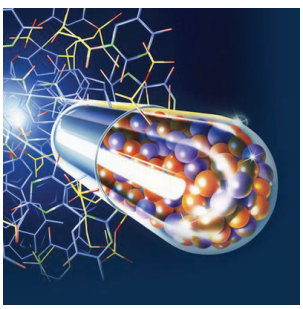
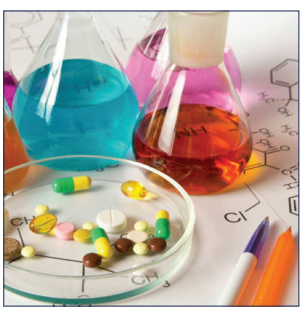
Video Presentation

Chemistry 2019







9th World Congress on

Chemistry and Medicinal Chemistry

May 13-14, 2019 | Prague, Czech Republic

Shin Aoki, Asian J Biomed Pharmaceut Sci, Volume:9
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Design and Synthesis of Cyclometalated Iridium (III) Complex-Peptide Hybrids for the induction of Cancer Cell Death

Shin Aoki
Tokyo University of Science, Japan

Cyclometalated iridium (III) complexes such as fac-Ir(tpy)3 (tpy = 2-(4′-tolylpyridine) are strong triplet luminescent organometallics not only in the production of organic light-emitting diodes (OLED) but also as chemosensors and bioimaging agents, due to their excellent photophysical properties and stability even in aqueous solution [1]. In this paper, we present the design and synthesis of new cyclometalated Ir complex-peptide hybrids (IPHs) as detectors of cancer cells and/or inducers of their cell death [1,2] based on the regioselective substitutions [3]. The IPHs linked with cationic peptides such as GGKK(K) sequences through C6 or C8 linker exhibit potent cytotoxicity against Jurkat cells and strong green emission from IPHs were observed in dead cells [2]. On the other hand, it was found that IPHs having cyclic peptides that had been reported to bind to death receptor (DR) of cancer cells bind to DR5 expressed on cancer cells and induce their necrosis-type [3a] or apoptosis-type cell death [3b]. In this paper, these results will be reported.

Speaker Biography

Shin Aoki graduated from the University of Tokyo with B. S. (1986), M.S. (1988), and Ph.D. (1992) degrees in pharmaceutical sciences under the supervision of Prof. Kenji Koga. He started his academic carrier as an assistant professor at the University of Tokyo from 1990. Following postdoctoral positions with Professor Chi-Huey Wong at the Department of Chemistry, the Scripps Research Institute, USA, he joined Prof. Eiichi Kimura's research group in 1995 at the Faculty of Medicine, Hiroshima University, where he became an associate professor in 2001. In 2003, he was promoted to a professor at the Faculty of Pharmaceutical Sciences, Tokyo University of Science, and has been appointed as the Vice Dean of Research Institute for Science and Engineering, Tokyo University of Science, since 2018. He is a recipient of the Award of Japan Society of Coordination Chemistry for Young Scientists (1999), the AJINOMOTO Award in Synthetic Organic Chemistry, Japan (2001), the Pharmaceutical Society of Japan Award for Young Scientists (2002), and so on. His major research interests are organic synthetic chemistry, bioinorganic chemistry, supramolecular chemistry, photochemistry, and medicinal chemistry, mainly using metal complexes in aqueous solutions.

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Accepted Abstracts

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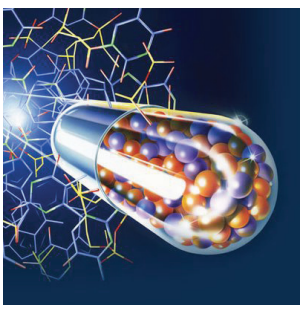



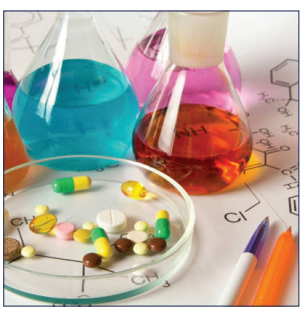

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The pros and cons of being a parasite: Obligate parasites produce myriads of protein isoforms from each gene

Sergey Melnikov
Yale University, USA

I study the phenomenon of genome decay in obligate intracellular parasites – organisms that exploit living cells of other species as a nutrient-rich shelter in which to grow, reproduce, and evade the host immune response. As intracellular parasites evolve under conditions with alleviated natural selection, they suffer from irreversible accumulation of deleterious mutations and progressive genome decay. Through biochemistry, genetics, structural biology and bioinformatics, I investigate how the genome decay affects structure and activity of molecular machineries of a parasite cell. Because the genome decay problem is universal, I move back and forth between bacterial and eukaryotic pathogens (Microsporidia, Wolbachia, Mycoplasma). These studies are important because they are uncovering fundamental principles and predictable routes of pathogen evolution and because they may lead to new effective therapies to eliminate diseases caused by intracellular parasites.

The talk will present my recent findings that the genome decay in intracellular parasites eradicates one of the most fundamental properties of a cell – its ability to accurately translate the genetic code into correct protein sequences. For instance, in Microsporidia – emerging pathogens of animals, including humans, mosquitos and honey bees – protein synthesis is accompanied with statistical errors in protein sequence leading to expression of myriads of protein isoforms from each gene. In my talk I will highlight our current efforts to understand the impact of error-prone protein synthesis on parasites' fitness and parasite-host interaction. Also, I will present our progress in using the error-prone protein synthesis as a target to treat parasite infections.

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Material science for medical radionuclides production: Cyclotron solid target preparation in the framework of LARAMED project

Hanna Skliarova, S Cisternino, G Cicoria, M Marengo, G Gorgoni, E Cazzola, J Esposito, C Rossi Alvarez and **V Palmieri**
National Institute of Nuclear Physics, Italy

Nuclear medicine is a field of medicine that uses a trace amount of radiopharmaceuticals for the diagnosis and treatment of many health conditions such as certain types of cancer, neurological and heart diseases. Radiopharmaceuticals are pharmaceutical drugs containing radioisotopes.

Nowadays two main approaches to produce radioisotopes for medical interest are used: as decay products in so-called "generators" and a direct production by cyclotron irradiation of a dedicated target.

At INFN-LNL a new high performance 70 MeV cyclotron has been installed. It will be dedicated not only to nuclear physics study, but also part-time to medical physics application. LARAMED (Laboratory of Radioisotopes for Medicine) project is aimed to R&D on medical radionuclides cyclotron production. Waiting for the facility full operation, LARAMED team has started working on the cyclotron production of conventional (Tc-99m) and emerging (Cu-67, Sc-47, Mn-52) radionuclides in a collaboration with other institutions.

Suitable target design and preparation is one of the most critical technological challenges in cyclotron production of radioisotopes. To maximize the nuclear reaction yield, the production should be performed at maximum proton currents. Thus, the target system should provide high efficiency of heat dissipation. The basic solid target system supposed to be the target material deposited on a baking plate, liquid/gas cooled. In order to maximize the heat dissipation, the target should be constructed of materials with maximum thermal conductivity, including both target material itself and target backing plate, by a method providing good thermo-mechanical contact between them. The chemical inertness of the backing plate in the target dissolution conditions should be also considered.

For different radionuclides production LARAMED group has studied a set of non-classical techniques for metallic target preparation, like magnetron sputtering, High energy Vibration Powders Plating (HIVIPP) and Spark Plasma Sintering (SPS). Current presentation will include results on the use of described methods.

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Catalysts for H_2-cleanup technologies. The role of the support

José Antonio Odriozola
University of Sevilla, Spain

Since E. Davy at the beginning of the 19th century is customarily accepted that metal dispersion plays a fundamental role in the activity of solid catalysts and therefore enormous efforts were dedicated to reduce the size of the active phases since the increase of the surface-to-volume ratio on reducing particle sizes. The development of nanotechnology has resulted in synthetic strategies for nanomaterials allowing metal nanoparticles with well-defined surfaces. This has lead to fill the gap between the reactivity of well-defined faces of metal single crystals and conventionally prepared catalysts with a broad size distribution of the metal particles with uncontrolled shape. As a result of these advances the modification of the catalyst selectivity by altering size and/or shape of the nanoparticles has been clearly understood as well as the molecular factors that cause them, including structures, surface compositions, oxidation states and gaseous environments. For instance, the size modification affects the relative proportion of exposed faces of FCC metal nanoparticles. This has a significant effect on the metal activity in, for instance, oxidation reactions. However, on supporting these metal nanoparticles a direct relationship between the size/shape and the catalytic activity may not be present

In this talk, we address the role of the support in a set of relevant catalytic reactions for H_2-cleanup: WGS, COPROX and the Sabatier reaction. Operando studies of these reactions help in understanding the synergies occurring at the metal interfaces during the catalytic reaction that sometimes are of greater relevance than size or shape.

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Chemistry for sustainability study

Guangwei Huang
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Chemistry provides a foundation for understanding various basic and applied scientific disciplines at a fundamental level. It appears that industry has been making the best use of chemistry science as it converts raw materials (oil, natural gas, air, water, metals, and minerals) into more than 70,000 different products, which are central to the modern world economy. However, for the sake of sustainability, we should pursue for not just chemical production but more importantly, environmental chemistry that is the study of chemical processes occurring in the environment which are impacted by mankind's activities and the impacts may be felt through the presence of pollutants or toxic substances from various sources.

This talk presents several case studies of environmental degradation including water pollution and soil contamination. These cases require the profound knowledge of chemistry science for better solutions. Therefore, this presentation will serve as a call for further deep collaboration between environment conservation, chemistry science and business world.

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Sustainable utilization of clinical solid waste materials with supercritical carbon dioxide

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There is increasing concern on the safe handling and sustainable utilization of hazardous solid waste materials are generating by health care facilities. The potential threat of clinical solid waste materials is the presence of opportunistic human pathogen. Current practices for clinical solid waste management, particularly in developing country, open dumping, landfilling and incineration. These uncontrolled practices of clinical sold waste pose serious health hazards and environmental pollution concern. The clinical sold waste materials would recycle and reuse after it has sterilized with an effective sterilization technology. Supercritcial carbon dioxide ($scCO_2$) is an effective sterilization technology, able to eliminate any short of microbial threat without destroying the heat sensitive plastic and polymer materials. Therefore, the adoption of SC-CO_2 sterilization technology in the management of clinical waste would be benefited to a health care facility in several ways, including: (i) handling and segregation of clinical solid waste can be carried out without any risk of infection; (ii) Sterilized clinical solid waste materials such as medical tools and equipments made from metal or plastic components, plastic materials, paper, cardboard, etc. can be reused and recycled; (iii) reduce the exposure of infection, decrease labor, lower costs, and yield better compliance with regulatory and accrediting agencies. The hospital can both save money and provide a safer environment for patients, healthcare staffs and clinical staffs.

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Stability and influence of agro-environmental conditions on phenolic compounds and biological properties of Grape (*Vitis vinifera L.*) stems

Irene Pereira Gouvinhas
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The winery industry is one of the most important industries worldwide, with an economical and social impact in Europe and specially in northern Portugal. This socio-economic activity entails large quantities of by-products generated annually, causing economical and environmental problems. In a close connection with the 40 years history of investigation on agro-food valorization, nowadays, a growing interest has wake up on recycling winery wastes boosted by the more and more reported putative health-promoting effects. Furthermore, the continuous emergence of multidrug resistant bacteria is becoming a huge threat to human, animal and environmental health (One health approach). Therefore, the research for new natural antimicrobial compounds is the most promising alternative to effectively control multidrug bacterial infections. Hence, qualitative and quantitative evaluation of polyphenolic extracts of grape stems as sources of individual phenolic compounds and their biological activity *in vitro* (radical scavenging power and antimicrobial activity) were assessed. Grape stems revealed to be a rich source of phenolic compounds, even after some months of storage. Furthermore, all extracts (with and without storage) were able to inhibit the bacterial growth of the Gram-positive bacteria and Gram-negative bacteria (except E. coli and K. pneumoniae), revealing the potential inclusion of these bioactive compounds in the food, cosmetic, and pharmaceutical industry as functional ingredients. Furthermore, and as expected, it was also verified a year-to-year variation proved by a significant increase of these parameters from 2017 to 2018, revealing the high influence of growing seasons in the phytochemical composition of these by-products. The antimicrobial activity determined in these samples demonstrated to be not severally affected by the climate conditions of each year of study, however, the high altitude induced generally a lower activity in the stem samples, results confirmed by the multivariate analysis.

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New mathematical models for adsorption on heterogeneous surface of carbonaceous adsorbents

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AGH University of Science and Technology, Poland

The optimal selection of the methods and conditions for the production of adsorbents requires reliable and accurate description of the parameters of the heterogeneous surfaces and physico-chemical processes occurring on them. Many theories of the adsorption processes were developed in the past century, which assume different mechanisms of processes on surfaces and various simplifications. This work presents the results of the application of new mathematical models with the unique numerical fast multivariate numerical identification procedure as the universal tool for analysing the heterogeneous surfaces. The mathematical models are based on general thermodynamics expressing changes of internal energy ΔH and configurational entropy ΔS due to the process. To derive the formulas for ΔH and ΔS were exploited a BET-like approach, in which the adsorption system is constructed by considering a virtual multistep adsorption. In the proposed model's adsorption process is viewed as a clusterisation of adsorbate molecules in pores, with a cluster size limited by micropore size. A set of pore geometry – adsorption energy relationships is derived and checked by fast multivariant fitting procedure of the model to adsorption data. The proposed models yield a broader range of reliable information on the surface structure of the analysed material, which is particularly useful for the assessment of the impact of production process conditions and modifications on the development of both geometrical and energetic properties of the surface of heterogeneous catalysts.

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