



令和7年度第5回超越量子未来アリーナ

ネオ・エクセレントコアセミナー

Advances in Atomic Fabrication for Diamond Quantum Computing

講演者: Dr. Hung-Hsiang Yang

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日 時: 令和8年1月29日 (木) 15:30-17:00

開催場所: 知識科学系講義棟 2階 中講義室

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【講演概要】

Diamond is a leading platform for room-temperature quantum technologies based on nitrogen-vacancy (NV) centers, but scalable quantum computing requires deterministic placement and coupling of NVs with atomic-scale precision. Achieving such control remains a central fabrication challenge.

In this seminar, I will introduce recent advances in atomic fabrication for diamond quantum computing, with an emphasis on scanning tunnelling microscope (STM)-based surface engineering. While STM lithography is well established on materials such as silicon and metals, its application to diamond has remained largely unexplored. I will present our progress in STM studies of hydrogen-passivated diamond C(100) and C(111) surfaces, including controllable nanometer-scale surface modifications and atomically resolved imaging on both surface orientations. These results establish the essential capability to visualize and manipulate diamond surfaces at the atomic scale, providing a critical step toward deterministic NV engineering.

Our work highlights the potential of STM-enabled atomic fabrication as a pathway toward scalable, room-temperature diamond quantum computing and related quantum technologies.

Ref. "Bottom-up fabrication of scalable room-temperature diamond quantum computing and sensing technologies", L. Oberg, et al., 2025 Mater. Quantum. Technol. 5 033001
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【講演者略歴】

09/2006 - 07/2010

Bachelor of Physics National Taiwan Normal University

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Doctor of Physics National Taiwan University Prof. Minn-Tsong Li

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Prof. Yukio Hasegawa Postdoc, Surface Scientist University of Tokyo Responsible for operating and maintaining low-temperature ultra-high vacuum scanning probe systems

10/2019 – 01/2022

Karlsruhe Institute of Technology Prof. Wulf Wulfhekel Postdoc, Surface Scientist Responsible for upgrading home-built low-temperature ultra-high vacuum scanning probe systems

01/2022 – 11/2022

Quantum Brilliance GmbH Senior Surface Scientist Responsible for setting up atomic-scale fabrication laboratories and progressing towards company North Stars

11/2022 – present

Quantum Brilliance GmbH Lead Surface Scientist Responsible for leading a team of scientists and engineers to develop core fabrication techniques for diamond quantum computers.

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