レンセラー工科大学 － 北海道大学 共催

第 3 回 RPI–HU 共同セミナー
“RPI-HU joint seminar on advanced semiconductor and related technologies for future communication and computing”

2024 年 8 月、本学は、レンセラー工科大学*（米国：ニューヨーク州）と、半導体分野における人材育成・研究活動での協力を共に検討していくための合意書を締結しました。研究者レベルでの技術交流を活発化し両大学の連携を一層強化することを目的に、RPI – HU 共同セミナー・シリーズを企画しましたのでご案内いたします。今回は 3 回目の開催となり、Rena Huang 教授（レンセラー工科大学 Electrical, Computer, and System Engineering Department）と島田敏宏 教授（北海道大学 大学院工学研究院応用化学部門）の双方から、最新の研究内容を紹介していただきます。本学教員の皆さんをはじめ、研究員・学生の皆さんも聴講可能ですので、お誘い合わせの上、ぜひご参加ください。

*レンセラー工科大学: Albany NanoTech Complex、IBM など、地域の半導体主要機関と緊密な関係を有し、半導体分野における教育及び研究において先進的な取り組みを行なっています。

開催概要

「第 3 回レンセラー工科大学-北海道大学共同セミナー」

日時：2025 年 4 月 23 日（水）8:00am ～ 9:00am

形式：オンライン-Webex meeting（事前受付不要）

https://rensselaer.webex.com/rensselaer/j.php?MTID=mcef5e8ad3061c9793eaab35fad36d049

Meeting number (access code): 2344 095 4852

Meeting password: NAerGDY93y3

※ご不明点ございましたら世話人：佐藤威友（taketomo@rciqe.hokudai.ac.jp）までお問い合わせください。

講演内容

“Large Scale Integrated Optoelectronic Devices and Systems for Photonic Computing”

Prof. Rena Huang, *Rensselaer Polytechnic Institute, USA*

Abstract: Over the past decade, integrated optoelectronic systems have emerged as a promising platform for photonic computing. Enabled by silicon photonics foundries worldwide, most photonic computing systems are fabricated through standardized foundry processes. While this area continues to grow, there is increasing interest in extending the capabilities of silicon photonics through heterogeneous integration with non-silicon materials. In this talk, I will present our recent work on Bragg grating and photonic crystal (PhC) waveguide-enabled slow-light silicon modulators for efficient matrix-vector multiplication (MVM), a fundamental operation in many computing tasks. I will also highlight emerging directions in our research, including the integration of indium tin oxide (ITO) for low-power optical switching and the use of phase-change materials to realize non-volatile photonic components. These technologies pave the way for energy-efficient, scalable photonic systems and open new opportunities for implementing unsupervised learning directly in the optical domain.

“Chemical Search and Defect Engineering of New Semiconductor Materials”

Prof. Toshihiro Shimada, *Hokkaido University, JAPAN*

Abstract: There are various types of semiconductor materials. 2D materials and organic molecular crystals are two important variations for future semiconductor devices. We have studied molecular beam epitaxy (MBE) and chemical vapor deposition (CVD) of 2D metal chalcogenides, both suffering from chalcogen vacancies. We found that high pressure might be key to controlling defect densities and developing equipment to study it. Organic semiconductors are made from molecules with vast variations, which can be chemically synthesized in a flask. They are mechanically flexible but have a trade-off relation with carrier mobilities due to strong polaron effects. We have developed the crystallization technique using naphthalene as a solvent and found interesting molecule arrangements. We discovered that semiconductor molecules in a crystal can be polymerized under very high pressure, hopefully leading to new carbon allotropes for semiconductor applications.

セミナー世話人

Prof. Christian M. Wetzel, *Rensselaer Polytechnic Institute, USA*

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