Professor Dr. Masao ARAKAWA

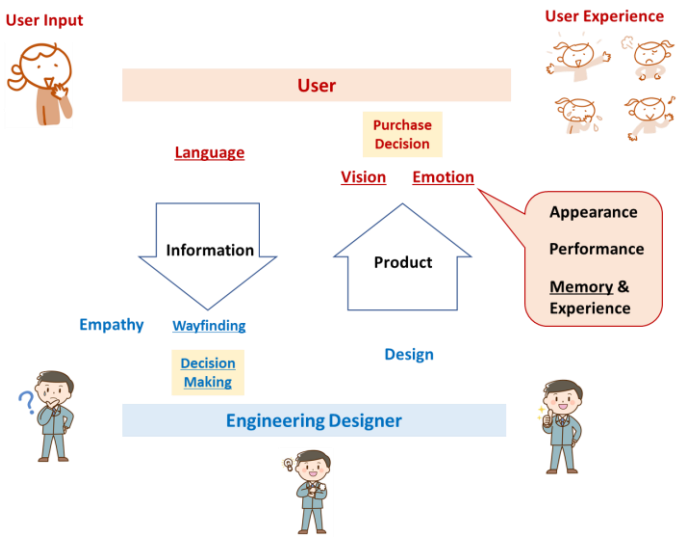
Production System Field, Engineering Design Research
Laboratory S223 tel: 093-692-**** E-mail: Arakawa.masao@waseda.jp

1. Biographical Information

Waseda University, Faculty of Science and Engineering, Department of Mechanical Engineering, (BS 1988, MS 1990, Ph.D 1993)
1993.4-1996.3 Assistant, Waseda University, Faculty of Science and Engineering
1996.3-1996.10 Visiting Lecturer, Rearch Institute of Science and Engineering, Waseda University,
1996.11-1999.3 Associate Professor, Tokyo Institute of Technology, JR Ease Endowed Lab
1993.4-2023.3 Kagawa University, Faculty of Engineering (Associate Professor, Professor), Faculty of Engineering and Design (Professor)
Society: JSME, ISSMO, ASSMO

2. Research

- Design Methodology
  Design Methodology develops Tools to realize Concepts in Design Theory
  - Multi-level Design
    Multidisciplinary Optimization, Optimization for Large Scale system needs Multi-level optimization, Major problem lies in how to reduce feed backs
  - Robust Design
    It is not less sensitive design, but optimization of worst case.
  - Plot Planning
    One of the most daunting problems in Optimization. We can deal with them by combination of heuristic search and mathematical programming
  - Surrogate Multi-objective optimization
    We can solve most of problems in Engineering by Approximation (RBF network), Optimization (GRGAs) and Satisficing Method. It is cool.
- Development of Heuristic Search
  Challenge is to extend the number of design variables. With ability of Usefulness of heuristic search we can extend problems that we can solve.
- Diagnosis
  Challenge to find error out of data which seems normal reaction. Alert Level 4 in Japan is based on my idea
- Engineering Start with Words
  Users make decisions with words. Engineers do them by numbers. If and only if we can develop the method to fill the gap, we can provide better design. It's a new challenge



3. Message

Let's find "wants" of target customers. Then, we can provide happy life that they did not even aware of. Go for it!!!

Professor Dr. Kenji Hashimoto

Production Systems Field, Mobile Robotics Platform Research
Laboratory: S203 tel: 093-692-5147 E-mail: kenji.hashimoto@waseda.jp
URL: https://hashimoto-lab.jp/

1. Biographical Information

Education

2004: B.E., Department of Mechanical Engineering, Waseda University
2006: M.E., Department of Mechanical Engineering, Waseda University
2009: Ph.D, Department of Integrative Bioscience and Biomedical Engineering, Waseda University

Carrer

2008-2010: JSPS Research Fellow DC2, PD
2010-2013: Postdoc, Graduate School of Creative Science and Engineering, Waseda University
2012-2013: French Government Scholarships (PostDoctoral Researcher), Collège de France-CNRS
2013-2015: Junior Researcher, Research Institute for Science and Engineering, Waseda University
2015-2018: Assistant Professor, Waseda Institute for Advanced Study, Waseda University
2018-2022: Associate Professor, Department of Mechanical Engineering Informatics, Meiji University
2022-Present: Professor, Graduate School of Information, Production and Systems, Waseda University

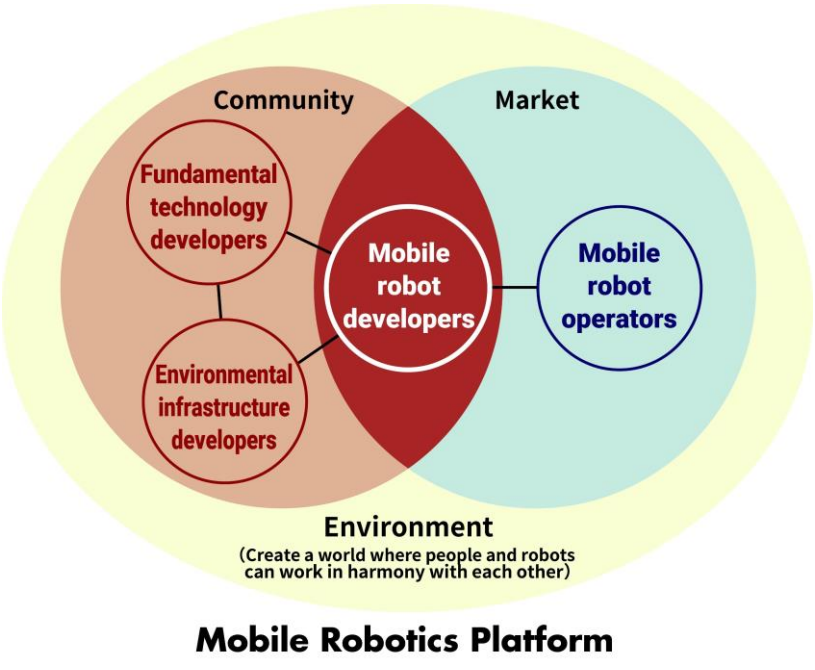
2. Research

We aim to develop mobile robots that exceed the capabilities of humans and other living things, not only on land, at sea, and in the air, but also in the space environment in the long term. Our research targets not only legged robots like humanoids but also mobile robots such as wheeled, flying, and hybrid types. In addition to the hardware development of robots, we also address software issues such as recognition of the robot's surrounding environment, path planning, robot motion generation, and controller design using various types of sensor information in order to make the robot autonomous and intelligent.

In addition to the development of mobile robots, we aim to create a world where people and robots can work in harmony with each other in cooperation with fundamental technology developers, environmental infrastructure developers, and mobile robot operators.

3. Message

Let's develop practical robot systems together to solve social issues. Through the development, cultivate your engineering sense, design skills, and problem finding and solving ability.



Professor Dr. Kazuma Mawatari

Production System Field, Micro- and Nanofluidic Device Research
Laboratory s225 tel: 093-692-5192 E-mail: kmawatari@waseda.jp
URL:

1. Biographical Information

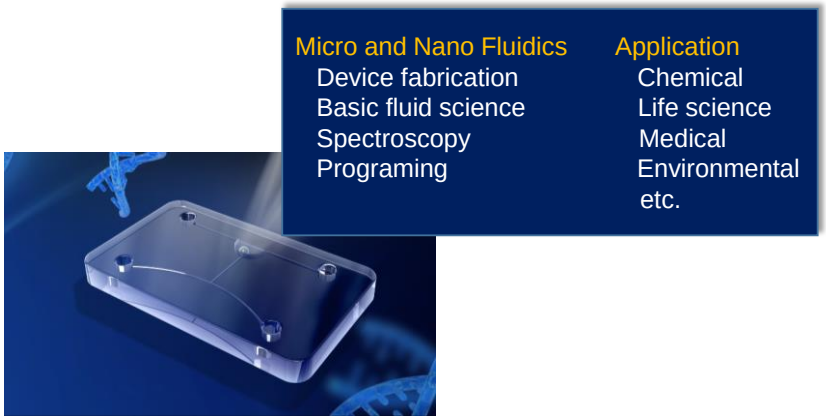
Degree
1998 Master degree, The University of Tokyo, School of Engineering, Department of Applied Chemistry
2006 Ph.D. degree, The University of Tokyo, School of Engineering, Department of Applied Chemistry

Work history
1998 Researcher, Central Research Laboratory, AsahiKasei Corporation
2003 Researcher, Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency (JST)
2004 Researcher, Micro Chemistry Group, Special Research Laboratory, Kanagawa Academy of Science and Technology (KAST)
2009 Lecturer, Department of Applied Chemistry, School of Engineering, The University of Tokyo
2011 Associate professor, Department of Applied Chemistry, Department of Bioengineering, School of Engineering, The University of Tokyo

2. Research

Fluidics is widely used in society such as analytical chemistry, biology, medicine, pharmaceuticals, plants, etc. Here, we develop the device technologies, micro- and nanofluidic engineering, for applications and social implementation. In addition to the micro and nano fundamental technologies (fabrication, detection, fluidic control, etc.), information technologies are also important for control, measurement, data processing, and information transfer, and we develop technologies for micro- and nanofluidics. As a basic science, the devices are used to investigate the fluidic, chemical, and biological properties of nanoscale liquids, which are quite different from the liquid in bulk space.

- Micro- and nanofluidic devices and applications
- Nano solution chemistry
- Ultrasensitive laser spectroscopy
- Digital technologies (control, signal processing, AI, IoT, etc.)
- Design and production for social implementation of a device and system



3. Message

Currently, we can use many physical devices such as a smartphone. Here, we challenge the creation of chemical devices through micro- and nanofluidic engineering and basic liquid science. This research field is quite multidisciplinary (chemistry, biology, mechanical engineering, electronics, medicine, etc.), and we welcome researchers from various backgrounds.

Professor Dr. Takeo Miyake

Bioelectronics Group, Production systems Filed
Laboratory S213 tel: 093-692-5158 E-mail: miyake@waseda.jp

1. Biographical Information

Education
2004 BS, Department of Electronic Information and Communication Engineering, Waseda University
2006 MS, Department of nanoscience and nanoengineering, Waseda University
2008 Ph.D, Department of nanoscience and nanoengineering, Waseda University
Experience
2006–2009 Research Fellowships for Young Scientists, Japan Society for the Promotion of Science
2009–2014 Tohoku University, Assistant Professor
2014–2016 University of Washington, Materials Science and Engineering, Acting Instructor
2015–2016 University of California, Santa Cruz, Electrical Engineering, Research Associate
2016–2021 Waseda University, Associate Professor
2021– Waseda University, Professor

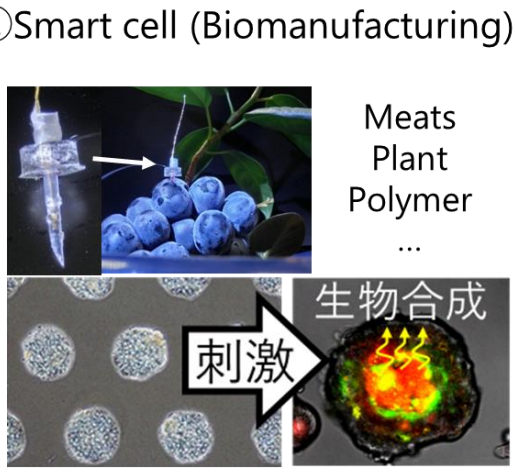
2. Research

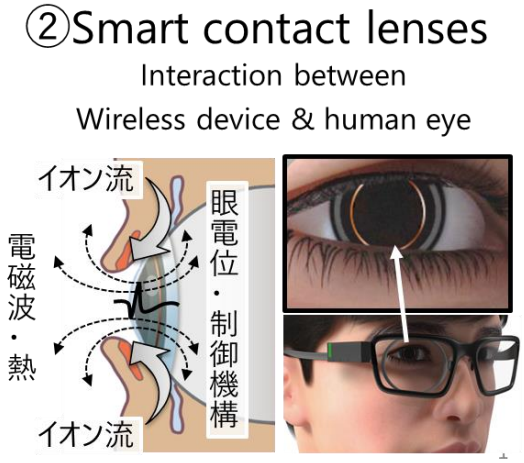
Innovative Biomedical wearable electronics: Material, device, and system development

A human body is soft and exhibit advanced functionality through *ionic* control. In contrast, devices created by humans are rigid and realize superior functionality through *electronic* control. In MIYAKE laboratory, we aim to develop original technologies that organically integrate these two contrasting types of materials, and we are pioneering the creation of medical devices that are compatible with living organisms. We are currently tackling the following challenges:

1. Smart Cells (for regenerative medicine, bio-manufacturing, etc.)
Here we focus on cell-based manufacturing, developing materials, devices, and systems to address social issues such as regenerative medicine and food supply. To advance this effort, we have established a startup company originating from Waseda University.

2. Smart Contact Lenses (for glaucoma, diabetic retinopathy, AR displays, etc.)
In collaboration with Japanese companies and ophthalmologists, we are developing materials, devices, and systems for prototyping next-generation contact lenses.





3. Message

I can say, "The greater the anxiety, the greater the success." Trying something new can be (always) unsettling, but the potential for personal growth and success makes it worthwhile.

Let's take on the challenge together and achieve great success.

Professor TANAKA, Eiichiro

Production System Field, Mechanical System Design Engineering, Mechanical System Design Laboratory
Lab. : S201 Tel: 093-692-5043 E-mail: tanakae@waseda.jp

1. Faculty member Introduction

1997-2003	Researcher of Mechanical Engineering Research Laboratory, Hitachi Ltd.
2003	Graduated Graduate School of Tokyo Institute of Technology doctor course, received the Dr. Eng.
2003-2016	Research Associate, Lecturer, Associate Professor of TMCAE, Hiroshima Univ., SIT, and Saitama Univ.
2016-	present post

Research field: Machine Design, Mechanisms, Machine Elements, Assistive Engineering

2. Research Introduction

Our laboratory is focused on a mechanical system design which is based on 3 S's; Safety, Sustainability, and Support feasibility. When these three guide lines are fulfilled, the QOL (Quality Of Life) of people around the world can improve. To make this happen we are developing diagnosis and analysis technology for machine and the life support devices.

2. For Students

I'd like to create useful machines using various mechanisms. Let's make this happen together.

Professor Dr. Shigeyuki Tateno

Production Systems Field, Production Process Engineering
Laboratory: room S205 Tel: 093-692-5148 E-mail: tateno@waseda.jp
URL: https://tateno.w.waseda.jp/

I love drinking black coffee and making computers.

1. Biographical Information

1992 M.Eng., Chemical Engineering, Kyushu Univ.
2001 D.Eng., Kyushu Univ.
1992～2003 Research Assistant (Kyushu Univ.)
2003～ Associate Professor (Waseda Univ.)
Society: SCEJ, SICE, IEICE and SPEJ

2. Research

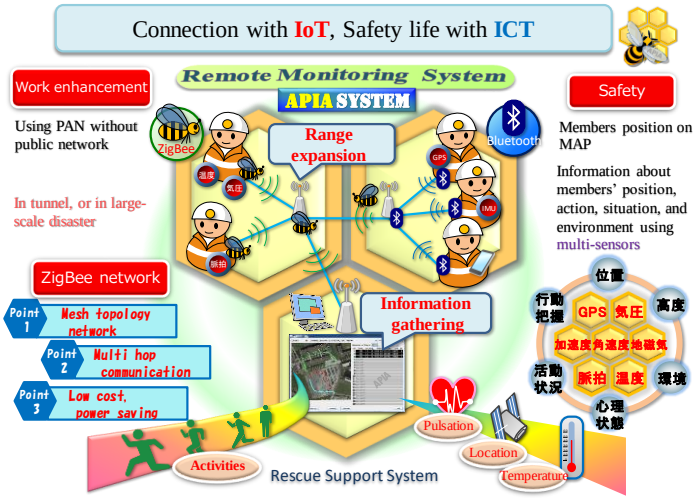
We conduct research to improve convenience and safety in the information society. In the production process of the manufacturing industry, it is important to avoid accidents to produce safely, and to produce efficiently by eliminating waste as much as possible. Therefore, we have developed a system to detect and diagnose failures and abnormalities that occur in the production process at an early stage, and a wireless monitoring system to efficiently perform maintenance work. We are also developing monitoring systems to improve safety at hospitals and nursing care facilities.

A) Fault detection and diagnosis system in manufacturing industry

We have been developing a system to detect and diagnose abnormalities that occur on factory production lines. We have developed the "SDG abnormality diagnosis method", a method that uses signed directed graphs based on graph theory, which enables high-speed diagnosis, and are also developing a system for estimating locations of external corrosion occurring in piping within plants.

B) Remote Monitoring System using Wireless Network

In order to enhance security and work efficiency of plant workers or rescue teams at the scene of a disaster, we developed a remote monitoring system which can keep track of workers' positions, situations and physical conditions during operation. We are also developing remote monitoring system which supports health care work in hospitals or nursing houses. We have been developing the system using ZigBee devices as a wireless communication method in collaboration with a company.



C) Developing gadgets that enrich our lives

We use cutting-edge IoT devices and ICT to develop devices that make life more convenient. For example, we have developed non-contact operation of home appliances and equipment using thermal array sensors, super-directional sound systems using ultrasonic parametric speakers, and object position estimation systems using 3D depth sensors to protect privacy.

Master's theses

- Fault detection and diagnosis in chemical plants
- Research on position estimation using multiple wireless devices
- Rescue team support system using wireless communication
- Development of Health Care Support System using wireless communication
- Development of non-contact control system using thermal array sensor
- Development of directional sound system using ultrasonic parametric speakers

Professor Kenji Ueda (Dr. Sci.)

Production System Field, Functional Thin Films Research Group
Laboratory S217 Tel: 093-692-5176 E-mail: k-ueda@waseda.jp

1. Biographical Information

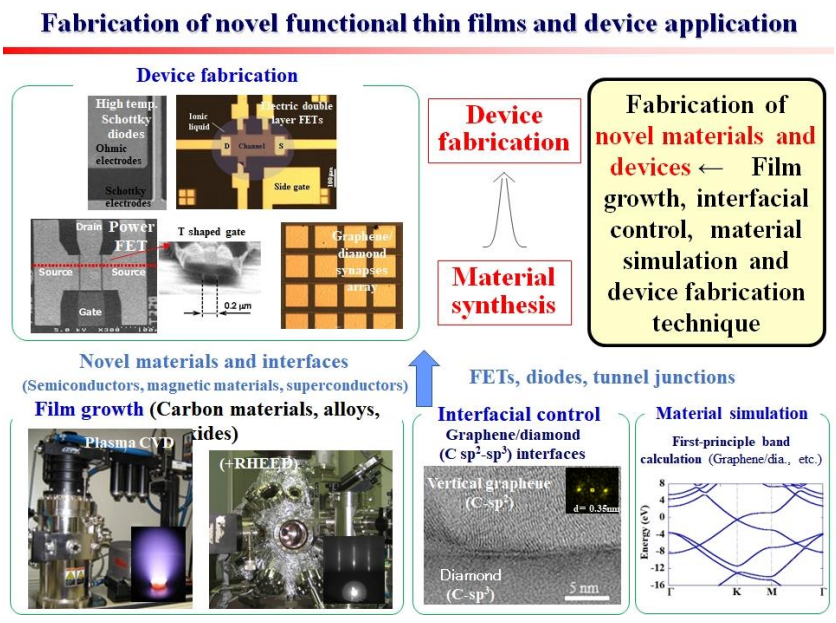
1994 Bachelor degree of Science, Kagoshima University
1996 Master degree of Science, Osaka University
1997 Researcher, Toshiba corporation
2000 Dr. of Science, Osaka University
2000～2001 Postdoctoral fellow, ISIR-sanken, Osaka University
2001～2009 Researcher, NTT basic research laboratory
(2011 Invited researcher, Neel Institut, CNRS, France)
2009～2022 Associate Professor, Nagoya University
2022～ Professor, Waseda University

2. Research

Thin films are used in various purposes such as optical functional films, magnetic films, electronic devices, etc. It is not too much to say that these functional thin films manage not only present information society but also our life. In our laboratory, we have been developing novel thin films, especially novel brain mimic materials and devices, that can innovate our information society, by using thin film growth and interfacial control technique.

Recently, we have mainly been fabricating novel materials and devices by combining graphene and diamond films, which are typical inorganic carbon materials. Followings are our recent research topics.

・Fabrication of novel brain-mimic optoelectronic memory devices using graphene/diamond junctions.
・ Reservoir computing using graphene/diamond devices.
・ Development of high-performance graphene/diamond power devices.
・ Search for novel high-performance carbon materials by using first principle electronic states calculation (material simulation) and their synthesis



3. Message

We have been trying fabricating novel functional materials by using thin film growth technique. Please visit our laboratory if you are interested in creating novel materials and/or the world of nanotechnology.

Professor Dr. Takayoshi Shimura

Production System Field, Semiconductor Device Materials
Laboratory S221 tel: 093-692-5179 E-mail: shimura@aoni.waseda.jp

1. Biographical Information

Education

1987 B. E. in Applied Physics, Nagoya University
1989 M. E. in Applied Physics, Nagoya University
1993 Ph. D. in Applied Physics, Nagoya University

Work Experience

1993 Assistant Professor, Faculty of Engineering, Osaka University
2007 Associate Professor, Graduate School of Engineering, Osaka University
2024 Professor, Graduate School of Information, Production and Systems, Waseda University

2. Research

The period when Japan's semiconductor industry was at its peak momentum was from the 1980s to the 1990s. However, from the late 1990s to the 2000s, Japanese semiconductor device manufacturers lost their competitive edge and market share. However, the intensification of US-China trade tensions and the disruption of supply chains due to the coronavirus shock led to a renewed recognition of the importance of semiconductor devices. Japan is now aiming for the revival of its semiconductor industry. In particular, the Kyushu region accounts for about 50% of Japan's semiconductor production value, making it the most critical area.

In this context, the Semiconductor Device Materials Laboratory aims **to produce sustainable human resources** and **to support the semiconductor industry using advanced semiconductor material evaluation methods.**. Furthermore, it seeks to work on **the development of new elemental technologies for semiconductor devices** that will support future societies.

Advanced semiconductor material evaluation methods: In November 2022, a new semiconductor company named "Rapidus" was established, backed by investments from eight companies including Toyota Motor Corporation and Sony. It revealed plans to mass-produce advanced semiconductors of the 2 nm generation in the latter half of the 2020s. There are plans to receive technology transfers from IBM and IMEC, but many challenges are anticipated. To support the technological development of Rapidus and the Japanese semiconductor industry, we are advancing plans to set up an advanced semiconductor evaluation platform at the **third-generation synchrotron radiation facility, SPring-8**. Our laboratory is responsible for **nano-beam X-ray diffraction** and **X-ray topography**, promoting the development of measurement and analysis systems and their application research.

New elemental technologies for semiconductor devices: The power consumption of data centers was estimated to account for about 4% of Japan's total power consumption as of 2018. It is anticipated that this power consumption will further increase with the advancement of digitalization, AI, and machine learning. In this context, the Japanese government has listed the development of advanced optoelectronic integration technology. This aims to achieve energy savings, increased capacity, and reduced latency, with a goal of significantly reducing energy consumption by more than 40% in data centers. Our laboratory is advancing the **development of light emitting and receiving devices made of germanium**, a Group IV semiconductor like silicon.

3. Message

I joined Waseda University in April 2024. I am looking for students who are interested in semiconductor devices and related technologies and would be interested in starting up the lab with me.

Professor Dr. Junko Takahashi

Production System,　Biomedical Engineering Research
Laboratory　S211 : 093-692-5154　E-mail: junko.takahashi@anoi.waseda.jp

1. Biographical Information

Education

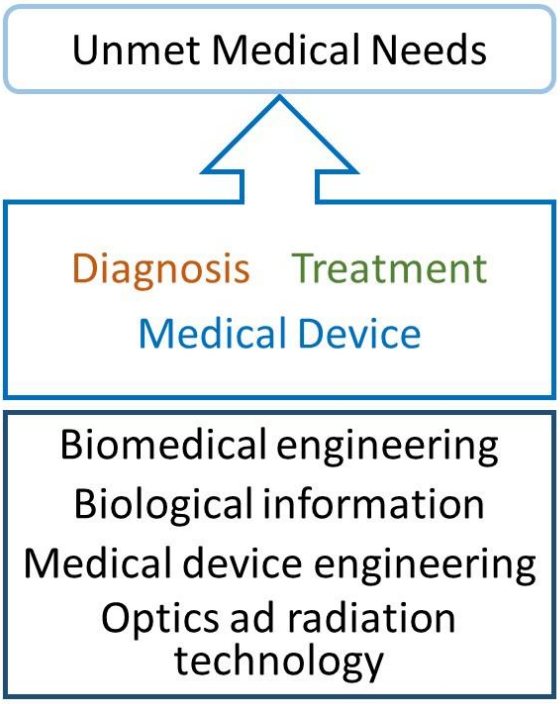
1985 B.S. at Hokkaido University
1993 M.S. at Tsukuba University
1998 Ph.D. at Tohoku University

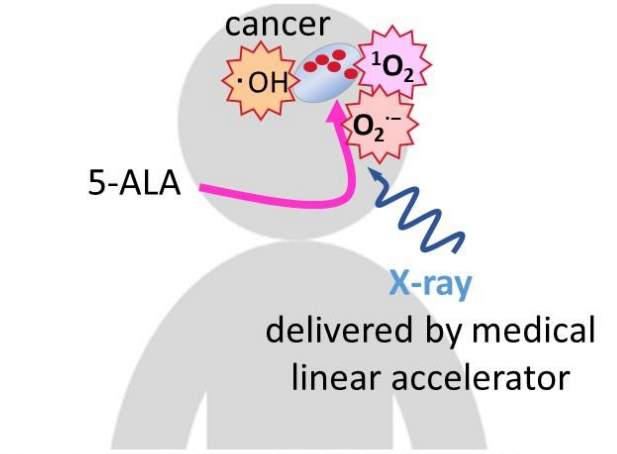
Experience

1985 – 1988　Matsushita Communication Industrial Co., Ltd.
1990 – 1991　Upjohn Pharmaceuticals Ltd.
1993 – 2005　Daikin Industries, Ltd.
2005 – 2021　National Institute of Advanced Industrial Science and Technology (AIST)
2021–　Professor, Graduate School of Information, Production and Systems, Waseda University

2. Research

Biomedical application of optics and radiation technologies have been intensively studied. Photodynamic therapy (PDT) and photodynamic diagnosis (PDD) are cancer treatment methods, in which photosensitizers generate Reactive Oxygen Species (ROS) and fluorescence in response to light irradiation. Recently, it has been found that some kinds of organic compounds generate ROS in response to X-ray irradiation. Radiotherapy with such compound having radiosensitizer characteristic is expected to improve therapeutic efficacy of cancers, especially radioresistant cancers, for which sufficient radiotherapy effects were not obtained. Overall, understanding of the physicochemical reactions induced by light or radiation in combination with organic radiosensitizer compounds and the following physiological reactions will lead to the development of new therapeutic methods.





5-aminolevulinic acid (5-ALA), which is a precursor to PpIX, leads to selective accumulation of PpIX (●) in cancer cells.

Radiodynamic Therapy (RDT)

Development of medical treatment by engineering strategy

3. Message

Engineering way of thinking is critical for understanding of the living organisms and progress of the medicine. Let's study and work together on unmet medical needs that have not been satisfied yet.

Assistant Professor D. Eng. Gabor Mehes

Production Systems Field, Organic Electronics and Microbial Electronics Research Laboratory:S209 (Miyake-lab) tel: 093-692-5192 E-mail: mehes.gabor@aoni.waseda.jp
URL:

1. Biographical Information

Education

2006/2008	Bc./MSc. in Electronics, Slovak Univ. of Technology in Bratislava, Slovakia
2014	D. Eng in Organic Electronics and Photonics, Kyushu University, Japan

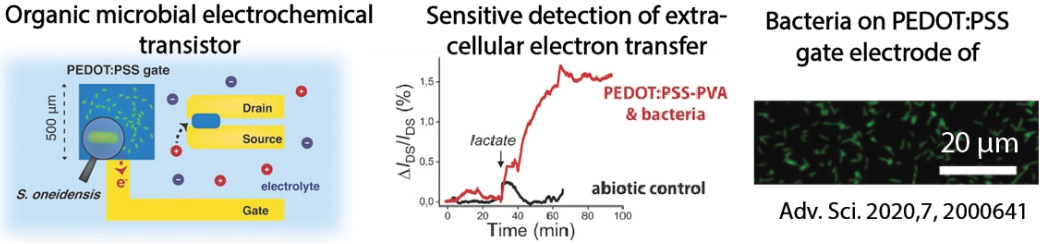
Work & training

08/2006 – 05/2008	Research Assistant, Industrial Recognition Technologies, Slovakia
09/2007 – 10/2007	IAESTE internship (UWB antenna), Omron, Japan
09/2008 – 11/2008	IAESTE internship (optical meas.), Tampere Univ. of Technology, Finland
04/2009 – 12/2010	Electrical Engineer, Sony Slovakia/Foxconn Slovakia, Slovakia
02/2011 – 07/2014	Research Technical Staff, Center for Organic Photonics and Electronics Research (OPERA), Kyushu University, Japan
08/2014 – 10/2015	Researcher, Fukuoka i3 Center for Organic Photonics and Electronics Research; Fukuoka Industry, Science and Technology Foundation, Japan
11/2015 – 02/2020	Postdoc/Marie-Curie Fellow/Principal Research Engineer, Laboratory of Organic Electronics (LOE), Linköping University, Sweden
02/2017 – 03/2017	Visiting postdoc, Molecular Foundry, Lawrence Berkeley National Laboratory
12/2020 – 03/2022	Assistant Professor, Research Center for Organic Electronics (ROEL), Yamagata University, Japan
04/2022	Assistant Professor, Graduate School of Information, Production and Systems, Waseda University, Japan

2. Research

Organic electronics is a modern interdisciplinary field at the intersection of electronics, materials science, physics and chemistry. I had a chance to actively engage in research in various subfields of *organic electronics* in world-leading laboratories: OLEDs (Prof. Chihaya Adachi, Kyushu U.), conducting polymers for photosynthetic energy harvesting (Prof. Magnus Berggren, Linköping U.), printed and flexible hybrid electronics (Prof. Shizuo Tokito, Yamagata U.), as well as in microbial electrochemistry (Prof. Caroline Ajo-Franklin, Berkeley Lab). I also have experience with industrial engineering and research.

I want to leverage this broad exposure by utilizing devices and materials from organic electronics/photonics and microbial technology to address global issues, such as energy conversion and sensing. I want to explore new concepts in basic science but also challenge future useful devices. Currently, I am working on new biohybrid bacterial electrodes, semi-wet devices and fabrication techniques.



3. Message

I would like to ask students to help me connecting *organic electronics* with the *microbial electrochemistry* field and explore exciting and impactful new science. I help students in developing creative thinking and imagination in science, problem solving and communication skills.