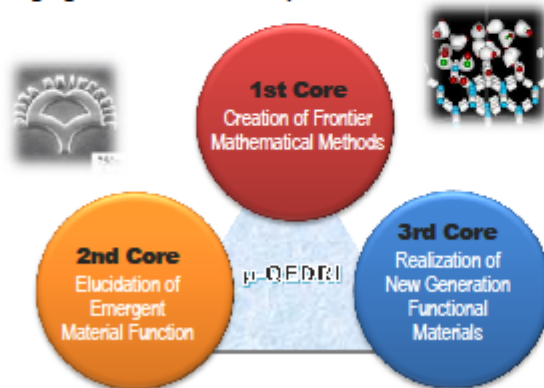


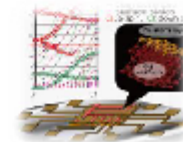
What μ -QEDRI is

Universal Quantum Engineering Design Strategic Research Initiative (μ -QEDRI)

Universal Quantum Engineering Design Strategic Research Initiative (μ -QEDRI) was established in 2014 to succeed Quantum Engineering Design Research Initiative in promoting Osaka University Graduate School of Engineering as one of the "World Premier Research Centers". It is composed of researchers from various fields such as Physics, Chemistry, Mathematics, Information Technology, and Computer Science. Its mission is to carry out researches that would effectively meet the ever-changing needs of the society.



μ -QEDRI aims to promote the design of novel materials, highly sophisticated and functional devices, as well as environment-friendly technology, through the development of novel theoretical routines and techniques.



It has significantly contributed to quantum engineering research and has established collaboration with various universities in different countries.

Furthermore, it promotes academic and research excellence among young researchers and students through its graduate program "Quantum Engineering Design Course (QEDC)".

The Master's and Doctor's Degree Programs in QEDC equip the next generation of young scientists with fundamental knowledge and state-of-the-art research skills in quantum engineering design. Most of the lectures and seminars are conducted in English. The students will have ample opportunity to network and collaborate with several local and international universities, as well as research institutions and industries through the vast linkages established by QEDRI.

<http://www.dvn.ap.eng.osaka-u.ac.jp/QEDC/home.html>

μ -QEDRI Organization



Education

◆ Quantum Engineering Design Course (Master's and Doctor's Degrees)

Quantum Engineering Design Course provides students with up-to-date and world-class research techniques related to advance quantum engineering design in response to global, technological and environmental issues. This program extends across 3 academic divisions and 10 departments, having 3 core areas, viz.,

- (1) Creation of frontier mathematical methods,
- (2) Elucidation of emergent material function, and
- (3) Realization of new generation functional materials.

QEDC students are assigned to one of the professors of the above core areas according to their research theme. By taking advantage of this organizational network, students can carry out research and develop a human network of students from various countries and academic fields.

Students successfully finishing this 5-year course program will obtain both Master's and Doctor's Degrees.

◆ Quantum Engineering Design Course Workshops

- Quantum Engineering Design Course Workshop & Thesis Presentation and Defense, Osaka University, 3July 2018
- QEDC Short-Term Research Program Final Presentation, 28August 2018
- Quantum Engineering Design Course Workshop, Osaka University, 16November 2018
- Quantum Engineering Design Course Workshop & Thesis Presentation and Defense, Osaka University, 29-30January 2019



QEDC Short-Term Research Program Final Presentation



QEDC Thesis Presentation and Defense 3July2018/30Jan2019

Recent Activities

◆ International Exchange

- Osaka University - The National University of Malaysia (UKM), Malaysia, Double Degree Program Meeting, 02February 2018



OU-USM DDP Signing Ceremony



OU-UKM DDP Meeting

- Osaka University - University of Science Malaysia (USM), Malaysia, Double Degree Program Signing Ceremony, 05February 2018

- Osaka University - Institute of Technology Bandung (ITB), ASEAN Campus Signing Ceremony, 27 July 2018
- Osaka University - University of Science Malaysia (USM), Malaysia, International Joint Research Promotion Program, 03 October 2018
- Osaka University - De La Salle University, Philippines International Meeting, 06 November 2018, etc.



OU-DLSU International Meeting



OU-ITB ASEAN CAMPUS Opening Ceremony

◆ Computational Materials Design (CMD*) Workshops

- 3rd Asia CMD Workshop Malaysia, The National University of Malaysia (UKM), Malaysia, 7-11 May 2018
- 33th CMD Workshop, Osaka University, Japan, 3-7 September 2018
- 10th Asia CMD Workshop Philippines, De La Salle University, Philippines, 18-19 Sep 2018
- 10th Asia CMD Workshop Indonesia, Institute of Technology Bandung, Indonesia, 15-17 Oct, 2018
- 9th Asia CMD Workshop Vietnam, Thanh Tay University, Vietnam, 27-29 Nov, 2018
- 34th CMD Workshop, Osaka University, Japan, 18-22 February 2019



**3rd ASIA CMD Workshop,
The National University of Malaysia, Malaysia**



**10th ASIA CMD Workshop,
De La Salle University, Philippines**



**10th ASIA CMD Workshop,
Institute of Technology Bandung, Indonesia**

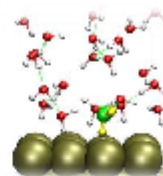


**9th ASIA CMD Workshop,
Thanh Tay University, Vietnam**

1st Core Creation of Frontier Mathematical Methods

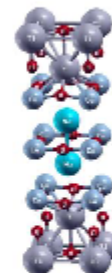
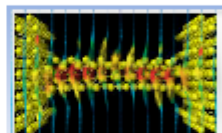
Yoshitada MORTIKAWA (Chair of the 1st Core)

Professor, Department of Precision Science & Technology,
Graduate School of Engineering
Physics, Quantum Simulation, Surfaces & Interfaces, Heterogeneous Catalysis,
Electrochemistry, Organic Devices



Satoshi HAMAGUCHI

Professor, Center for Atomic and Molecular Technologies,
Graduate School of Engineering
Plasma Physics and Technologies, Computational Plasma Physics,
Plasma Processing for Semiconductor Devices and Biomaterials,
Plasma and Beam Experiments, Atomic-scale Simulation



Koichi KUSAKABE

Associate Professor, Department of Materials Engineering Science,
Graduate School of Engineering Science
Theory of interacting electrons, Magnetism,
Rigorous theory of correlated electron systems

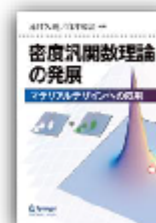
Koun SHIRAI

Associate Professor, The Institute of Scientific and Industrial Research
Condensed Matter Physics (Theory), Material Design, Dynamical Properties



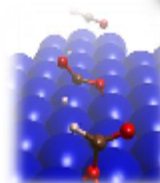
Kazunori SATO

Associate Professor, Department of Materials and Manufacturing Science,
Graduate School of Engineering
Theoretical Solid State Physics, First-Principles Calculation,
Computational Materials Design



Ikutaro HAMADA

Associate Professor, Department of Precision Science & Technology,
Graduate School of Engineering
Condensed matter physics, electronic structure theory,
Many body perturbation theory,
Surface science, Electrochemistry

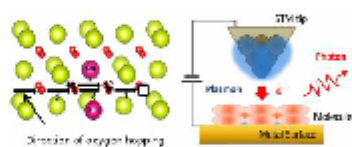
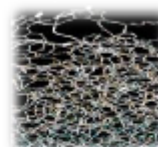


Hisazumi AKAI

Professor, The Institute for Solid State Physics (The University of Tokyo)
Development of First Principles Methods,
First Principles Electronic Structure Calculations, Magnetism, Transport Properties,
Disordered Systems, Metals and Alloys, Semiconductors

Daisuke MATSUNAKA

Associate Professor, Department of Mechanical Engineering,
Graduate School of Engineering (Shinshu University)
Computational Materials Science, Solid Mechanics, Condensed Matter Theory,
First-principles Calculations of Interface, Multiscale Modeling of Surface Dynamics and Growth



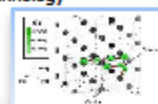
2nd Core Elucidation of Emergent Material Function

Yoji SHIBUTANI (Chair of the 2nd Core)

Professor, Department of Mechanical Engineering, Graduate School of Engineering
Solid Mechanics, Computational Mechanics, Materials Science
Size Effects of Solid Mechanics, Multiscale Modeling of Defects, Plastic-physics of Crystalline and Amorphous Materials, Beam-induced Acoustic Technology

Shigenobu OGATA

Professor, Department of Mechanical Science and Bioengineering, Graduate School of Engineering Science
Theoretical Solid Mechanics, Computational and Theoretical Materials Science,
First Principles Study of Mechanical Properties of Materials, Computational Mechanics,
Design of Functional Nano-structures using Carbon Nanotube, Multi-Scale Modeling of Materials



Heiji WATANABE

Professor, Department of Material and Life Science, Graduate School of Engineering
Nano-electronics, Applied Surface Science
Advanced Si-based LSI, SiC-based power devices, Material characterization by synchrotron radiation, Bio-nano process

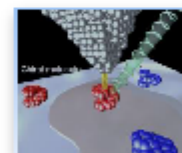


Takashi KUBO

Professor, Department of Chemistry, Graduate School of Science
Structural Organic Chemistry, Physical Organic Chemistry Research on Syntheses and Functional Properties of Novel Organic Molecules

Yuji KUWAHARA

Professor, Department of Precision Science & Technology, Graduate School of Engineering
Surface Chemical Physics, Soft Material Devices, Synchrotron Radiation, Nanoscience

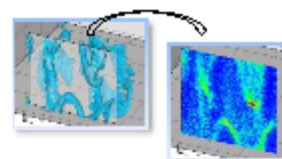


Hidehiro YASUDA

Professor, Department of Materials and Manufacturing Science,
Graduate School of Engineering & Research Center for Ultra-High Voltage Electron Microscopy
Materials science by in-situ transmission electron microscopy, Nanoparticle physics,
Irradiation-induced phenomena by ultra-high voltage electron microscopy

Toshitsugu TANAKA

Professor, Department of Mechanical Engineering, Graduate School of Engineering
Multiphase Flows, Gas-Solid Flows, Mechanics of Granular Flows,
Discrete Particle Modeling of Dense Gas-Solid Flows, Multiscale Modeling of Gas-Solid Flows

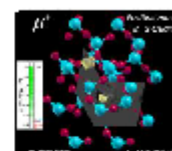


Nobuya MORT

Professor, Department of Electrical, Electronic and Information Engineering,
Graduate School of Engineering
Semiconductor Physics, Quantum transport and electron-phonon interaction in semiconductor nano structures,
Non-equilibrium Green's function method applied to device simulation,
Electron transport in semiconductor superlattices under magnetic fields,
Electronic and optical properties of semiconductors under free-electron laser irradiation

Yasuhiro TAKAYA

Professor, Department of Mechanical Engineering, Graduate School of Engineering,
Laser applied nano-measurement in production engineering



Hirotsugu OGI

Professor, Department of Precision Science & Technology, Graduate School of Engineering
Elastic constants, Ultrasonics, Nondestructive evaluation, Sonochemistry, biosensors

Tetsusei KURASHIKI

Professor, Department of Management of Industry and Technology,
Graduate School of Engineering
Image Based Analysis-Design System for Bio Material, Mechanical Characteristics of Advanced
Textile Composites, Disaster Mitigation Simulation in Urban Areas

Hiime KIMITZUKA

Associate Professor, Department of Mechanical Science and Bioengineering,
Graduate School of Engineering Science
Computational Materials Science, Computational Mechanics,
Atomistic Modeling of Thermal and Mechanical Properties of Solid Materials,
Characterization of Hydrogen Diffusion Kinetics in Solid, Molecular Simulations of Polymer Systems

Hiroshi NAKANTSU

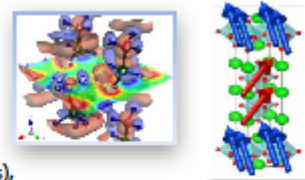
Professor, National Institute of Technology (Akashi College)
Theoretical Physics, Solid State Physics, Surface Physics, Computational Physics,
Computational Materials Design, Quantum dynamics of surface reactions,
Computational Materials Design Copymart, Nano-physics of surface nano-structures

3rd Core Realization of New Generation Functional Materials

Tamio OGUCHI (Chair of the 3rd Core)

Professor, The Institute of Scientific and Industrial Research

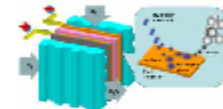
Condensed Matter Theory, First-Principles Electronic Structure Calculation, Spin-Orbit Driven Properties, Transition-Metal Oxides, X-Ray Absorption Spectroscopy, Secondary Batteries, Spintronics, Ferroelectrics, Materials Informatics



Hideaki KASAI

President, National Institute of Technology (Akashi College)

Condensed Matter Physics at the Nanoscale Electric properties of carbon nanotubes (CNTs), Hydrogen-surface reaction dynamics, Spintronics nanomaterials and nanodevice design



Atom scale reactions in Fuel cell

Toshihiro TANAKA

Professor, Department of Materials and Manufacturing Science, Graduate School of Engineering

Physical Chemistry of Materials, Surface Science and Technology of Materials Design of Materials Processing

Takeshi FUKUDA

Professor, Department of Sustainable Energy and Environmental Engineering, Graduate School of Engineering

Advanced plasma engineering, Quantum energy engineering



Kazuto YAMAUCHI

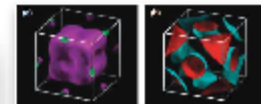
Professor, Department of Precision Science & Technology, Graduate School of Engineering

Ultraprecision machining, Surface characterization, Surface figure testing, X-ray Optics, X-ray nanoscopy /spectroscopy

Michio OKADA

Professor, Institute for Radiation Sciences and Department of Chemistry, Graduate School of Science

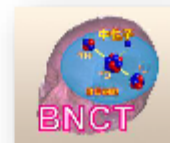
Surface chemistry, Surface reaction dynamics, Oriented molecular beams, Low-energy ion beams



Isao MURATA

Professor, Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering

Neutronics, Nuclear medicine, Radiation application



Takanori KITADA

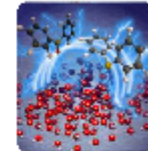
Professor, Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering

Reactor Physics, Nuclear Data

Hiroshi YAMASHITA

Professor, Division of Materials and Manufacturing Science, Graduate School of Engineering

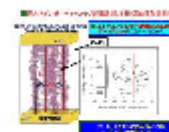
Catalysis, Photocatalysis, Nanostructured Catalysts, Plasmonic Catalysts, Nanoporous Materials



Wilson Americo DIÑO

Associate Professor, Department of Applied Physics, Graduate School of Engineering

Dynamical Quantum Processes, Surface Reactions/Excitations, Many Body Effects, Cond. Matt. Phys., Comp. Mat. /Devices/Proc. Design, Bioinspiration/Biomimetics, Complexity/Emergence, Energy, Hydrogen



Takashi FUKUDA

Associate Professor, Division of Materials and Manufacturing Science,

Graduate School of Engineering

Solid-state physics, Crystallography, Metallography

Hiroshi KATAYAMA-YOSHIDA

Senior Research Fellow (Professor), Center for Spintronics Research Network (CSRN), Graduate School of Engineering, The University of Tokyo

Materials Design, Condensed Matter Theory, Computational Nano-Materials Design

Ab initio molecular dynamics excitation-induced atomic migration, Valence control and materials design of wide band-gap semiconductors, Materials design of high efficient photovoltaic solar-cells, Semiconductor spintronics, Computational nano-materials design

