphine or fentanyl, continue to be the cornerstone medication for treating moderate to severe pain, but their use upon chronic administration suffers from important side-effects such as tolerance, addiction and hyperalgesia. Several anti-opioid systems have been reported as valuable targets for blocking opioid-induced hyperalgesia (OIH). Among them, the NPFF receptors belonging to the GPCR family were recently identified as one of the keystones of the opioid-induced hyperalgesia. We developed the first NPFF-receptor antagonist (RF9), and its co-administration with opioid analgesics (fentanyl) led to block the delayed and long lasting paradoxical opioid induced-hyperalgesia and prevent the development of associated tolerance. However, the dipeptide nature of RF9 limited its application to sc or iv administration. Based on an extensive SAR study, we developed a peptidomimetic of RF9 containing novel unnatural amino acids. These basic amino acids were obtained through a specific Ru-catalyzed reduction of tertiary amides to afford in very high yields novel families of chiral  $\alpha$  or  $\beta$  Y amino acids exhibiting a large diversity of basic side chains. Obtained at a gram-scale, these unnatural amino acids are directly suitable for peptide synthesis in liquid or solid phase. When applied to the development of new ligand of NPFF receptors, we were able to design and synthesize RF313 as the first orally-active NPFF receptor antagonist able to reverse opioid-induced hyperalgesia in several pain models (post-operative pain, neuropathic pain, inflammatory pain). Active at low dose (1 mg/kg p.o. in rat), RF313 is also able to extend the duration of the analgesic effect induced by the opiates, opening the way to a promising therapeutic pathway to treat acute or chronic pain.



### Biography

F Bihel has completed his PhD from University of Marseille (France) and Postdoctoral studies from Harvard Medical School and BWH (Boston, MA, USA). He is currently Senior Researcher and Group Leader at the French National Center for Scientific Research (CNRS), within the Laboratoire d'Innovation Thérapeutique (UMR7200 – CNRS/University of Strasbourg). He is a member of several academic societies and has published more than 60 papers in reputed journals, and 6 patents. He is an expert in Medicinal Chemistry, with research programs dedicated to design and functionalization of innovative molecular scaffolds targeting proteins involved in CNS pathologies or cancers.

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## CATALYSIS IN WATER – KEY TO A SUSTAINABLE FUTURE

**C Len<sup>1,2</sup>**

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**T**he design of environmentally friendly methodologies has been the driving force of scientists in recent years. In particular the use of biomass-derived materials, green solvents and alternatives techniques has been investigated. In this presentation, several green chemistry approaches that target advanced synthesis and processes will be presented. These approaches include C-C bond formation such as Suzuki-Miyaura, Heck and Tsuji-Trost cross coupling reactions in water via conventional catalysis or micellar catalysis using microwave irradiation and high temperature/pressure; ultrasound irradiation in batch and in continuous flow. Conception, synthesis and physico-chemical properties will be detailed.



### Biography

C Len received his PhD in 1995 from the Université de Picardie Jules Verne followed by a Postdoctoral Fellowship at the University of Hull, England. In 1997, he became Assistant Professor at UPJV and was promoted to full Professor in 2004 at the Université de Poitiers, France and in 2010 at the Université de Technologie Compiègne, France. He has published almost 150 original publications, five chapters and eight patents. Among recent awards and recognition, he was promoted Honorary Professor of the University of Hull, England in 2012-2018. He is a Fellow of Indian Society of Chemists and Biologists, Fellow of the Association of Carbohydrate Chemists and Technologist of India and Fellow of the Royal Society of Chemistry. In 2017, he has been honored with Glycerine Innovation Award sponsored by the American Cleaning Institute and the National Biodiesel Board. His current research explores organic chemistry and catalysis applied to biomass.

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## ORGANOTRIFLUOROBORATES AND NEW ORGANIC TRANSFORMATIONS FOR AROYLATION, NITRATION, AMIDATION AND C-H ACTIVATION REACTIONS

**Mohammad Al-Masum**

Tennessee State University, USA

In the present world, the cross-coupling chemistry is best molecule maker in terms of atom economy, less waste, and environmentally favored. The developments in cross-coupling chemistry have extensively changed the protocols for the construction of natural products, building blocks for supramolecular chemistry and self-assembly, organic materials and polymers, and lead compounds in medicinal chemistry from simpler entities. In this work, we have furnished aroylation reactions by palladium-catalyzed cross-coupling of potassium organotrifluoroborates and aroyl chlorides, C-H activation of alkynes for conjugated enynes, nitration reactions by palladium-catalyzed cross-coupling of potassium organotrifluoroborates and sodium nitrite, and styryl amidation by Cu-Pd dual catalyst system involving styryltrifluoroborates and amides. These novel reactions and their mechanisms will be discussed.



### Biography

Mohammad Al-Masum has completed his PhD from Tohoku University, Sendai, Japan under Professor Yoshinori Yamamoto and Postdoctoral studies from Montana State University, MT, USA and University of Tennessee, TN, USA. Currently, he is working as a full Professor at Tennessee State University, Nashville, TN, USA. He has published more than 30 papers in peer-reviewed journals. He is journal reviewer for many journals.

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