Science of Technology Innovation

Science of Technology Innovation

1 Chaos and Fractals Informatics Laboratory

Professor / NAKAGAWA Masahiro

- Research into Brain and Nature
- Overwhelming collaborative reserch achievements
- Research activities to be promoted freely

https://pelican.nagaokaut.ac.jp/

Supervisor Professor / NAKAGAWA Masahiro

Professor Nakagawa has a friendly personality, and we can easily talk about research, trivial problems, hobbies, and so on. He actively provides opportunities for students to present the results of their research at academic conferences. He also focuses on research and development, and students are given the opportunity to be a part of it with responsibility.

Research Content

Applying the concept of "chaos and fractals" in nature, we are engaged in research on the analysis of biological information and natural phenomena, especially on the quantification of human sensitivity using Electroencephalography (EEG).
In addition, we are also conducting diverse research in brain function-related fields such as neural networks and brain-computer interface, as well as in voice, image, and bioassay, applying chaos fractal theory to suit individual interests.
Our technologies have attracted social attention, and we aim to contribute to society by conducting many collaborative research projects and actively participating in exhibitions and events.

Wearable device and real-time processing system for online EEG measurement.

A Day in the Lab

We have no core times and only students in the research office.
Except for periodic progress report seminars, the use of time is left up to the individual, allowing us to work at our own pace.
Students are given the opportunity to present at conferences and write papers, depending on the results of their research.
We can research flexibly according to our own motivation and personality.
Because of this freedom, small events are often held in addition to regular events such as cherry blossom viewing and trips, allowing students to enjoy their days while balancing their research.

A study session by students.

Thesis Subjects

- (M) Research on Kansei Measurement of Arousal and Pleasure to Olfactory Stimuli
- (M) A Study on Sensibility Evaluation of Workspaces and Shoes in Comfort
- (M) A Study of Emotional Information Processing Using Fractal Dimension Analysis

The number of PhD Graduates **13**

Major employers of Graduates

- NTT DATA SYSTEM TECHNOLOGIES INC.
- Japan Total System Co.,Ltd.
- TSUGAMI CORPORATION
- DENSO WAVE INCORPORATED
- FUJITSU COMPONENT LIMITED
- NTT DATA INTELLILINK Corporation
- SUZUKI MOTOR CORPORATION
- FPT Japan Holdings Co., Ltd.
- ANRITSU CORPORATION
- NEC Corporation

Writer : NAGASAWA Renshi, Electrical, Electronics and Information Engineering
(National Institute of Technology, Oyama College)

教員名
NAKAGAWA Masahiro

キーワード
Chaos and Fractals
Electroencephalography
Sensitivity analysis
Neural network

2 Power Electronics Laboratory

Professor / ITOH Junichi

- You can reserch advanced technology of Power Electronics
- You can contribute curb of global warming
- You can enjoy reserch life and lab events

http://itohserver01.nagaokaut.ac.jp/itohlab/jp/index.html

Supervisor Professor / ITOH Junichi

His policy is to do his best for both of research and playing. If we have problems about research, he always accepts to discuss technical issues with us. He also participates in futsal tournaments that is planed by the laboratory member.

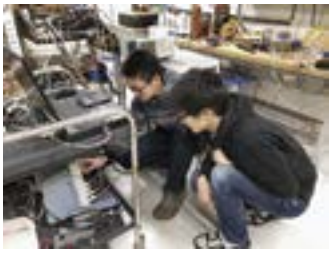
Research Content

Recently, Power Electronics is an important key to problems of global warming and nuclear power generation. Power Electronics is technique to utilize electrical energy efficiently. It is applied for wide field such as industrial machines, electrical vehicles and home appliances. In Itoh laboratory, we are doing research about power converter, motor drive, wireless power transmission, smart grid for renewable energy, energy storage and so on. Our laboratory is leading technique of evolving Power Electronics.

Matrix converter(I made this one from scratch.)

A Day in the Lab

AM : After morning assembly, I do simulation and theoretical analysis to contrive a novel method.
Noon break : we often eat lunch with laboratory's members.
PM : I made a main circuit and a controller to do experiments. Some members write paper for upcoming conferences until late. Others continue to do experiments.
It's important to take enough rest in the evening so as to be active.



Our Laboratory has many labmate at the toughest time.

Thesis Subjects

- (M) Digital Damping Control Method for Grid-tied inverter with small LCL filter
- (D) Switch Sequence Strategy for Accurate Voltage/Current Regulation in Isolated Matrix AC to DC Converter
- (D) Optimal Design Focusing on Magnetic Coupling for Wireless Power Transfer System with Multi-winding Transmission Coil

The number of PhD Graduates **25**

Major employers of Graduates

- Nagaoka Power Electronics
- MEIDENSHA CORPORATION
- HITACHI
- MITSUBISHI ELECTRIC Corporation
- YASKAWA Electric Corporation
- DIAMOND ELECTRIC Corporation
- Fuji Electric Corporation
- GS YUASA Corporation
- Panasonic Corporation
- TOSHIBA Corporation

160 Writer : UCHIDA Yasuo, Electrical, Electronics and Information Engineering
(National Institute of Technology, Kisarazu College)

教員名
ITOH Junichi

キーワード
Power electronics
Power conversion
Motor drive
Wireless power transmission

3 Energy Engineering Laboratory

Professer / Noboru YAMADA

- Make it speedy!
- No pain No gain!
- We love renewable energy!

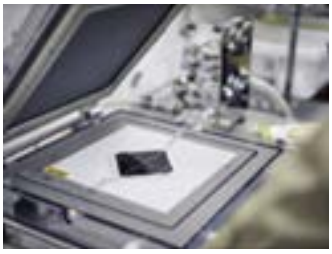
http://mcweb.nagaokaut.ac.jp/~n_yamada/

Supervisor Professer / Noboru YAMADA

Professor Yamada takes care of students and teaches carefully. He often advises students about research, future and so on. His office door is always open to accept questions from student.

Research Content

In this laboratory, we focus on sustainable energy utilization technologies related to solar energy, heat engine, energy conversion / storage / transportation, heat transfer phenomena. The main research contents are as follows. Research on solar power generation, which is drawing attention as "renewable energy". Development of compact heat engine for temperature difference power generation using high-temperature thermal energy called "waste heat". Research on large heat transport device "to recover and transport heat in a large space". Developed a highly efficient mechanical battery system that enables "reciprocating conversion of electric energy and kinetic energy".



Solar cell module that increases power generation efficiency by converging sunlight with a lens.

A Day in the Lab

There is no time restriction in this laboratory. Therefore, you can create you own research style that suits your own life. It is roughly divided into two teams, a research team related to photovoltaic power generation system and thermal engineering, and both teams cooperate each other. Even if there is something you can not understand, your seniors will guide you kindly and carefully. Even at the seminar, regardless of grade, various opinions are overflowing and it is exciting.

It is a usual laboratory. Some graduate students teaching undergraduate students, others reading papers

Thesis Subjects

- (M) Effect of temperature change of silicone-on-glass micro lens array on optical efficiency of concentrator photovoltaic module
- (M) Characterization of gerotor expander for micro organic Rankine cycle power generation system -- Comparison with scroll expander --
- (M) Rotation speed improvement of light-driven micro-motor and investigation of effective application

The number of PhD Graduates **9**

Major employers of Graduates

- Nissan Motor Co., Ltd.
- UACJ Corporation
- Hitachi Astemo, Ltd.
- Azbil Corporation
- Shin-Etsu Chemical Co., Ltd
- Tohoku Electric Power Co.,Inc.
- ASAHI KOHMATSU CO., LTD.
- MAYEKAWA MFG. CO., LTD.
- Hitachi Chemical Company, Ltd
- NACHI-FUJIKOSHI CORP.

Writer : Yutaka Watananbe, Science of Technology Innovation
(National Institute of Technology Kisarazu)

教員名
YAMADA Noboru

キーワード
Energy
Photovoltaic
Heat transfer
Energy storage

4 Plasma Dynamics Laboratory

Associate Professor / Toru SASAKI

- Can obtain both theoretical and experimental knowledge on Dynamic Plasma
- Can enhance the communication skills with international exposure
- Can improve the creativity and face for challenges which required for working in industry

https://mhdlab.nagaokaut.ac.jp/

Supervisor Associate Professor / Toru SASAKI

Plasma dynamics laboratory is supervised by Associate Professor. Toru SASAKI who is a young expert in this field. Professor is interacting with students of his laboratory friendly and kindly manner and encourage students to present their research outcome in national and international level conferences to get the exposure. His balanced life style shows how to "joy and work" without stress.

Research Content

Mainly, the properties, characteristics and mechanisms related to dynamic plasma are discussed through the experimental and simulation studies. By those experiments and simulation works, understanding of physical mechanisms related to the natural phenomena of dynamic plasma in the space and solving engineering issues related to the dynamic plasma are done. Currently, studies related to the engineering application of atmospheric plasma, high energy density physics using power-pulsed discharge, magnetohydrodynamics, beam physics using simulations so on are being performed.

RF plasma emission

A Day in the Lab

Altogether around 25 students present their research progress in the weekly seminar as every student in twice a week, where professor and senior students make constructive comments to develop the research. In addition to the seminar, students can freely discuss with professor and laboratory members through some e-communications or physical meeting regarding academic/research matters and even personal matters for assistances. No time restrictions are available to be switched between the research activities and personal activities. To balance the "joy and work", various entertainment events such as sport events, welcome parties, year-end parties are held.

While doing an experiment

Thesis Subjects

- (M) Study on magnetic field response of mixed-gas plasma flow driven by the electromagnetic pulse discharge
- (M) Study on the thrust performance of laser propulsion with a high-repetition and high-power laser
- (M) Development of capacitive coupling hole type MHD generator

The number of PhD Graduates **5**

Major employers of Graduates

- Advantest Corporation
- DAIHEN Corporation.
- Mitsui Chemicals, Inc
- Mitsubishi Electric Corporation
- Mitsubishi Materials Techno Co.
- Shin-Etsu Chemical Co., Ltd.
- Tokyo Electric Power Company Holdings, Inc.
- TOSHIBA PLANT SYSTEMS & SERVICES CORPORATION
- ULVAC, Inc.
- YASKAWA ELECTRIC CORPORATION.

Writer : LATHTHUWAHANDI MALITH MADUSHANKA DE SILVA, Energy and Environment Science
(Sabaragamuwa University of Sri Lanka)

教員名
SASAKI Toru

キーワード
Atmospheric Plasma
High energy density plasma
Magnetohydrodynamic (MHD)
Nuclear Fusion

5 Aqua and Soil Environment Laboratory

Professor / Takashi YAMAGUCHI　Associate Professor / Shinya MAKI
Assistant Professor / Nur Adlin Binti Abu Bakar

- Cost-Saving and Energy-Recovering Water Treatment Technologies
- Novel Molecular Microbiological Techniques for Microbial Ecosystem Analysis
- Innovative ideas for global environmental issues

https://www.ecolabnagaokaut.com/

Supervisor　Professor / Takashi YAMAGUCHI

Our professor is a dedicated teacher and also a great companion who is willing to give us sincere suggestions so that we can overcome the problems encountered. Besides, as an understanding person, he encourages us with warm words and is ready to give us opportunities to make our wishes come true. For us, he is a great guide.

Research Content

Drawing on the potential strength of the microbial communities, we develop environmentally friendly and cost-saving innovative wastewater and waste treatment systems, which are then be piloted on a large scale for industrial application. Besides, with sophisticated and advanced molecular microbiology techniques, we conduct a series of in-depth studies on the microorganism (e.g., analyzing microbial community, isolating, and culturing uncultured microorganisms, or clarifying species interactions). Recently, pioneering hydrosphere soil environmental control technologies are becoming a new research direction of our lab with studies involving agricultural biomass recycle, water reclamation systems implementation for terrestrial aquaculture, or plant diseases treatment by biological methods.

A lab member performing a TOC measurement of wastewater

A Day in the Lab

Overall, we work on the spirit of independence, self-discipline, and creativity. In other words, we are always motivated to work towards goals but based on self-time management. Besides, thanks to a dense network of cooperation with many institutions, universities, and companies in Japan and abroad, lab members have many opportunities to attend domestic and international conferences or job fairs to keep up with novel waste treatment technologies and expand career opportunities. Outside of research, many parties and extracurricular activities are organized to make the relationship among laboratory members close-knit.

A group photo taken at the 2021 graduation ceremony

Thesis Subjects

- (M) Isolation, cultivation, and characterization of MBR biofilm-forming bacteria by in-situ cultivation
- (M) Development of a plant disease control method using soil microorganisms
- (D) Development of bioreactors for methane-driven nitrogen removal in anaerobic wastewater treatment

The number of PhD Graduates **47**

Major employers of Graduates

- Taisei Coorporation
- Kubota Coorporation
- Sanki Engineering
- Organo Coorporastion
- Meidensha Coorporation
- Nihon Suido Consultans
- JGC Plant Innovation
- Hitachi Zosen Cooporation
- Nippon Jogesuido Sekkei
- Kurita Water Industries

Writer : NGUYEN THU HUONG, Science of Technology Innovation
(Hanoi University of Science and Technology)

教員名
YAMAGUCHI Takashi
Nur Adlin Binti Abu Bakar

キーワード

6 HAKKO Science Laboratory

Professor / Wataru OGASAWARA

- Amazing microbial power hidden in fermentation
- Understanding and utilizing microorganisms
- Seriously and actively, opening up new frontier

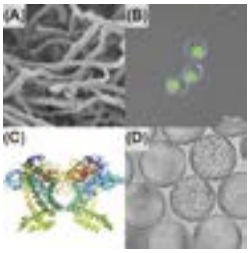
http://www.microorganisms.jp/ogasawara-lab/

Supervisor Professor / OGASAWARA Wataru

Prof. Ogasawara and Shida are cheerful teachers who guide us sometimes strict and sometimes kindly. We are given various chances such as attending academic conferences and internships at universities and companies. They always encourage us to be independent in research activities.

Research Content

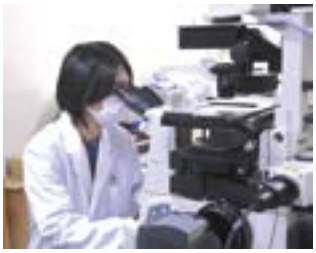
We aim to deepen understanding about the world of microorganisms and how to exploit their promising potential for industrial applications.
Filamentous fungi (mold): Analysis of enzyme production mechanism of filamentous fungi capable of decomposing plant biomass with the aim of producing useful substances.
Oleaginous yeast: Study on the production mechanism of yeast accumulateing lipid in the cell for stable supply of edible lipid.
Bacteria: Drug development for periodontal pathogens and multidrug-resistant bacteria through investigation of proteolytic enzymes.
Screening of microorganisms: Establishment of state-of-the-art culture technology using emulsion and screening for useful microorganisms.



(A)Filamentous fungi, (B)Oleaginous yeast,
(C)Structure of enzyme crystallized in space,
(D)Screening of microorganisms by emulsion

A Day in the Lab

The core time in our laboratory is from 10:00 to 18:00. Seminars are held on every Monday, where students present their research progress and review a publication related to their research theme. We have great opportunities to share our research information with professors and students from other universities or institutes via domestic and international conferences. Because there are many seniors and assistants, we have an environment that supports how to conduct research and how to create presentation materials.



Microscopy

Thesis Subjects

- (M) Correlation analysis between enzyme productivity and morphogenesis in filamentous fungus *Trichoderma reesei.*
- (M) Establishment of CRISPR / Cas9-mediated genome editing method in the filamentous fungus *Trichoderma reesei*
- (M) Establishment of screening method based on the function and activity of microorganisms using two types of droplets.

The number of PhD Graduates **11**

Major employers of Graduates

Writer : MARUTA Kodai, Materials Science and Engineering/Bioengineering
(National Institute of Technology, Nagaoka College)

教員名
OGASAWARA Wataru

キーワード
Microorganism
Fermentation
Enzyme
Genetic engineering

7 Laboratory of Resource and Energy Cycles

Associate Professor / HIMENO Shuji

- Build a society based on resource and energy cycle technologies.
- Research with a focus on practical applications.
- Investigate and satisfy the needs of society through technology development.

https://whs.nagaokaut.ac.jp/reclab/

Supervisor Associate Professor / HIMENO Shuji

Prof. Komatsu focuses on the research involving anaerobic digestion and water treatment, where Prof. Himeno accurately aims and engages several environmental issues through research with the cooperation of other companies and associations. Both professors positively instruct and discuss with their pupils to provide them support for their respective investigations.

Research Content

In our laboratory, we are developing technologies that take advantage of local properties of the sewerage structure of Niigata Prefecture, under the theme of "Building a Resource-Energy Recycling Society", based on the recovery and utilization of unused resources obtained from the sewage systems to generate energy. In addition, we also cover other themes like methane fermentation using biomass, the pretreatment of sludge using ozone, harvest of plants managing sewerage systems, removal of harmful metals deposited on roads using porous concrete, and the development of zeolite membranes and MOF technologies for green gas mixtures separation and storage.

Demonstration of the sewerage system for plant harvesting.

A Day in the Lab

Each of our laboratory's different areas conduct experiments at the campus installations or/and sewage treatment plants. We also participate in various events throughout the year such as harvesting rice, maintenance of facilities used for our research, or exhibiting about our research/themes in the Nagaoka Festival. Thanks to these events we have the opportunity to interact with people outside the university which are part of important companies, acquiring the needed knowledge and skills for the future laboral life like formality for business conversations, e-mailing and other aspects.

Exhibition of a snow-melting pipe at the Nagaoka Festival.

Thesis Subjects

- (M) Solubilization of excess sludge by ozone treatment and increased production of biogas.
- (M) Construction of a plant harvest environmet utilizing sewer unused resources.
- (D) Purification of greenhouse gasses through its separation using zeolite membranes (DDR type zeolite)

The number of PhD Graduates **2**

Major employers of Graduates

- Nihon Suido Consultants Co., Ltd
- NJS Co., Ltd.
- OHARA Corporation
- Sanki Engineering Co., Ltd.
- Kyowa Exeo Corporation
- Mitsubishi Electric Corporation
- Takasago Thermal Engineering Co., Ltd
- Maezawa Industries, Inc.
- Sumitomo Rubber Industries, Ltd.
- TOSHIBA HOME TECHNOLOGY CORPORATION

Writer : Sanchez Lopez Alejandro, Civil and Environmental Engineering
(Instituto Regiomontano Unidad Chepevera)

教員名
HIMENO Shuji

キーワード
Biogas production
Porous concrete for the environment
Harvest environment technologies
Zeolite membrane technologies

8 Computational Fluid Dynamics Laboratory

Associate Professor / Wataru YAMAZAKI

- Search the ultimate fluid machine !
- Go to a new world faster than sound !!
- Chase best award !!!

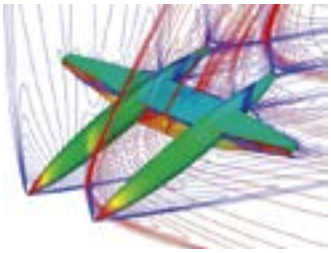
https://mcweb.nagaokaut.ac.jp/~yamazaki/index.html

Supervisor Associate Professor / Wataru YAMAZAKI

Prof. Yamazaki is a very kind and friendly person. He often comes to check on the students and have small talk with students. He also let students free to decide the content and direction of their research. When students discuss and consult with him about their research, he gives them detailed and careful advice.

Research Content

Our research topics are related with fluid dynamics, CFD technology and optimization technology. For instance, we are developing a new concept of supersonic aircrafts, a flapping wing micro air vehicle as dragonflies and a highly efficient vertical axis wind turbine. These researches will contribute to improving the fuel consumption of aircraft and the power generation of wind turbines. Furthermore, we are developing optimization methods, uncertainty analysis methods and CFD methods. These researches will help increase the speed of manufacturing by reducing the cost of computations.



A newly developed supersonic transport configuration

A Day in the Lab

Prof. Yamazaki respects student's personal life, so it's not decided ordinarily what time we should come to the laboratory. We can manage our own time. Thus, some students come to the laboratory in the morning and some come to the lab in the afternoon. We need to report weekly progress and have a seminar to introduce English journal papers. For that, there are a few hours of core time in a week that we have to spend doing research. Lab-mates are very friendly, so we often go to dinner and hang out together after the core time.

Laboratory members !

Thesis Subjects

- (M) Investigation of Indirect Reynolds Number Effect around Airplane Considering Influence of Roughness
- (M) Computational Fluid Dynamics Analysis of Ventilation System Including Diffusion of Micro Pollutant Particles
- (D) Advanced Multi-Objective Shape Optimization of Aircraft and Extraction of Design Knowledge by Dimension Reduction Technology

The number of PhD Graduates **2**

Major employers of Graduates

- Nissan Motor Corporation
- Omori Machinery Co., Ltd.
- KITZ Corporation
- D&M Holdings Inc.
- CHUO ENGINEERING CO., LTD
- Suzuki Motor Corporation
- Sumitomo Heavy Industries, Ltd.
- NISHIKAWA KEISOKU Co.,LTD.
- i-system Co.,Ltd.
- Ebara Corporation

Writer : Ken'ya HIROSE, Science of Technology Innovation
(National Institute of Technology, toyota College)

教員名
YAMAZAKI Wataru

キーワード
Computational Fluid Dynamics
Design Optimization
Aircraft
Flud Machineries

9

Bio-sustainable Environmental Material Engineering Laboratory

Professor / KOBAYASHI Takaomi

- Sustainability!!! Biomass usability for economic purpose
- Green Technology toward Environmental Sustainability
- International Friendly Laboratory

Supervisor Professor / Takaomi KOBAYASHI

Prof. Kobayashi is a senior professor with deep insight knowledges about his field of work which is valuable for the research orientation. Beside the academic standard that each student have to archive, "Manner" and "Interpersonal Relationship" for him also stand a significant point for the future success of his students.

Research Content

With the "Bio-sustainability" as the main aim, our laboratory mainly focuses on the development of bio-interfacial and environmentally friendly material as the mean to solve any possible problems. With biochemistry and material science expertise, material structure and its nature from micro to macro-scale of the researched materials are carefully considered for the optimal utilization to tackle the practical issues. Our laboratory has a wide range on interesting on material, namely polymers, inorganic and organic, composite, and industrial waste. With the wide connection of our professor, students have wide options for their internship, from domestic like company, Kosen or University in Japan or in other countries like Thai, Vietnam, Germany, Malaysia…

Cosmetic products containing moisturizing ingredients "Porphyra" extracted from Seaweed and Limonite-PES composite fiber

A Day in the Lab

The most unique point of our lab is more than a half of the students are international students whom coming from variety of background and culture like: Vietnam, Thailand, Malaysia, China, Mexico. In such a multiple-culture laboratory, we have valuable chance for understanding the culture and the people from different countries. Both English and Japanese are encouraged for daily communication in our laboratory. Not only in culture, but we also have many different backgrounds from material science, medical, bioscience to environmental technology, so we can support each other in research with many different points of view. Beside research, annual event like Hanami, Hanabi, Halloween, Christmas Party, Bonen-kai and some international cooking exchange party.

Seminar ending party of the year 2021

Thesis Subjects

- (M) Application Zeolite Polymer Composite Fiber in Bioreactor for Land-based aquaculture of Rainbow Trout cultivation
- (D) Study on Ultrasound Technologies Concerning with Nitrogen for Decomposition of Organic Compound and For Soil Washing Application.
- (D) Study on Mordenite Zeolite-nylon Composite Membranes Used for Functional Adsorbents.

The number of PhD Graduates **27**

Major employers of Graduates

- Nitto Denko. Co. Ltd
- Daikin Industries. Co. Ltd
- Takasago Thermal Engineeiring. Co. Ltd
- Nippon Paint Co. Ltd
- Fuji Electric. Co. Ltd
- Dow Chemical Japan
- Sakai. Co. Ltd
- Oji Paper Co. Ltd
- Toyo seikan. Co. Ltd
- Unicharm Corporation

Writer : PHAN Phuoc Tri, Science of Technology Innovation
(University of Science - Vietnam National University Ho Chi Minh city)

教員名
KOBAYASHI Takaomi

キーワード
Bio-chemistry
Sonochemistry
Environmental Technology
Fish Cultivation

10 Nanosecond Nanotechnology Laboratory

Professor / Tadachika NAKAYAMA　特任教授 / Takashi GOTO

- Improvement of creativity by challenge to the unknown territory !
- Improvement of communication skills with international exchange!!
- Improvement of resourcefulness with a extensive experience!!!

https://etigo.nagaokaut.ac.jp/people/staff/nky15/index.html

Supervisor　Professor / NAKAYAMA Tadachika

Prof. Nakayama gives you many chances. There are opportunities for domestic and foreign academic conferences, joint research with companies, and foreign internships. In addition, Prof. Nakayama himself shows "work hard and play hard", and during the softball tournament is working hard in the entire laboratory.

Research Content

This laboratory has a well-developed research environment at the top level in the world, and is characterized by the ability to conduct a series of research from creation of new materials, evaluation of properties, and commercialization in cooperation with companies. Materials and technologies that have been studied and developed in this laboratory are evaluated and sometimes awarded by companies, enabling them to engage in cutting-edge research.
<Recent research subjects> Fabrication of microstructure using 3D printer, development of electric field treatment method using nanosecond pulse power supply, creation of organicinorganic hybrid pressure sensor, etc.

One frame of the experment

A Day in the Lab

This laboratory can offer you not only technical and research skills but also resourcefulness, and the labo values student autonomy and no core time. The unique point is many international students, so there are many opportunities to work international. In addition, many opportunity of the work with the companyies makes you can be involved in cutting-edge development of commercialization. At academic conference, you can not only participate in international conference, but also be involved in the planning and management of the conference, and learn skills other than research.

One frame of after the end of softball tournament

Thesis Subjects

- (M)Synthesis of ceramic 3D structures using laser CVD and nano-level 3D printer
- (D)Development of sewage water purification method using nanosecond pulse electric field
- (D)Design of material for pyroelectric power generation from low-grade waste heat sources

The number of PhD Graduates **15**

Major employers of Graduates

- Kao Corporation
- Mitsubishi Electric Corporation
- Panasonic Corporation
- Shin-Etsu Chemical Co., Ltd
- Sumitomo Electric Industries, Ltd
- Ricoh Japan Co., Ltd.
- Central Japan Railway Company
- Tokyo Electric Power Co., Inc.
- Hino Motors, Ltd.
- Toyohashi University of Technology

Writer : Okawa Ayahisa, Science of Technology Innovation
(National Institute of Technology, Tomakomai College)

教員名
NAKAYAMA Tadachika
GOTO Takashi

キーワード
Ferroelectric ceramics
3D stereolithography
Nanostructure control
Pulse electric field orientation

11 Stem Cell Technology Laboratory

Associate Professor / OHNUMA Kiyoshi

- Producing high quality research related to regenerative medicine
- Investigating the mechanism of human embryogenesis
- Establishing a work-life balance in laboratory

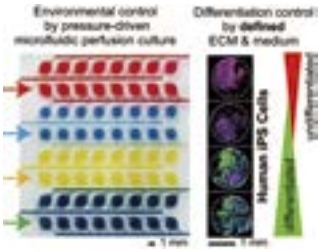
https://bio.nagaokaut.ac.jp/~en/research/stem_cell_technology.html

Supervisor Associate Professor / Kiyoshi OHNUMA

Our sensei always share significant wisdom and great advice with us. He thinks about students' futures carefully. Sensei is dedicated to educating students even though he is very busy. He is a good-hearted sensei who teaches the student with a gracious speech. For this reason, students can discuss freely with him in everything, especially academic work and living.

Research Content

Stem cells possess the ability to differentiate into all cell types and to self-renew continuously. We believe that stem cells are the key to success in regenerative medicine. Thus, we are committed to developing novel technologies alongside stem cells application for biomedical purposes. We utilize human induced pluripotent stem cells (iPSCs) to tackle the research both in vitro and in vivo platforms.
Our major research topics include;
(1) Zebrafish models for cardiovascular research
(2) Development of microfluidic devices to study the mechanism of human iPSCs differentiation
(3) Effect of teratogenic drugs on human embryo self-organization
(4) Planarian cell culture for understanding regeneration dynamics



iPSCs culture using microfluidic device

A Day in the Lab

Our laboratory starts at 9:30 am with a morning meeting. Everyone in the lab discuss the daily schedule and inform academic events. After that, we are free to do experiments according to the schedule. We progress the experiment with sensei and group members twice a month.
Normally, everyone gathers in the lab every day, and all members can become accustomed to each other. We work as a family by taking care, supporting, and helping each other. We also freely talk and advise on everything.
We sometimes have a party in the lab to celebrate the members who graduate (following the guidance of covid -19 prevention).

Good atmosphere in the laboratory

Thesis Subjects

- (M) High cell density suppresses BMP4-induced differentiation of human pluripotent stem cells to produce macroscopic spatial patterning in an unidirectional perfusion culture chamber
- (D) Effect of cell density on cardiomyocyte differentiation of human induced pluripotent stem cells
- (D) Thalidomide induces apoptosis during early mesoderm differentiation of human induced pluripotent stem cells

The number of PhD Graduates **3**

Major employers of Graduates

- Micron Memory Japan, G.K.
- Japan Atomic Energy Agency
- Nipro Pharma Corporation
- Showa Denko Materials Co., Ltd.
- Moritan Co., Ltd.
- CoorsTek KK
- Japan Nuclear Fuel Limited
- Kobayashi Pharmaceutical Co., Ltd.
- Nipponham Delicatessen Ltd.
- Shinshin Pharmaceutical Co., Ltd.

Writer : LIMJANTHONG Nuttakrit, Integrated Bioscience and Technology
(King Mongkut's University of Technology Thonburi)

教員名
OHNUMA Kiyoshi

キーワード
Human induced pluripotent stem cells
Microfluidic
Self-organization
Human embryogenesis

12 Ceramic Materials Design Laboratory

Associate Professor / Satoshi TANAKA

- Highly reliable ceramics
- Ceramic science begins from observation
- Build the foundation for the ceramics manufacturing process

https://mst.nagaokaut.ac.jp/ceramsci/index%20-%20eng.html

Supervisor Associate Professor / Satoshi TANAKA

Tanaka sensei values communication with students and gives enthusiastic guidance. He politely answers our questions and occasionally talks with us mixing a gentle joke. When we are having a trouble for planning the next experiment or interpreting research data, he helps us to solve them.

Research Content

Our laboratory has studied the method of manufacturing ceramics to improve properties. Ceramics is widely used for electrical, environmental and energy fields which is indispensable for everyday life. The philosophy of this laboratory is to contribute to improving the status of ceramics by solving many problems occurring during manufacturing. A major goal of our research is to systematize the manufacturing process of ceramics and to develop advanced ceramics.

This is a scene to make granules

A Day in the Lab

You can free to use your time to proceed with your research. We are experimenting by voluntarily deepening our knowledge and making plans. Also, Students are actively exchanging opinions with each other, and they are conducting research from various perspectives. Seminars are held every Thursday and Friday afternoon to introduce the latest articles related to research and the latest research results. There is lively discussion here. In addition, occasionally various events such as a welcome party, a cherry-blossom viewing, a ski trip etc. are planned.

graduation ceremony

Thesis Subjects

- (M) Fabrication of cathodes for oxide-based all-solid-state lithium-Ion batteries and their co-sintering with solid electrolytes
- (M) Fabrication and structural evaluation of alumina ceramics by micro-extrusion molding
- (M) Fabrication of porous alumina ceramics by gel casting method and evaluation of mechanical properties

The number of PhD Graduates **15**

Major employers of Graduates

- JAPAN FINE CERAMICS CO., LTD.
- Nippon Electric Glass Co. ,Ltd.
- Mizusawa Industrial Chemicals, Ltd.
- Nitolex Corporation
- AGC Inc.
- Hitachi Chemical Company
- TAIHEIYO CEMENT CORPORATION
- TAIYO YUDEN CO.,LTD.
- CoorsTec, Inc.
- Fukui Murata Manufacturing. Co., Ltd.

Writer : Kotaro YOKOO, Materials Science and Technology
(National Institute of Technology, Tsuruoka College)

教員名
TANAKA Satoshi

キーワード
manufacturing process of ceramics
functional ceramics
engineering ceramics
application of strong magnetic field