北海道大学
大学院総合化学院
GRADUATE SCHOOL OF CHEMICAL SCIENCES AND ENGINEERING
HOKKAIDO UNIVERSITY

北海道大学 理学部
School of Science,
Hokkaido University

化学部門特別講演会

演題：SPASER-based Nanolasing-Probe and Cell Thermodynamic Measurements

講師：**Bin Kang 准教授**
南京大学化学化工学院

日時：2022 年 7 月 6 日(水)　16:30～18:00

場所：北海道大学　理学部　本館　N-308

※感染対策を施した参加者対面とビデオ会議システム「Zoom」を併用したオンライン参加を併用したハイブリッド開催を予定。Kang 先生はオンラインにてご講演。

ABSTRACT

The development of modern biomedicine largely depend on the invention and use of advanced probes. Currently used luminescent materials, limited by the physical properties of spontaneous emission, generally have a spectral width of 30-100 nm. In order to overcome the spectral crosstalk between different emitters, scientists expect to shrink the laser to the nanometer scale to realize a Nanolasing probe that could emit laser-like monochromatic light. Nanoparticles based on SPASER (Surface Plasmon Stimulated Emission Amplification) are an effective way to realize nanolasing. The first part of the seminar will discuss the basic concept and development history of SPASER; focus on key issues and unaddressed controversies in the SPASER nanoparticle system; In the second part of the seminar, we will share with you our explorations and attempts to measure the heat transfer and dissipation inside a single cell using advanced nano-probes and transient optical imaging techniques.

※本講演会は HSI 事業「世界を先導する物質化学 II(生体電気化学の基礎と応用)」、「化学特別講義(修士課程)/先端総合化学特論Ⅱ(博士後期課程)(注：HSI 受講者は履修対象外)」の一部として開催します。

主催：総合化学院
共催：物質科学フロンティアを開拓する Ambitious リーダー育成プログラム
スマート物質科学を拓くアンビシャスプログラム
フロンティア化学教育研究センター
協賛：公益社団法人日本化学会北海道支部、公益社団法人電気化学会北海道支部

HOKKAIDO UNIVERSITY
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北海道大学 スマート物質科学を拓く
アンビシャスプログラム

連絡先：世話人 北海道大学理学研究院化学部門　村越 敬（TEL:011-706-2704）

北海道大学
大学院総合化学院
GRADUATE SCHOOL OF CHEMICAL SCIENCES AND ENGINEERING
HOKKAIDO UNIVERSITY

北海道大学 理学部
School of Science,
Hokkaido University

化学部門特別講演会

演題：**Lead-free Perovskite Solar Cells**

講師：**Eric Diau 教授**

台湾国立陽明交通大学

日時：2022 年 7 月 13 日(水)　16:30～18:00

場所：北海道大学　理学部　7 号館　7-310 教室

ABSTRACT

The performance of a tin-based perovskite solar cell (PSC) has undergone rapid progress in recent years but most high-performing devices were fabricated according to a traditional one-step method with the key anti-oxidizer or passivator treated as an additive in the perovskite precursor solution. Herein we present a sequential deposition procedure to passivate the surface of a hybrid mixed cationic perovskite with phenylhydrazinium halide (PHX, X = Cl, Br, I and SCN) dissolved in trifluoroethanol (TFE) solvent. This work provides a new direction for the development of HTM-free lead-free perovskite solar cells for their future up-scale production. We deposited a smooth and uniform tin-perovskite layer on a hydrophobic conducting polymer, (bis (4-phenyl) (2,4,6-trimethylphenylamine) (PTAA), on modification of the PTAA surface with an organic ammonium salt, phenylethylammonium iodide (PEAI), according to a two-step approach. We found that π-π interaction between the phenyl rings of PTAA and PEAI plays an important role to modify the hydrophobicity of the PTAA surface and to passivate the crystal surface so as to form a tin-perovskite film of high quality. The FASnI3 device with PTAA serving as a hole-transport layer (HTL) attained PCE 8.3 % with great stability, becoming the first example reported for a PTAA-based tin-perovskite solar cell. Our approach is applicable to other prospective HTL materials to match the energy levels between perovskite and HTL so as to enhance further the performance of the device.

※本講演会は HSI 事業「世界を先導する分子化学 II(光エネルギー変換デバイスの最前線)」、「化学特別講義(修士課程)/先端総合化学特論Ⅱ(博士後期課程)(注：HSI 受講者は履修対象外)」の一部として開催します。

主催：総合化学院

共催：物質科学フロンティアを開拓する Ambitious リーダー育成プログラム
スマート物質科学を拓くアンビシャスプログラム
フロンティア化学教育研究センター

協賛：公益社団法人日本化学会北海道支部、公益社団法人電気化学会北海道支部

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Open New Frontiers in Materials Science

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北海道大学 スマート物質科学を拓く
アンビシャスプログラム

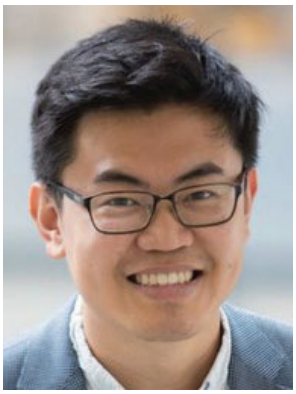
Frontier Chemistry Center
フロンティア化学教育研究センター

連絡先：世話人 北海道大学理学研究院化学部門　村越 敬（TEL:011-706-2704）

Frontier Chemistry Center
フロンティア化学教育研究センター
講演会

演 題：**Data-Driven Computational Materials Design:**

A tutorial on modern materials informatics



講 師：Prof. Wenhao Sun
(University of Michigan)

日 時：2022 年 8 月 5 日（金）10:30～12:00
※ビデオ会議システム「Zoom」によるオンライン開催
定 員： 100 名

要 旨：The Materials Genome Initiative (MGI) is an ongoing initiative to discover, manufacture, and deploy advanced materials twice as fast, at a fraction of the cost. Many MGI efforts are enabled by large-scale materials informatics—employing methods such as high-throughput computing, data-driven materials optimization, and knowledge discovery in materials databases. In this lecture, we will review successful examples of MGI efforts in the design of novel lithium-ion batteries and ternary nitride materials, as well as techniques for predicting the synthesis and synthesizability of these predicted computationally-predicted materials. The second half of the lecture will provide a practical tutorial covering how to access data from the Materials Project with Python, and strategies for designing and executing a data-driven research project in Materials Science and Engineering.

本講演は、Hokkaido Summer Institute G063 の一部として開催されます。
履修者以外で聴講を希望する人は、
https://forms.gle/ndraRCQjimf1YfnX8 から申し込みをお願いします。

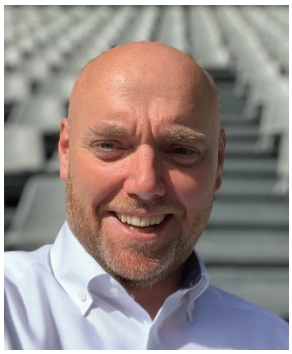
連絡先：工学研究院応用化学部門 三浦章（内線：７１１６）
接続先が届かない場合の問合先：同 島田敏宏 shimadat@eng.hokudai.ac.jp

フロンティア化学教育研究センター

Frontier Chemistry Center 講演会
フロンティア化学教育研究センター

演 題：**Hybrid materials made of solids and liquids – from catalyst immobilization to membrane reactors**

講 師：**Dr. Marco Haumann**
Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU),
Chemische Reaktionstechnik (CRT)



日 時：2022 年 8 月 5 日（金）14:45~16:15

場 所：フロンティア応用科学研究棟 1 階 セミナー室 1

※感染対策を施した参加者対面とビデオ会議システム「Zoom」によるオンライン参加を併用したハイブリッド開催。Haumann 先生はオンラインにてご講演。

ABSTRACT

Classical heterogeneous catalysis is extremely attractive for industrial production since separation of product and catalyst usually is simple and complete. However, in many technical, heterogeneously-catalyzed processes, only a small part of the metal loading is responsible for the majority of the observed catalytic activity. In traditional homogeneous catalysis, in contrast, all dissolved metal complexes show a uniform reactivity that can be rationally optimized by the help of suitable ligands. The price to pay is that product-catalyst separation is often difficult in these systems.

Hybrid materials, as investigated in the Haumann lab, are bridging homogeneous and heterogeneous catalysis by placing a suitable LIQUID (e.g. ionic, organic, metallic) onto dedicated SUPPORTS (e.g. ceramic, carbon). Examples presented in this work will showcase applications in hydroformylation, selective hydrogenation and water-gas shift reaction. In addition, these hybrid materials allow the implementation into membrane reactors for the first time, hence further process intensification is possible.

本講演は、Hokkaido Summer Institute『Leading and Advanced Molecular Chemistry and Engineering IIIC （Separation Process Engineering II）』の一部として認定されています。

共 催：北海道大学大学院総合化学院,フロンティア化学教育研究センター

連絡先：工学研究院 応用化学部門 荻野 勲（内線：6595）

フロンティア化学教育研究センター

Frontier Chemistry Center 講演会
フロンティア化学教育研究センター

演 題：**Redox-Active and AIE-Active Functional Materials for Optoelectronic Applications**

講 師：Prof. Guey-Sheng Liou
(Institute of Polymer Science & Engineering, National Taiwan University, Taiwan)

日 時：2022 年 9 月 2 日（金）14:45～16:15

場 所：MC030, Material and Chemistry Building, Faculty of Engineering

※Zoom online platform https://zoom.us/j/94338994325

Abstract: This article describes the recent development of triphenylamine (TPA)-based advanced materials for various optoelectronic applications, such as electrochromic (EC), electrofluorochromic (EFC), and polymeric memory devices. We herein systemically discuss the structural design, optical and electrical properties of different TPA-containing high-performance polymers (HPPs) that will be beneficial for polymer chemists and scientific community to have deeper and broader understanding of the recent developments and further prompt the engineering and conceptual design of materials for a number of emerging applications (data storage, displays, and flexible electronics). Thus, a majority of the recent works in our laboratory involving the synthesis and property evaluation of functional HPPs as well as their structural design by using the respective novel TPA-based monomers will be included in this talk as the application of AIE-active PL luminescent and EC materials with interesting color transitions, good EC reversibility in the visible region or NIR range, EFC (so called electrochemically photo-switching) and photoinduced transistor memory devices. The relation between structures and properties of the resulted functional high-performance polymers will be presented in terms of their functionality.

References:

1) H. J. Yen, G. S. Liou, Design and Preparation of Triphenylamine-based Polymeric Materials Towards Emergent Optoelectronic Applications. *Prog. in Polym. Sci.*, ***89***, 250-287, **2019**.
2) C.Y. Ke, M. N. Chen, M. H. Chen, Y. C. Chiu*, and G. S. Liou*, Novel Authentic and Ultrafast Organic Photo-recorders Enhanced by AIE-Active Polymer Electrets via Interlayer Charge Recombination. *Adv. Funct. Mater.* ***31***, 2101288, **2021**

主　催：北海道大学大学院総合化学院，フロンティア化学教育研究センター

連絡先：工学研究院応用化学部門 佐藤　敏文（011-706-6602）

Frontier Chemistry Center 講演会
フロンティア化学教育研究センター

演 題：**Self-Assemblies of Carbohydrate-Based Block Copolymers: Ultra-Nano-Structured Thin Films**

講 師：Prof. Redouane Borsali

University Grenoble Alpes,
CNRS, CERMAV, 38000 Grenoble, France

日 時：2022 年 9 月 30 日（金）9:00～10:30

場 所：フロンティア応用科学研究棟 1 階セミナー室 1

※Webex online platform: https://hokudai.webex.com/meet/polychem

要 旨：

During the last past decades, numerous studies have been focused on the self-assembly of petroleum-based block copolymers (BCPs) for potential applications in multidisciplinary fields, such as: nano-organized films used in microelectronic applications. Such materials are derived from fossil resources that are being rapidly depleted and have negative environmental impacts. In contrast, carbohydrates are abundant, renewable and constitute a sustainable source of materials. This is currently attracting much interest in various sectors and their industrial applications at the nanoscale level will have to expand quickly in response to the transition to a bio-based economy. The self-assembly of carbohydrate BCP systems at the nanoscale level via the bottom-up approach, has allowed only recently the conception of very high-resolution patterning (thin films with sub_10nm resolution) and provides these new materials with novel properties for new generation of nanolithography, memory devices, OPV, high resolution biosensors. We will present recent results on the self-assemblies of carbohydrate-based block copolymer leading to highly nanostructured thin films (sub-10nm resolution) in combination of solvent and/or thermal annealing as well as new and ultra-fast microwave “cooking” approach”.

出席確認方法：

Webex 入室時に（学生は学生番号および）氏名をチャットで記入してください。

主　催：北海道大学大学院総合化学院，フロンティア化学教育研究センター

連絡先：工学研究院応用化学部門　磯野 拓也（011-706-2290）

フロンティア化学教育研究センター

HOKKAIDO UNIVERSITY

～講演会のご案内～

SMatS

モントリオール大学の Adrian Serohijos 先生による講演会を企画いたしました。Serohijos 准教授は、タンパク質の分子進化の研究において、多くの顕著な業績を上げておられます。今回は、ゲノムワイドな多型とタンパク質間相互作用における最新の研究について、ご講演をしていただきます。多数のご参加をお待ちしております。

演 題: “***Dissecting the functional drivers of complex phenotypes using protein-interaction quantitative trait loci mapping (piQTL)***”

講 師: **Dr. Adrian Serohijos**

(Université de Montréal, Canada)

日 時: **2022 年 10 月 14 日（金）14:00～**

場 所: 北海道大学理学部 6 号館 6-204-02 室＜多目的演習室＞

共 催: 北海道大学大学院総合化学院，フロンティア化学教育研究センター，
北海道大学物質科学フロンティアを開拓する Ambitious リーダープログラム，
北海道大学スマート物質科学を拓くアンビシャスプログラム，
日本生化学会北海道支部，生命分子化学セミナー

要 旨:

The Central Dogma in Biology dictates that information flows from DNA to RNA, to proteins, and to complex phenotypes, which are governed by several hundred to thousands of genes. Complex traits in humans include height, intelligence, psychological state, and various diseases. I will describe the development of an approach, piQTL (Protein-Interaction Quantitative Trait Loci) mapping, to trace the flow of biological information by correlating genome-wide polymorphisms to how perturbations in protein-protein interactions.

連絡先：北海道大学大学院理学研究院化学部門 生物化学研究室
坂口 和靖（011-706-2698）