

**Nagoya Institute of
Technology, Japan**



RESEARCHER PROFILES





Prof. Nobuhiro Inuzuka

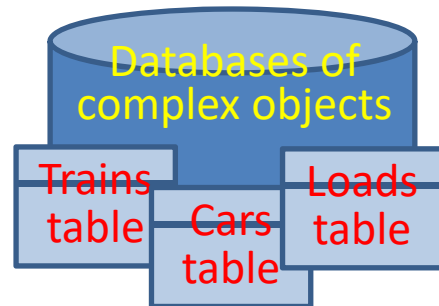
Field: Computer science, Knowledge discovery in databases

Research Keywords: Artificial intelligence, Knowledge discovery, Social Network Analysis, Logical and Formal Approach

Dr. Inuzuka's scientific interests include knowledge discovery in database with formal computer science concepts, logic programming and other artificial intelligence algorithms. The fields of application covers friendship network analysis, financial application and educational supports. The friendship research is applicable to actual friendship networks in a classroom. His research activities are extended into the area of algorithm design, knowledge representation, other computer science fields.



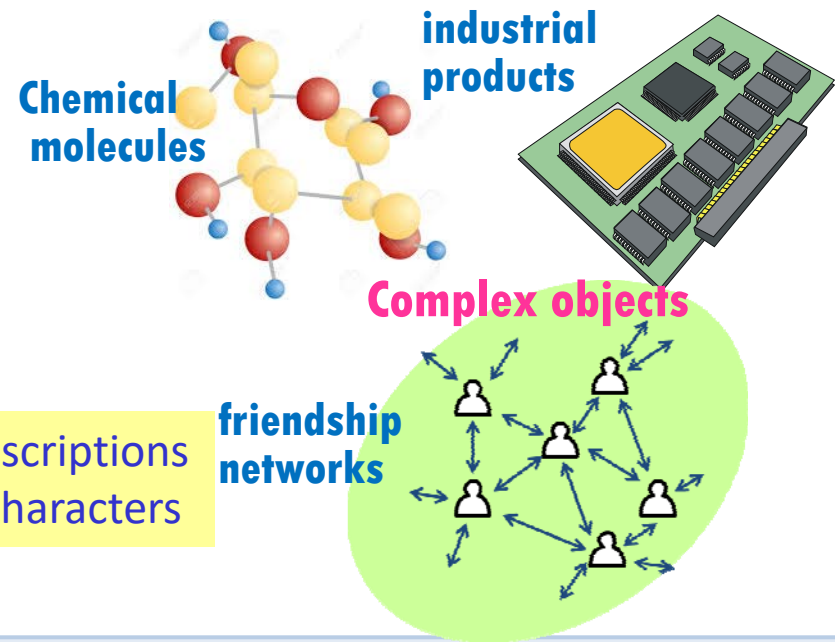
$\text{Train}(\text{train}_i) \wedge \text{Has-car}(\text{train}_i, \text{car}_j) \wedge \text{Has-roof}(\text{car}_j) \wedge \text{Short}(\text{car}_j) \wedge \text{Has-load}(\text{car}_j, \text{load}_k) \wedge \text{Large}(\text{load}_k)$



AI discovery algorithms



Logical descriptions of data's characters



References :

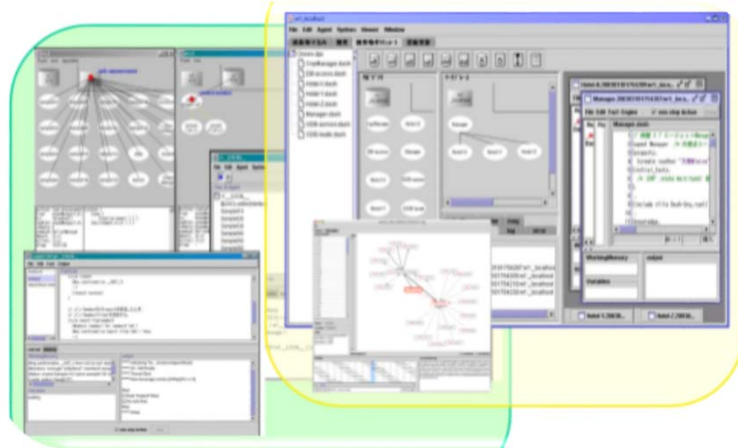
- [1] Effects of Grouping on Friendships and Group Composition *The 2016 Conference on Technologies and Applications of Artificial Intelligence* (2016)
- [2] Analysis of characteristic motions and their relations in radio gymnastic exercises, *IEEE 5th Global Conference on Consumer Electronics* (2016)
- [3] A model of friendship networks based on social network analysis, *Artificial Life and Robotics* (2016)
- [4] Concept lattice reduction using attribute inference, *IEEE 4th Global Conference on Consumer Electronics* (2015)
- [5] Transition of Local Structures of Friendship Networks, *ACIT-CSI* (2015)
- [6] Application of Inductive Logic Programming to Produce Emergent Behavior in an Artificial Society, *IEEE IIAIAAI* (2014)



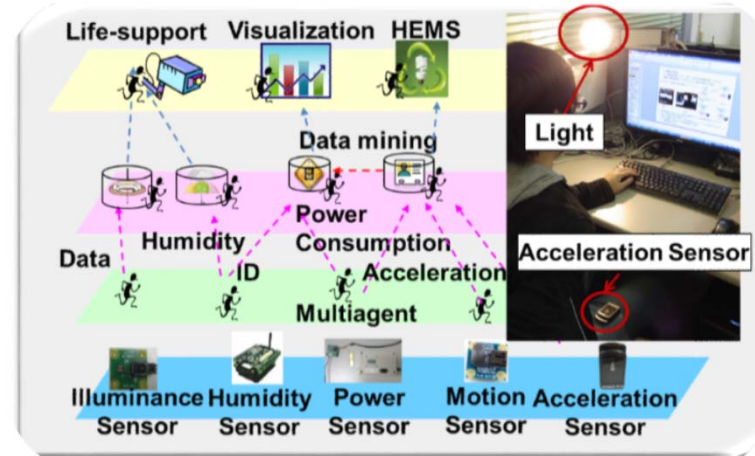
Assoc. Prof. Takahiro Uchiya

Field: Information Science, Artificial Intelligence, Distributed Computing

Research Keywords: Developing Tool of Multiagent System, Applied Multiagent Application, Spoken Dialogue System, Information Recommendation System, Automotive Robots



Developing Tool of AI System



Device Control by AI



Evacuation Guidance by Robots



Indoor Navigation by Spoken System

References:

- [1] "Design and Implementation of Agent Environment for Developing Nash-Q Learning Agents", IJEIC, 8(1), pp.39-50, 2017.
- [2] "Development Support of Learning Agent on Repository based Agent Framework", IJSSCI, 4(3), pp.62-79, 2012.
- [3] "Interactive Design Method of Agent System for Symbiotic Computing", IJCCNI, 3(1), pp.57-74, 2009.



Prof. Shohei KATO

Field: AI and Robotics, Affective Computing, Cognitive Impairment Screening

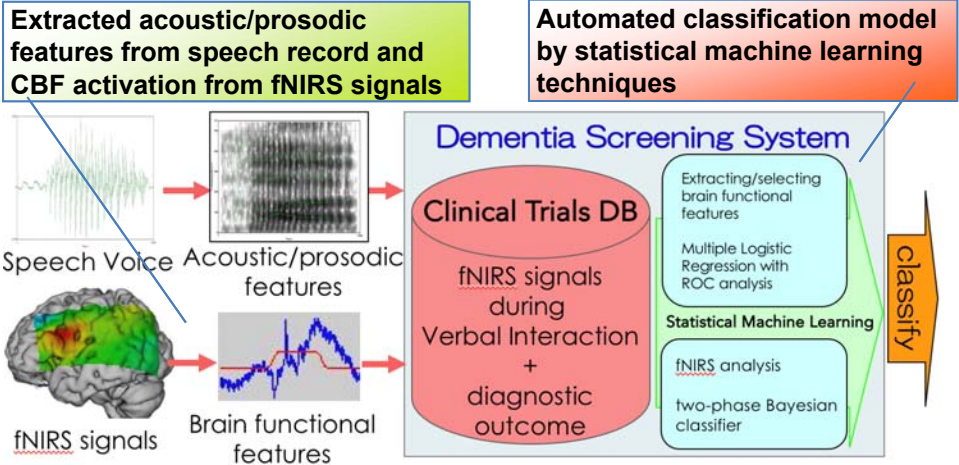
Research Keywords: Acoustic analysis, Machine Learning, Dementia Screening System Development

Dr. Kato has engaged himself in technology developments of "speech sound" and "cerebral blood flow activation" during conversation. Speech sound is not analyzed based on language, but is rather analyzed based on extra-linguistic information such as a change of rhythm, pitch, intonation, or cerebral blood flow activation. By analyzing speech sound and monitoring cerebral blood flow activation with AI technology and near infra-red spectroscopy, his research can determine the risk of cognitive decline.

CN: cognitively normal

MCI: mild cognitive impairment

AD: mild Alzheimer's disease



AI Technology-Based Detecting Cognitive Impairment of Elderly People from Speech Sound and Functional Near-Infrared Spectroscopy (fNIRS) Signals during Verbal Interaction

References :

1. Easy Screening for Mild Alzheimer's Disease and Mild Cognitive Impairment from Elderly Speech. *Current Alzheimer Research*, Vol. 15, No. 2, pp. 104-110, (2018), DOI: 10.2174/1567205014666171120144343.
2. Psychological Effects of Physical Embodiment in Artificial Pet Therapy, *Journal of Artificial Life and Robotics*, Vol. 22, No. 1, pp. 58-63 (2017), DOI: 10.1007/s10015-016-0320-7.
3. Comparison of Cerebral Blood Flow Activation of Elderlies with Amnesic and Non-amnesic MCI During Daily Conversation, 2016 IEEE EMBS International Conference on Biomedical and Health Informatics, (2016)
4. Awareness Motion and It's Timing to Induce User's Action, *The 5th IEEE Global Conference on Consumer Electronics*, pp.129-131, (2016) .



Assoc. Prof. Yoshihiro TANAKA

has researched basic studies and developments of unique tactile technologies utilizing human perception and motor control characteristics.

Field: Haptics, Mechatronics, Robotics

Research Topics: Rehabilitation, Minimally Invasive Surgery, Human-human/machine interaction, Tactile Design, Perception

Technologies: Tactile Sensor and Display, Tactile Enhancement Tool, FEM Finger Model, Evaluation and Design of Tactile Sensations



Tactile illusion

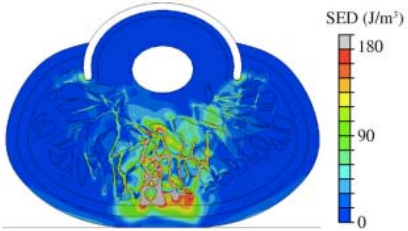


Prosthesis hand having tactile function

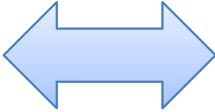


Hard plastic, but soft-feel like leather

Human haptic and tactile perception mechanism



FEM model of finger with collagen fibers



Display and Communication

Control and Design

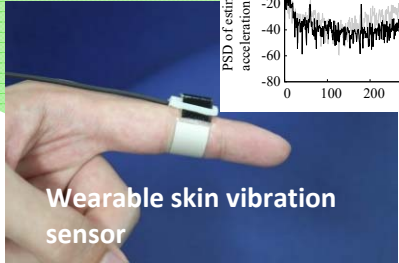
Measurement



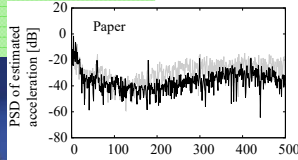
Palpation system for laparoscopic surgery



Tactile sharing



Wearable skin vibration sensor



Interdisciplinary Collaborations:
 Vrije Universiteit Amsterdam, The Netherlands (Psychophysics); Siena University, Italy (Robotics)
 Research Institute National Rehabilitation Center for Persons with Disabilities, Japan (Rehabilitation);
 Keio University, Japan (Media design); Nagoya University, Japan (Medical); Fujita Health University, Japan (Anatomy) etc.

Awards:
 Best poster award, 21st Annual Conference of the International Society for Computer Aided Surgery (2017);
 Best paper award, 25th IEEE International Symposium on Micro-Nano Mechatronics and Human Science (2014);
 Review panel's special prize, CEATEC JAPAN (2014); etc.

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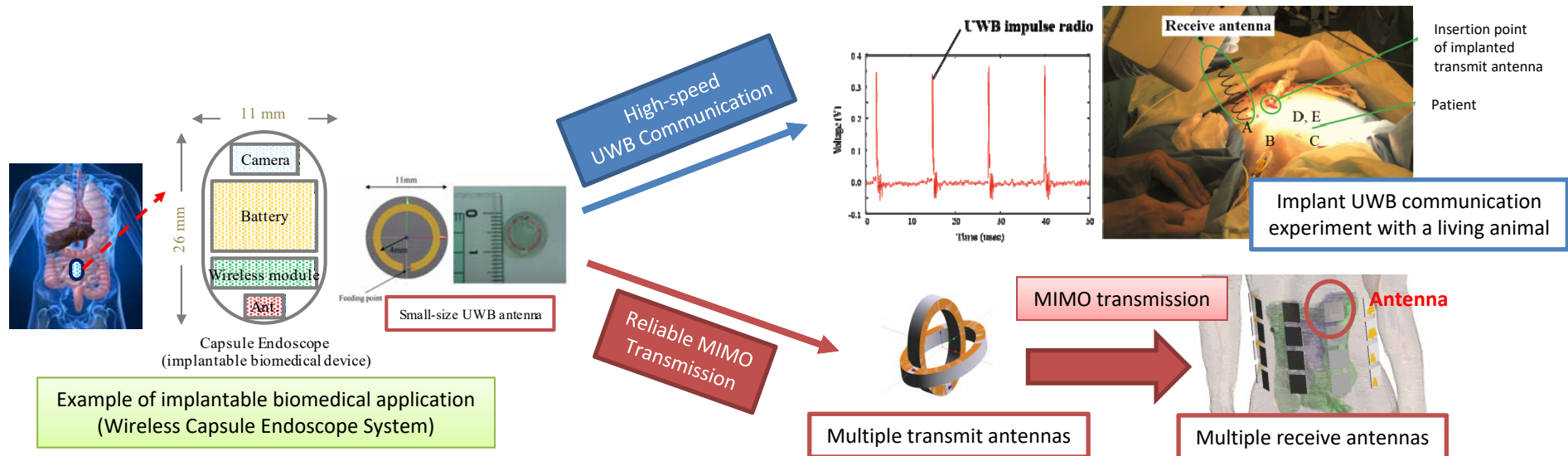


Associate Professor Daisuke ANZAI

Field: Biomedical communication, Wireless communication

Research keywords: Implant wireless communication (PHY/MAC Layer), Localization for implantable biomedical devices

Dr. Anzai has researched to develop reliable and high-speed communication systems for implantable biomedical devices. For achieving this purpose, effective wireless communication techniques, e.g., Ultra WideBand (UWB) and Multiple-Input Multiple-Output (MIMO), are applied to implant communication. This allows us to transmit high-quality medical image data for effective diagnosis in digestive organs.



Awards:

- [1] IEEE Microwave Theory and Techniques Society (MTT-S) Japan Young Engineer Award, 2015.
- [2] Telecommunications Technology Award from the Telecommunications Advancement Foundation, Japan, 2017.

References:

- [1] D. Anzai, et al., *IEEE Microw. Theory Tech.*, vol. 62, no. 1, 2014.
- [2] D. Anzai, et al., *Electronics Letters.*, vol. 53, no. 20, 2017.

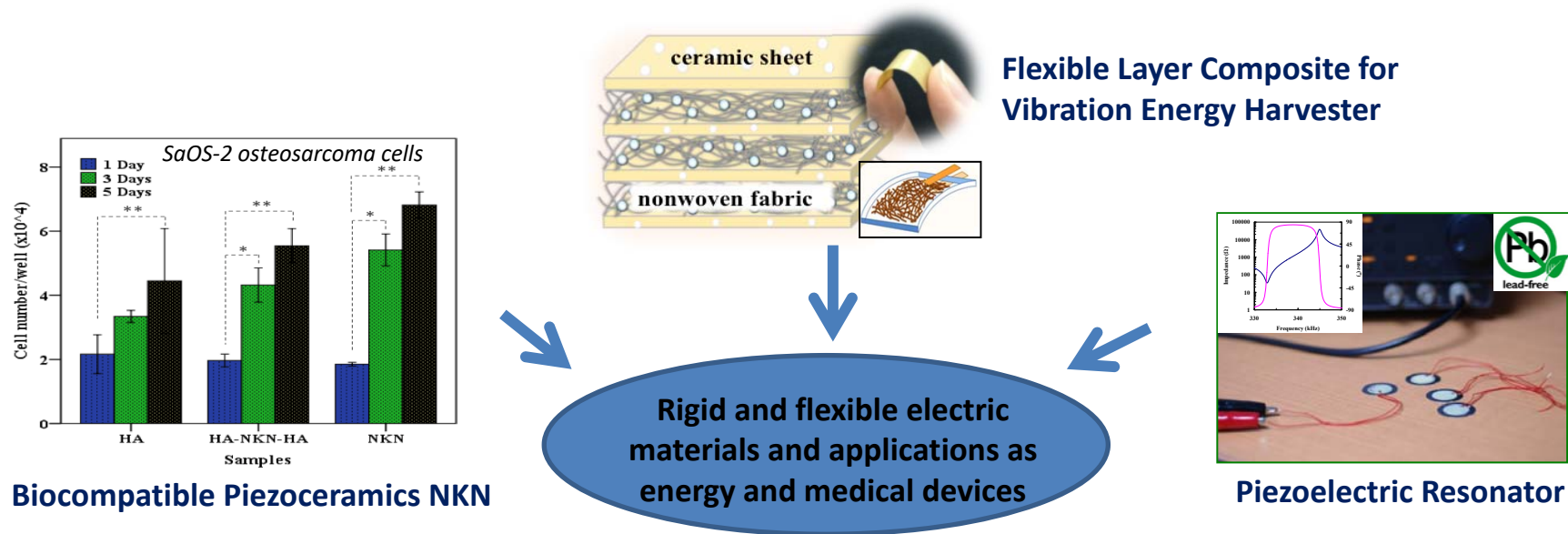


Prof. Ken-ichi KAKIMOTO

Field: Materials Science, Ceramics, Composite, Applied Physics

Research Keywords: Lead-free Piezoelectrics for Sensor, Actuator, Energy and Health Care Applications

Dr. Kakimoto has researched to develop high-performance lead-free niobate piezoelectric ceramics. This gives good high-temperature operation at higher than 200°C in sensor and actuator-type electrical devices, and also shows good biocompatibility in health care applications.



Awards:

- [1] Richard M. Fulrath Award, The American Ceramic Society, USA (2014)
- [2] Prizes for Science and Technology, The Commendation by the Ministry of MEXT, Japan (2011)

References :

- [1] M. Kato and K. Kakimoto, *Matt. Lett.*, 156 (2015) 183.
- [2] A. K. Dubey, R. Kinoshita and Kakimoto, *RSC Adv.*, 5 (2015) 19638.



Assoc. Prof. Hirotaka MAEDA

Field: Materials Science, Surface Science, Ceramics, Composite

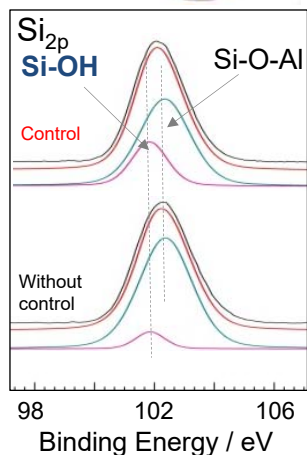
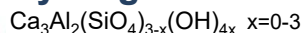
Research Keywords: Environmental purification materials, Hydrothermal synthesis, Thermal properties

Dr. Maeda has developed high-performance ceramics for environmental remediation by utilizing fundamental methods of geo-mimetics and computational simulations. This enables excellent high-adsorption capacities for humic substances, the major components of the natural organic matter in soil and water.

Geo-mimetics & Material science

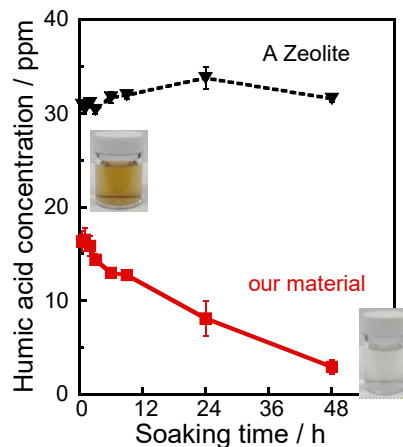


Hydrogarnet

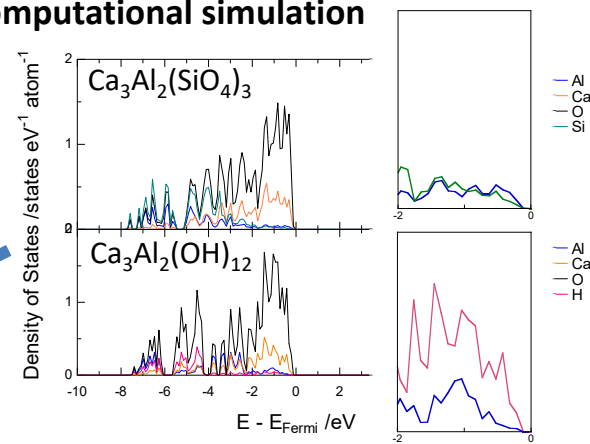


Increasing hydroxyl groups by controlling hydrothermal reaction

Excellent adsorption capacity for humic acid, compared with conventional adsorbents



Computational simulation



Existence of various surface hydroxyl groups by changing chemical composition

Awards:

[1] CerSJ Awards for advancements in ceramic science and technology (2013)

References:

[1] H. Maeda, Y. Kurosaki, M. Nakayama and T. Kasuga, *R. Soc. Open Sci.*, 5 (2018) 172023.

[2] H. Maeda, T. Tamura and T. Kasuga, *J. Phys. Chem. B*, 121 (2017) 5433.

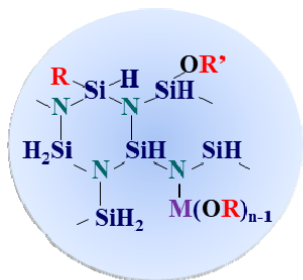


Prof. Yuji IWAMOTO

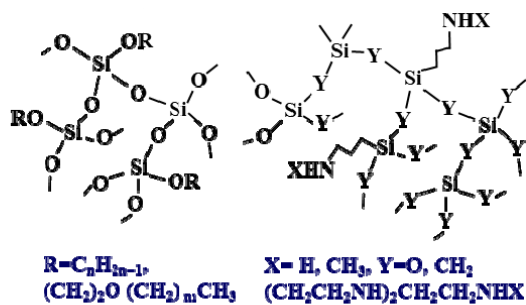
Field: Material sciences, Inorganic materials, Chemical process

Research Keywords: Polymer-Derived Ceramics (PDCs), Membranes, Gas Separation, Nanocomposite

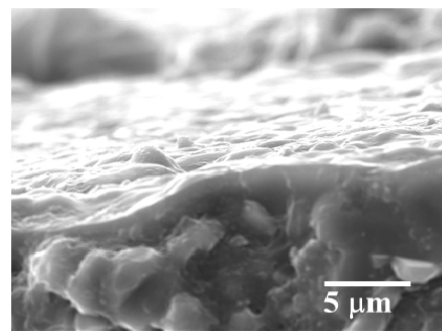
Design of high-performance ceramic materials based on atomic or molecular units is an ideal way for nanostructure controlling to achieve enhanced or novel properties. In our research group, Si-based polymers have been designed and synthesized as single source precursors, and successfully converted to novel H₂-selective microporous ceramic membranes, inorganic-organic hybrids having high CO₂ capture capacity, multicomponent amorphous compounds and non-oxide nanocomposites with enhanced thermal stability.



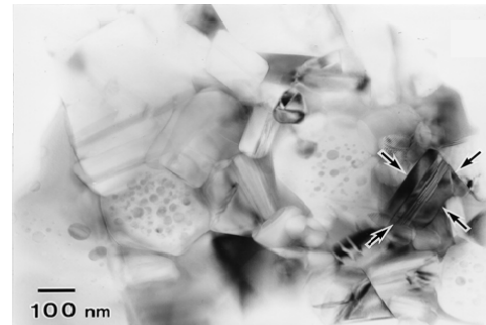
Design and synthesis of Si-based polymers as single source precursors



Amorphous SiO₂, SiC-based inorganic-organic hybrids



Thermally stable amorphous Si-M-(C)-N surface coating



Nanostructure-controlled Si₃N₄-based ceramics



References:

- [1] Y. Iwase *et al.*, *Materials*, **2018** (11), 422.
- [2] Z. Mouline *et al.*, *J. Euro. Ceram. Soc.*, **37**, 5213-5221 (2017).
- [3] F. Sandra *et al.*, *J. Membr. Sci.*, **501**, 79-92 (2016).
- [4] M. N. M. Sokri *et al.*, *Microp. Mesop. Mat.*, **215**, 183-190 (2015).

Main Awards:

- Richard M. Fulrath Award Am. Ceram. Soc. (2006).
- The Academic Achievements Award Ceram. Soc. Japan (2006).



Assoc. Prof. Yusuke DAIKO

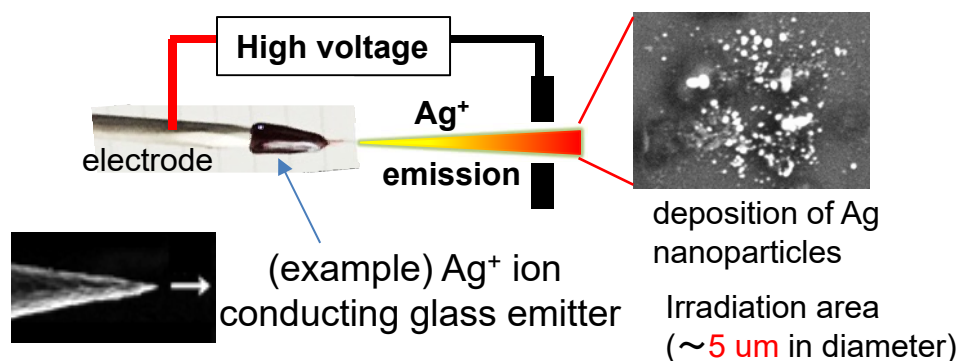
Field: Inorganic chemistry, Ion conduction, Intermediate temperature fuel cell

Research Keywords: Proton conductivity, Proton infiltration, Ion conduction of glasses, Ion emission, Cell activity/adhesion

Dr. Daiko employs the metal ions emission guns to change the surface properties of substrates. By utilizing sharpened glass emitters, his group has succeeded for ion emission/surface modification even under non-vacuum atmosphere. Research for bio-medical applications are in-progress.

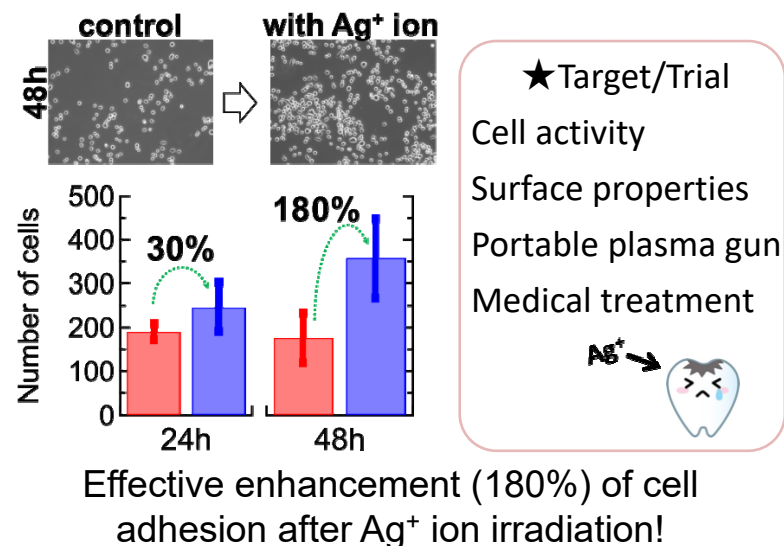
[Palm-sized (~ 5 cm) ion emission gun]

Ion emission even under non-vacuum atmosphere (25°C)



Various ions (H^+ , Ag^+ , Cu^+ , Na^+ , K^+ , F^- etc) can be emitted by changing the type of ion conducting glass emitters.

[Bio-medical applications]



References :

- [1] Y. Daiko, K. Segawa, S. Honda, Y. Iwamoto, *Adv. Eng. Mater.*, 1800198/1-6 (2018).
- [2] Y. Daiko, K. Segawa, S. Honda, Y. Iwamoto, *Solid State Ionics.*, **322**, 5-10 (2018).
- [3] Y. Daiko, S. Mizutani, K. Machida, H. Imataka, S. Honda, Y. Iwamoto, *J. Sol-Gel Sci. Technol.*, **83**, 252–258 (2017).

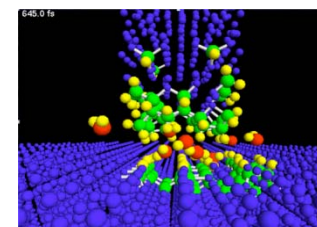
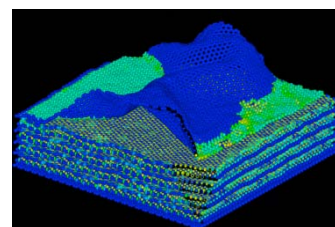
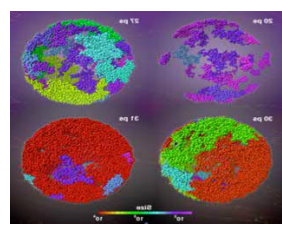
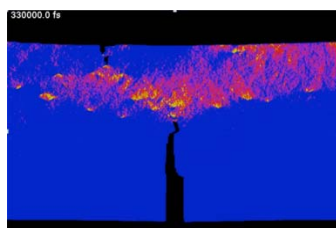
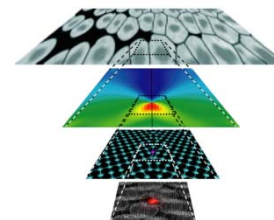
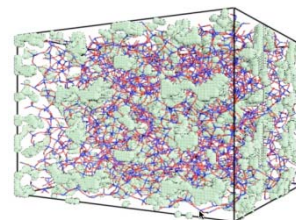
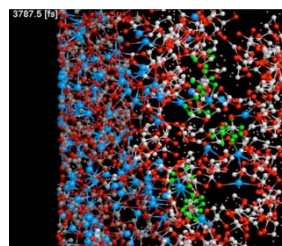
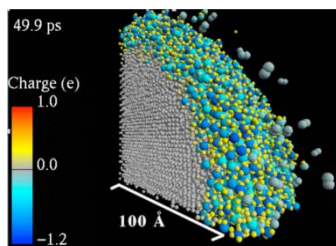


Prof. Shuji OGATA

Fields: Computational Materials Sciences, Inorganic-Organic Interface, Applied Physics

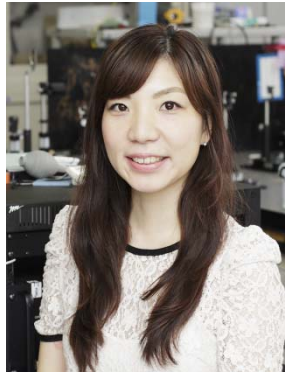
Research Keywords: Order-N DFT code, Large-Scale Molecular Dynamics, Reaction Dynamics, Atomic and Electronic Structures, Interfacial Phenomena, Transport Phenomena

Dr. Ogata has developed various kinds of original electronic and atomic computer-simulation codes and has performed large-scale simulations on supercomputers. His current interests include inorganic-organic interfacial phenomena such as the solid-electrolyte interface in the Li-ion battery, bonding of dissimilar materials with epoxy adhesive, and water-freeze tolerance by antifreeze proteins.



Awards:

- [1] Excellent Achievement Research Project (Hybrid quantum-classical simulation of complex interfaces in practical device), High-Performance Computing Infrastructure, RIST, Japan (2015)
- [2] Certificate of Merit for Best Presentation (Hybrid Simulation of solid-solid and solid-liquid interfaces), Computational Mechanics Division, Japan Society of Mechanical Engineering, Japan (2010)
- [3] Best Technical Paper (Scalable atomistic simulation algorithms for materials research), Supercomputing 2001, USA (2001)



Asst. Prof. Reina MIYAGAWA

Field: Laser processing, Crystal growth

Research Keywords: Femtosecond laser, Wide-gap semiconductors, Surface functionalization

Understanding the formation mechanism of hyperfine periodic structures
→ Flexible-formation control for functional application

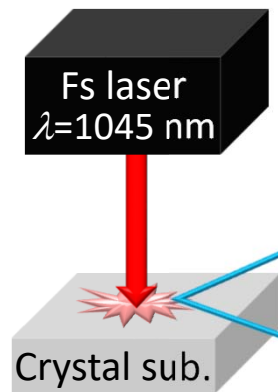
Femtosecond laser-induced periodic surface structures (LIPSS)

- ✓ The periodicity is less than the laser wavelength
- ✓ Self-formation without mask
- ✓ Formation mechanism is still an open question

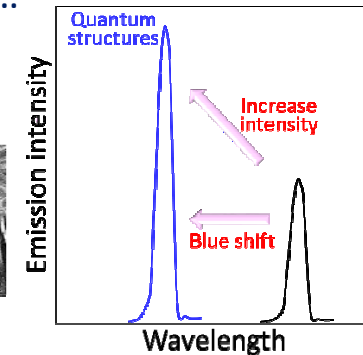
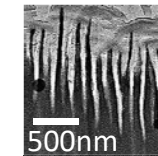
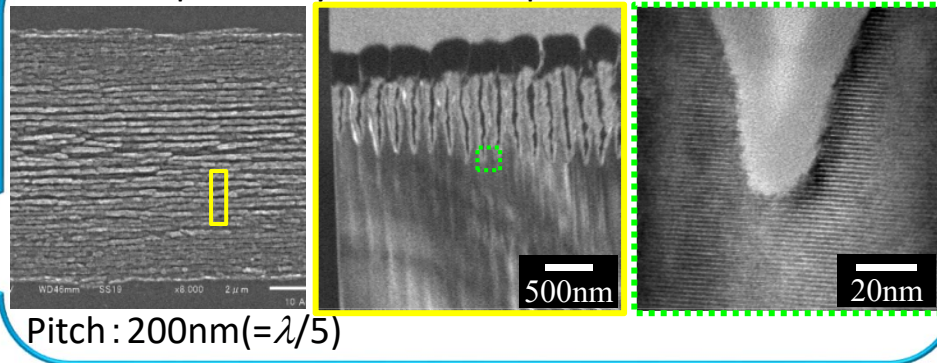


Application

- ✓ Quantum devices
- ✓ Photonic crystal
- ✓ Diffraction grating
- ✓ Initial nuclei for growth
- ✓ etc...



LIPSS kept the crystalline comparable to SiC substrate



Awards: [1] Ando Incentive Prize for the Study of Electronics, ANDO Laboratory (2015)

[2] Paper Award, The Japanese association for crystal growth (2012)

References:

[1] R. Miyagawa, Y. Ohno, M. Deura, I. Yonenaga and O. Eryu, : Jpn. J. Appl. Phys., 57 (2018) 025602.

[2] R. Miyagawa, Y. Okabe, Y. Miyachi, M. Miyoshi, T. Egawa and O. Eryu: Trans. Mat. Res. Jpn. 41 (2016) 155. Other more 18 papers

Other more 10 awards



Prof. Masaki TANEMURA

Field: Materials Science, 1- & 2-D Nanomaterials, Surface Analysis, Scanning Probe Microscope

Research Keywords: Low-Temperature Fabrication of, Energy- & Bio-Applications Nanomaterials, *In Situ* Observation in Atomic Scale with TEM (Transmission Electron Microscopy), Transparent & Flexible

Dr. Tanemura has researched the room-temperature fabrication of carbon nanofibers and their applications to transparent flexible displays and nanoprobe, as well as the *in situ* visualization of the growth of graphene nanoribbons and carbon nanotubes at the atomic scale. The growth of 2-D nanomaterials is also being investigated.

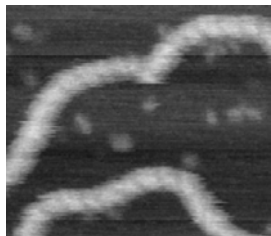
Commercialized Nanocarbon Probe



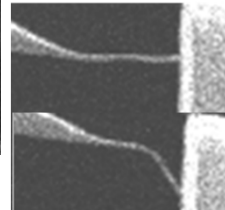
Silicon Cantilevers with a Carbon Nano Fiber Probe

For routine measurement of thin film roughness

Young's Modulus Measurement



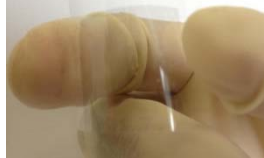
DNA Observation



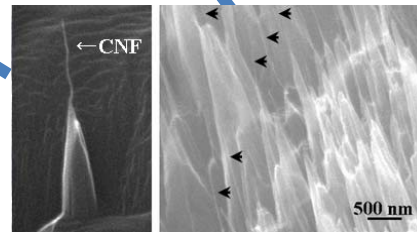
Display [1-4]



Electrode

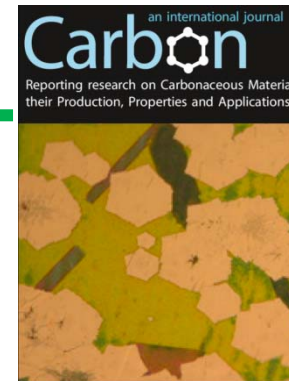


"Transparent & Flexible" Device



Room-Temperature Fabrication of Isolated and Densely Distributed 1-D Nanocarbon

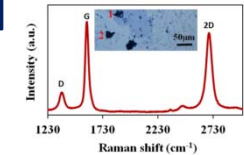
In situ TEM of Graphene Growth [5, 6]



Graphene Synthesis



Low-temperature Graphene Synthesis [7, 8]



Nano-soldering [9]



Awards: [1] Encouragement Award from Japan Institute of Invention and Innovation (2013)

References: [1] M. Tanemura and S. P. Lau: "Flexible Field Emitters: Carbon Nanofibers" in "Carbon Nanotube and Related Field Emitters: Fundamentals & Applications" Wiley-VCH (2010), Chapt.15; [2] P. Ghosh, et al., J. Am. Chem. Soc. 132 (2010) 4034; [3] D. Ghosh, et al., Physica Status Solidi-Rap. Res. Let. 7 (2013) 1080; [4] Z. Zulkifli, et al., Applied Surf. Sci. 356 (2015) 674. [5] M. Zamri, et al., ACS Nano, 6 (2012) 9567; [6] M. S. Rosmi, et al., Scientific Reports, 4 (2014) 7563. [7] R. Vishwakarma, et al., Scientific Reports, 7 (2017) 43756; [8] M. I. Araby, et al., RSC Advances 7 (2017) 47353. [9] S. Sharma, et al., Carbon 132 (2018) 165.



Prof. Makoto IWASAKI

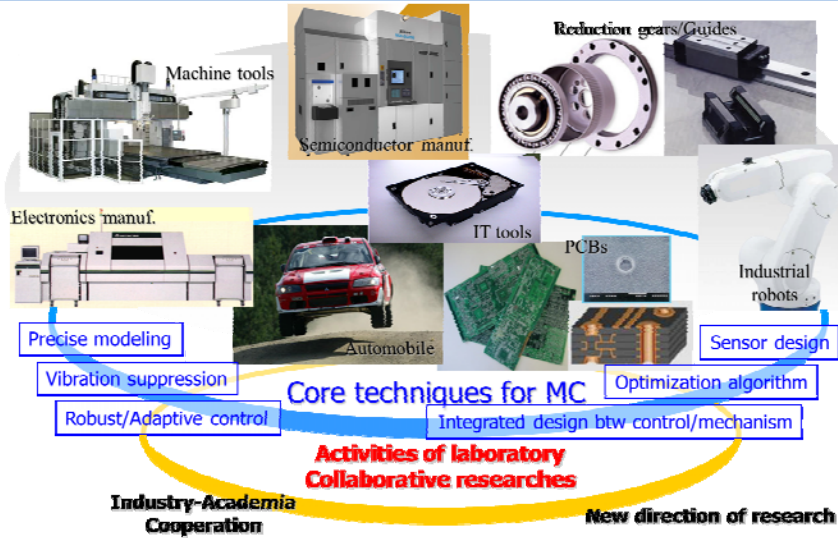
Field: Automation & Control Systems, Mechanics, Robotics

Research Keywords: High Precision Motion Control, Mechatronic Systems

Dr. Iwasaki aims to promote R&D activities with industries on fast and precise motion control techniques (e.g. precise mathematical modeling, mechanical vibration suppression, robust/adaptive controller design, sensor and mechanism design, optimization algorithms) to apply to varieties of industrial machines and consumer electronics products, such as machine tools, manufacturing machines for electronics, industrial robots, HDDs, automobiles, etc.



Industrial 6-axis robots as practical equipment for advanced research as well as educational programs



R&D with industries & core technologies



Thermostatic chamber room for environmental experiments using high-precision positioning devices and mechanisms

References:

[1] M. Iwasaki, K. Seki, and Y. Maeda: "High Precision Motion Control Techniques -A Promising Approach to Improving Motion Performance", IEEE Industrial Electronics Magazine, Vol.6, No.1, pp.32-40, 2012

[2] M. Iwasaki: "Modeling and Compensation for Angular Transmission Errors for Precision Positioning Devices with Harmonic Drive Gearings" (keynote lecture), Proc. of 6th ICPT, pp.13-20, 2014

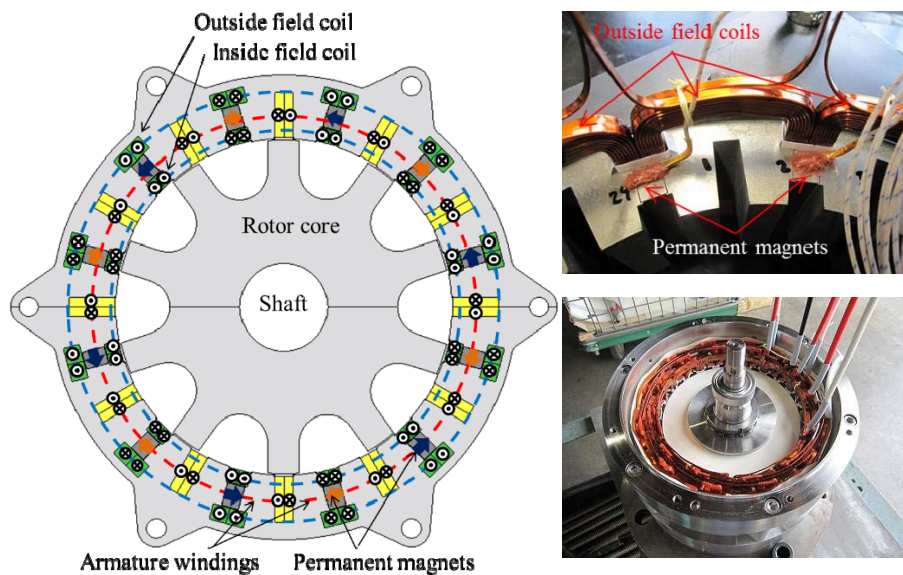


Prof. Takashi KOSAKA

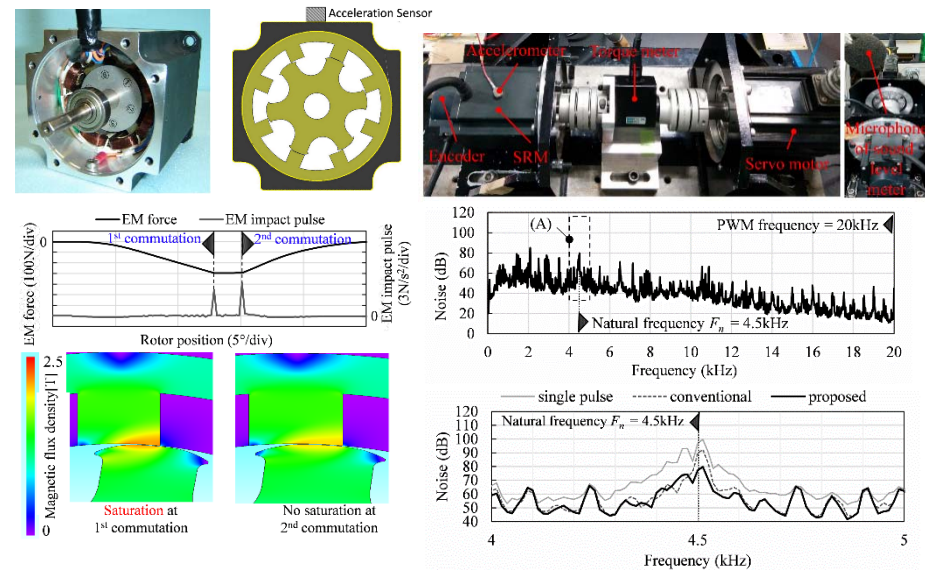
Field: Electric engineering, Power electronics, Electric Machines. Control engineering

Research Keywords: Hybrid excitation motor (HEM) for hybrid electric and pure electric vehicles (HEV and EV), Noise and vibration (NV) reduction, Integrated motor and drive circuit system

Dr. Kosaka researches advanced electric motors, in particular, hybrid excitation motors with higher drive performance and better efficiency for vehicle propulsion applications. Also, he studies noise and vibration reduction for various electric machines.



Hybrid excitation flux switching motors



NV reduction control for SR motor

References:

- [1] S-Y. Shin, N. Kawagoe, T. Kosaka and N. Matsui, "Study on Commutation Control Method for Reducing Noise and Vibration in SRM", IEEE Trans. on Ind. Applications, DOI: 10.1109/TIA.2018.2831173(Early Access) (2018)
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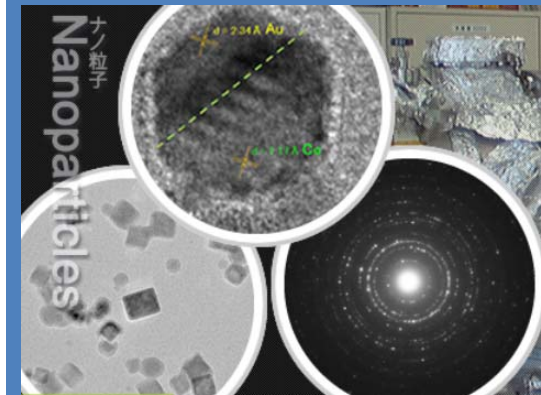
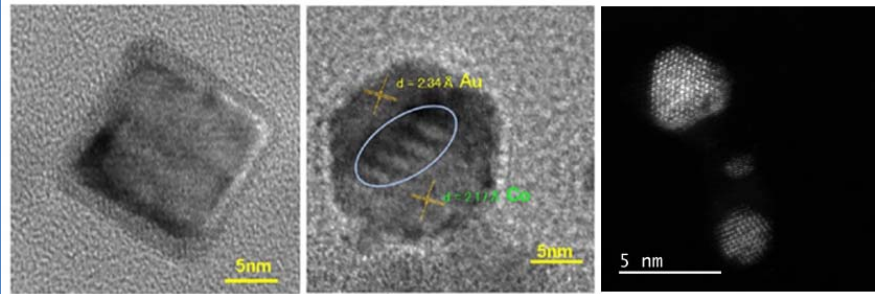


Prof. Takehiko HIHARA

Field: Nanostructural materials, Magnetic materials, Vapor phase synthesis process

Research Keywords: Platinum-free catalyst for the fuel cell, Nanocomposit magnet

Dr. Hihara focuses on understanding physical properties of metal base materials at the nanoscale. His lab tackles advanced fuel cells, high energy magnetic materials, and diluted magnetic semiconductor for eco-friendly applications.



References :

- [1] R. Miyazaki, D. Kurihara, D. Hayashi, S. Furugori, M. Shomura and T. Hihara, *MRS Advances*, 7, pp. 389-94 (2017)
- [2] M. Umezawa, R. Ishikawa, R. Miyazaki and T. Hihara, *J. Applied Physics*, 121035102 pp. 1-6 (2017)
- [3] R. Miyazaki, Y. Noda, H. Miyazaki, K. Soda, T. Hihara, *Journal of Alloys and Compounds* (2017)
- [4] R. Miyazaki, D. Kurihara, T. Hihara, *Journal of Solid State Electrochemistry*, 10, pp. 2759-64 (2016)
- [5] K. Sumiyama, Y. Kurokawa, H. Yamada, M. Yamazaki, T. Hihara, *Materials Transactions*, 6, pp.903-06 (2016)



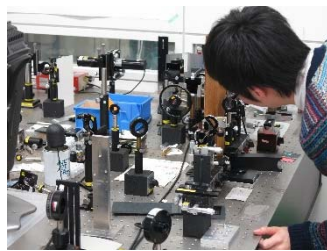
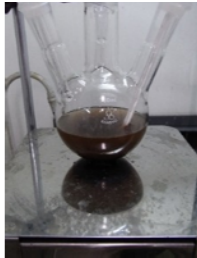
Prof. Yasushi HAMANAKA

Field: Applied Physics, Nanomaterials Science, Optical Physics, Spectroscopy

Research keywords: Colloidal Quantum Dots, Plasmonic Nanoparticles, Photonics Materials

Dr. Hamanaka studies on synthesis and optical properties of sulfide-based nanoparticles not containing toxic heavy metals such as Pb, Cd, etc. These nanoparticles exhibit excellent optoelectronic properties and are potential candidates for eco-friendly materials used in various photonics applications.

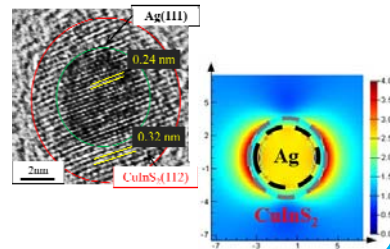
Colloidal Synthesis, Spectroscopy, Microscopy



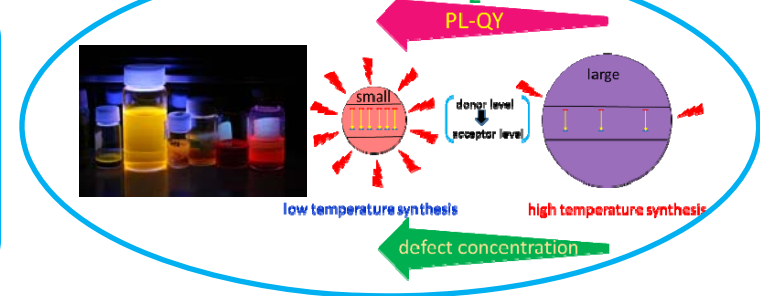
- size-control
- composition-control
- structure-control

core/shell
alloy
metal-semiconductor hetero-structure

NIR Plasmonic NPs



Fluorescent AgInS₂ QDs



Various photonics applications by eco-friendly nanoparticles of sulfide semiconductors (I-VI, I-III-VI, and I-II-IV-VI) and derivatives

- LEDs
- Photovoltaics
- Plasmonics
- Bio-Applications
- Photocatalysis
- NLO Devices, etc.

Research Papers :

- [1] Y. Hamanaka, K. Yamada, T. Hirose, and T. Kuzuya, *Jpn. J. Appl. Phys.* 57, 055201 (2018).
- [2] Y. Hamanaka, T. Hirose, K. Yamada, and T. Kuzuya, *Opt. Mater. Express* 6, 3838 (2016).
- [3] Y. Hamanaka, K. Ozawa, and T. Kuzuya, *J. Phys. Chem. C* 118, 14562 (2014).
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- [5] Y. Hamanaka, N. Okada, K. Fukagawa, A. Nakamura, Y. Tai, and J. Murakami, *J. Phys. Chem. C* 116, 10760 (2012).
- [6] Y. Hamanaka, T. Ogawa, M. Tsuzuki, and T. Kuzuya, *J. Phys. Chem. C* 115, 1786 (2011).

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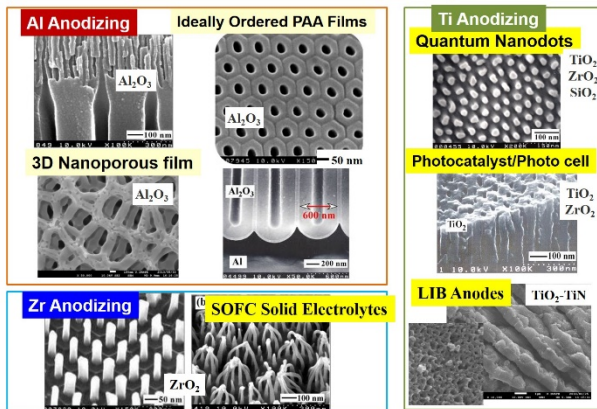
Prof. Shochiku KURE

Field: Functional surface finishing, Electrochemistry, Materials science, Materials chemistry

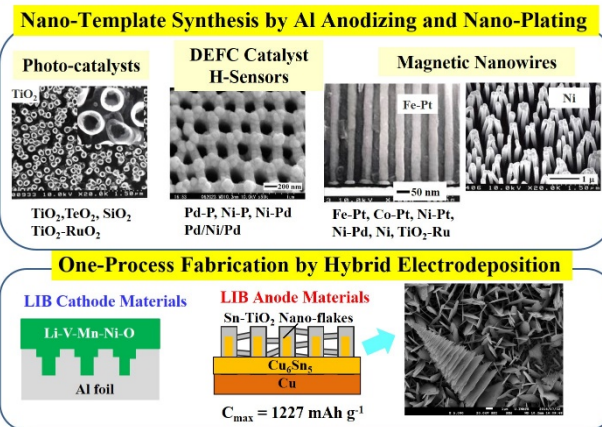
Research Keywords: Anodization, Electrodeposition, Electroless-plating, Nano-materials, LIB, DEFC

Dr. Kure-Chu' work mainly involves in the fabrication of various functional nanomaterials for broad applications such as automotive connectors, electronic components, electrode materials for lithium ion batteries and solar cells; catalysts for fuel cells, H-sensors, hydrogen production; magnetic recording media, photo-catalysis, self-lubrication, anti-corrosion, anti-abrasion, decoration, etc.

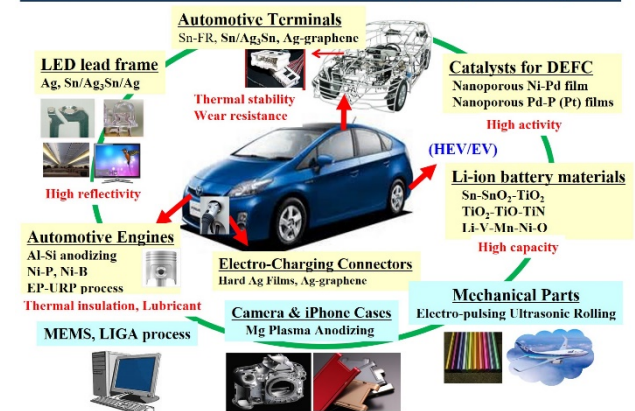
Fabrication of Oxide Nanostructures by Anodization



Fabrication of Nanomaterials by Nano-plating



Functional Surface Finishing Engineering



References :

- [1] S.-Z. Kure-Chu*, H. Sakuyama, E. Suzuki, H. Yashiro, K. Sasaki, T. Hihara, *J. Electrochem. Soc.*, 165, pp.A477-A486 (2018).
- [2] S.-Z. Kure-Chu*, T. Ogasawara, R. Ye, H. Yashiro, K. Sasaki, *Electrochimica Acta*, 222, pp.380-389 (2016).
- [3] S.-Z. Kure-Chu*, A. Satoh, S. Miura, M. Mizuhashi, H. Yashiro, *J. Electrochem. Soc.*, 162, pp.D305-D311 (2015).
- [4] S.-Z.Chu*, K. Wada, S. Inoue, M. Isogai, A. Yasumori, *Adv. Mater.*, 17, pp.2115-2119 (2005)
- [5] S.-Z. Chu*, S. Inoue, K. Wada, *Adv. Mater.*, 15, pp. 1752-1756 (2002).



Assoc. Prof. Hisashi SATO

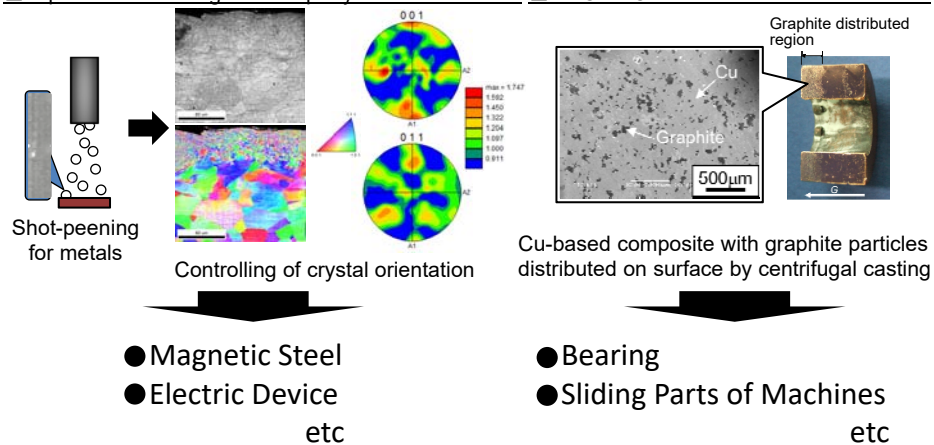
Field: Materials science, Metallurgy, Microstructural analysis, Crystallography

Research Keywords: Aluminum alloy, Steel, Phase Transformation, Deformation, Casting, Functionally Graded Materials

Dr. Sato's scientific interests include phase transformation of steel, microstructural change of metallic materials by severe plastic deformation and processing technique of functionally graded materials. Especially, he recently has investigated on functionalization, such as magnetic and self-lubrication, of metal surface by shot-peening, centrifugal casting and so on. Also, he has made fundamental studies of martensitic transformation of steel and grain refinement of as-cast Aluminum in term of crystallography.

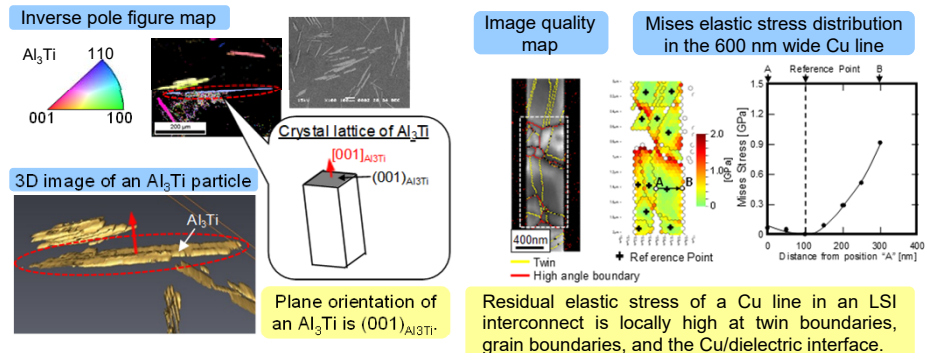
Functionalization of Metal Surface By Deformation and Casting

■ Improvement of Magnetic Property on Metal Surface ■ As-Cast Cu With Self-lubricated Surface



Microstructural Analysis for Metallic Materials

■ Orientation Analysis of an Al_3Ti Platelet Particle by Combination of EBSD and Serial Sectioning ■ Local Distribution of Residual Stress of Cu in LSI Interconnect



References:

- [1] "Three-dimensional microstructural analysis of fragmentation behavior of platelet Al_3Ti particles in Al- Al_3Ti composite deformed by equal-channel angular pressing", H. Sato and Y. Watanabe: Mater. Charact., 144 (2018) 305-315.
- [2] "Effects of work hardening rate on formation of nanocrystallized subsurface layer in Cu alloys", H. Sato *et al.*: Jpn. J. Appl. Phys., 56 (2017) 01AE05.
- [3] "Temperature dependence of reverse transformation induced by shot-peening for SUS 304 austenitic stainless steel", H. Sato *et al.*: Materials Today: Proceedings, 2S (2015) S707-S710.
- [4] "Local distribution of residual stress of Cu in LSI interconnect", H. Sato *et al.*: Mater. Lett., 136 (2014) 362-365.
- [5] "A study on the formation mechanisms of butterfly-type martensite in Fe-30% Ni alloy using EBSD-based orientation microscopy", H. Sato and S. Zaeferrer: Acta Mater., 57 (2009) 1931-1937.

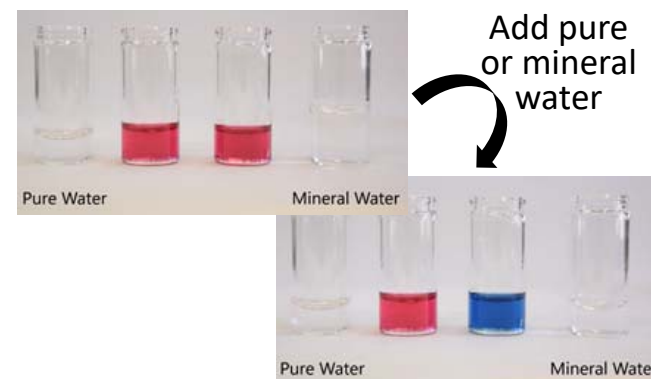
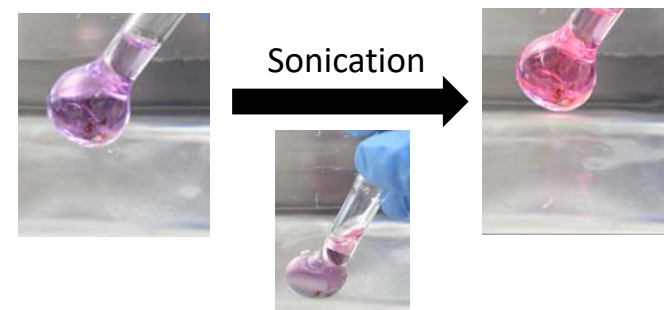
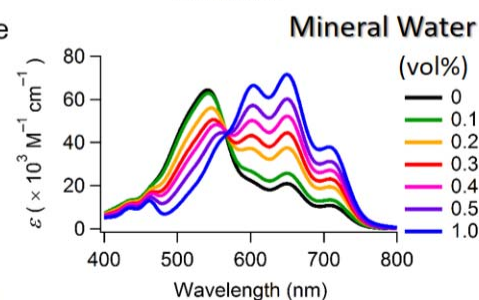
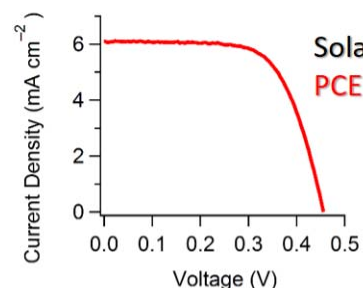
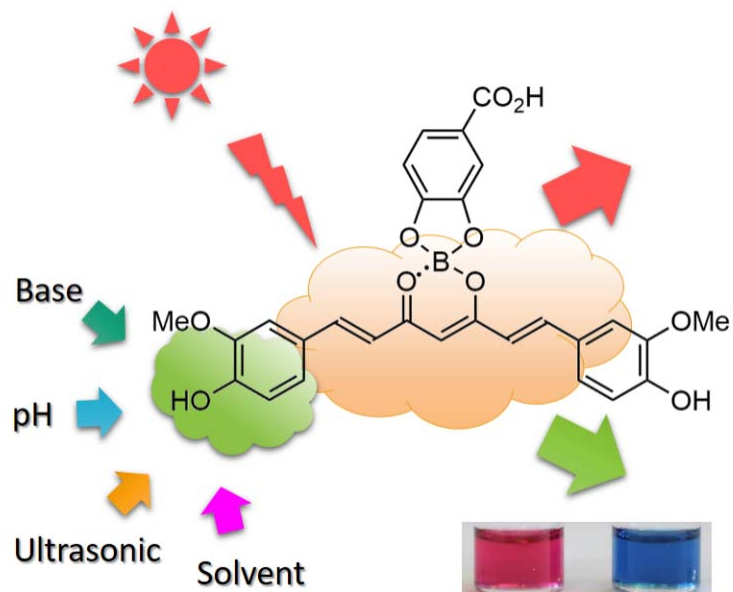


Assoc. Prof. Katsuhiko ONO

Field: Functional solid state chemistry, Organic chemistry

Research Keywords: Organic dye, Flexible solar cells, Organic semiconductors, Self-organization supramolecules

Dr. Ono focuses on the next generation dye-sensitized solar cells, organic semiconductors and solar cells by using his organic chemical research background. His research aim covers a wide range of fields from a molecule characterization to a material optimization for wearable applications.



References :

- [1] M. Tsuchikawa, A. Takao, T. Funaki, H. Sugihara, and K. Ono, *RSC Advances*, 7, pp.36612-16 (2017)
- [2] Y. Mizuno, Y. Yisilamu, T. Yamaguchi, M. Tomura, T. Funaki, H. Sugihara, and K. Ono, *Chemistry – A European Journal*, 20, pp. 13286-95 (2014)



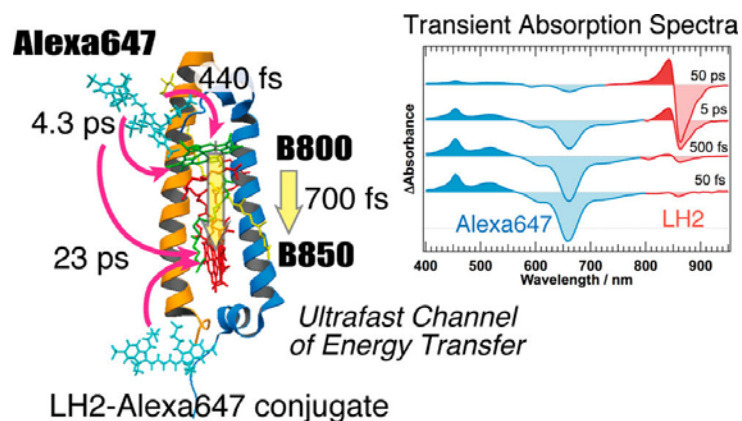
Prof. Takehisa DEWA

<http://www.ach.nitech.ac.jp/~polymer/ydk/en/dewakondo.html>

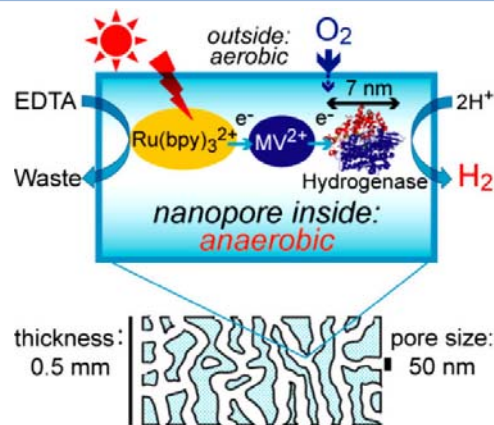
Field: Biochemistry & Physical Bio-organic Chemistry, Polymer Science, Pharmacology

Research Keywords: Application of photosynthetic function, Structure and Function of Biomembranes, Gene delivery using synthetic lipids

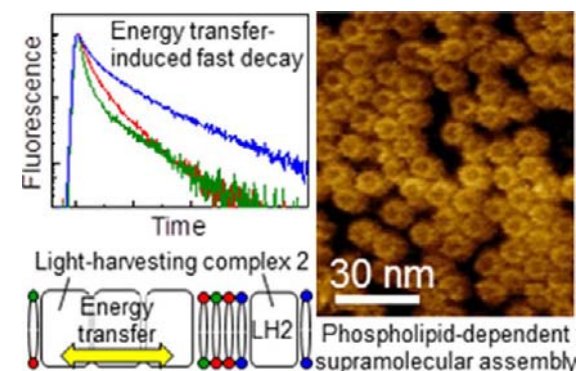
Dr. T. Dewa has engaged himself in developments and characterizations of bio-photonic materials as light-energy converters. By using various physicochemical approaches, his research aims to synthesize artificial photosynthetic nano-devices for next-generation optical medical tools and energy resources.



Extension of Light-Harvesting Ability of Photosynthetic Light-Harvesting Complex 2 (LH2)
J. Am. Chem. Soc. **2015**, 137, 13121.



Porous Glass Plate
Light-Driven Hydrogen Production by Hydrogenases in nanoporous glass
J. Phys. Chem. Lett. **2014**, 5, 2402.



Self-assembly of photosynthetic light-harvesting complex (LH2) and excitation energy transfer
J. Phys. Chem. B. **2013**, 117, 10395.

References:

- [1] Non-RVD mutations that enhance the dynamics of the TAL repeat array along the superhelical axis improve TALEN genome editing efficacy, *Scientific Reports*, 2016
- [2] One-step encapsulation of siRNA between lipid-layers of multi-layer polycation liposomes by lipoplex freeze-thawing, *JOURNAL OF CONTROLLED RELEASE*, 2016
- [3] Light-induced hydrogen production by Photosystem I–Pt nanoparticle conjugates immobilized in porous glass plate nanopores, *Res. Chem. Intermed.*, 2016
- [4] Enhanced efficacy of doxorubicin by microRNA-499-mediated improvement of tumor blood flow, *J. Clinical Medicine*, 2016



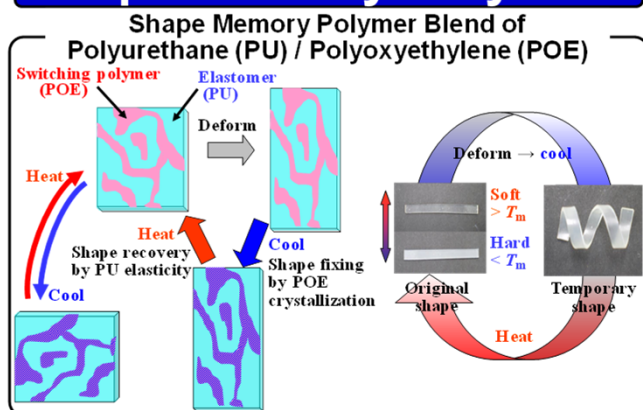
Prof. Katsuhiko INOMATA

Field: Polymeric materials, Polymer chemistry, Polymer physics

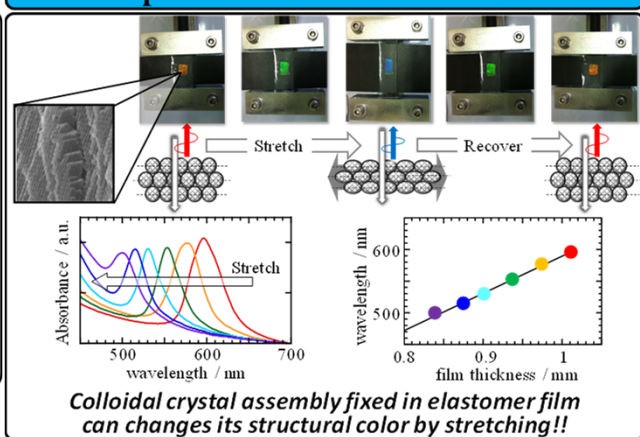
Research Keywords: Shape memory polymers, Colloidal crystal, Structural color, Polypeptides

Dr. Inomata has researched polymeric materials, such as shape memory polymers (shape fixation/recovery mechanism), structural colored elastomers (strain-responsive color change of polymer nanoparticle assembly), and shape changing liquid crystalline polypeptide gels (relationship between polymer conformation and material's shape).

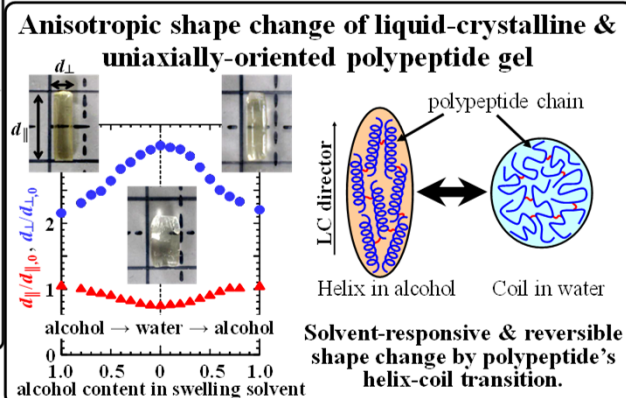
Shape Memory Polymers



Strain-responsive Structural Colored Elastomer



Liquid Crystalline Polypeptide Gel



References:

- [1] C. Katsura, S. Nobukawa, H. Sugimoto, E. Nakanishi, K. Inomata, *Colloid and Polymer Science* 9, pp.1709-15 (2017).
- [2] T. Ito, C. Katsura, H. Sugimoto, E. Nakanishi, K. Inomata, *Langmuir*, 45, pp.13951-57 (2013)
- [3] K. Inomata, Y. Iguchi, K. Mizutani, H. Sugimoto, E., *ACS Macro Letters*, 7, pp.807-10 (2012)
- [4] K. Inomata, T. Terahama, R. Sekoguchi, T. Ito, H. Sugimoto, E. Nakanishi, *Polymer*, 15, pp.3281-86 (2012)

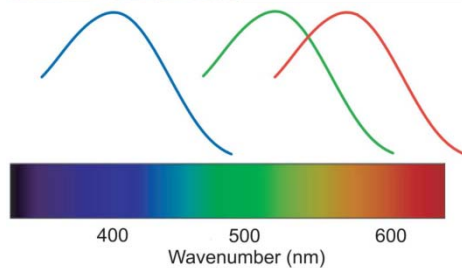
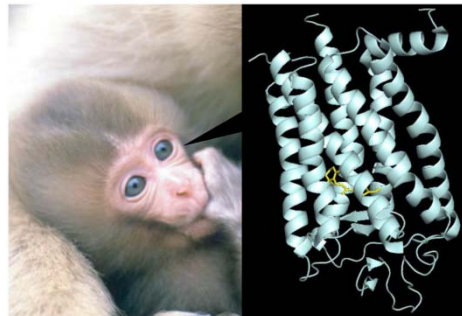


Prof. Hideki KANDORI

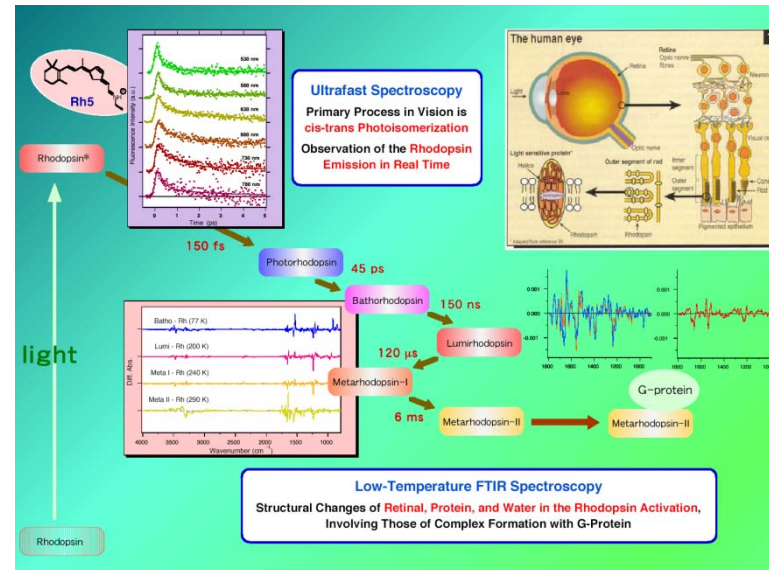
Field: Light-Energy and Light-Signal Conversions, Biophysics, Physical Chemistry, Optogenetics

Research Keywords: Light and Life, Rhodopsin, DNA repair, Ion-Transport, Vibrational Spectroscopy

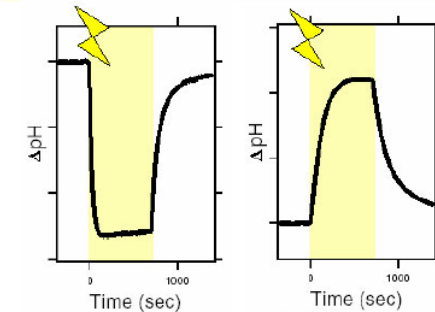
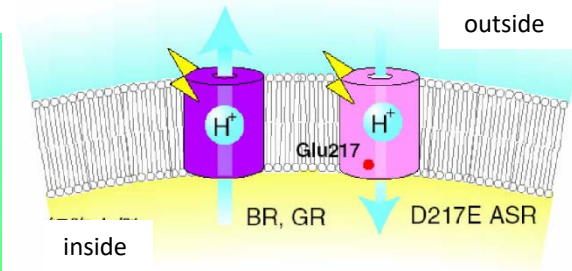
Photoreceptive proteins convert light into energy or signal in biological systems. Using state-of-the-art spectroscopy, Kandori group revealed structural changes of these proteins. Based on the fundamental results, new functions have been created, which are applicable to life science field.



Color Tuning in our Vision



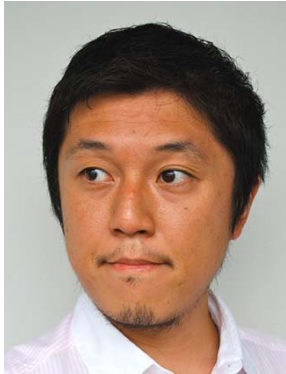
Spectroscopic Study of Visual Pigments



Creation of Inward H⁺ Pump

References :

- [1] Inoue et al. Natural light-driven inward proton pump, *Nature Commun.* 7, 13415 (2016).
- [2] Kato et al. Structural basis for Na⁺ transport mechanism by a light-driven Na⁺ pump, *Nature* 521, 48-U347 (2015).
- [3] Katayama et al. An FTIR study of monkey green- and red-sensitive visual pigments, *Angew. Chem. Int. Ed.* 49, 891-894 (2010).
- [4] Shibata et al. High-speed atomic force microscopy shows dynamic molecular processes in photoactivated bacteriorhodopsin, *Nature Nanotech.* 5, 208-212 (2010).



Professor Keisuke KITAGAWA

Field: Architecture Design, Appropriate Technology, Affordable House

Keywords: Easy + Portable + Handy Housing, Appropriate Invention in Architecture

Dr. KITAGAWA recently invented 'Instant House' and collaborate with international organizations, national governments, global companies, NGO, etc. to supply housing for poor and needy people all over the world. He is also a well known mentor through his dedicated supports for international internships.

① Lighter Weight

1-5% of Wood/Steel/Concrete Structures

② Lower Cost

1-5% of Wood/Steel/Concrete Structures

③ Compact Packaging

Easily Portable

④ Flexible Material

Effective for All Environmental Conditions

⑤ Easy Construction

Little Assembling required

⑥ Quick Installation

1 Day to Install a 100m² House

⑦ Adaptable Insulation

Temperature Control Anywhere/Anytime

⑧ Ideal Soundproofing

Controls Both External/Internal Noise



1 Day to Install a 100m² Instant House (2018)

Awards:

- [1] The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (2016)
 - [2] Special Excellence Award (2009, 2010, 2011) and the other Awards by NITech
 - [3] Tokai Award by Architecture Institute of Japan (2009)
- and the others



Prof. Eizo HIDESHIMA

Field: Civil engineering, Management of technology

Research Keywords: Infrastructure planning, Urban planning, Policy science

Dr. Hideshima focuses on planning and management of urban infrastructure. His research seeks the best solutions for public supports, social institutions as well as space configuration with facilities in urban area from the viewpoint of systems approach. Hideshima lab also argues and develops the management of technology for urban infrastructure improvements.



References:

- [1] The mitigation effect of BCP on financial damage -an empirical study of the non-manufacturing industries in the Great East Japan Earthquake-, *Journal of Japan Society for Civil Engineers Vol.5* (2017)
- [2] Influence of Vital Support for Rural Residents on the Evacuation Operation Time in A Wide-Area Evacuation Plan at Natural Disasters, *PRSCO (The Pacific Regional Science Conference Organization)* (2016)
- [3] Process and issues to start up a town organization-in the case of *Retoro-Nayabashi-Hyakunen linkai* , *Journal of Japan Society for Civil Engineers D3 Vol.71 No,5* (2016) , etc.

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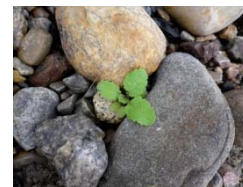
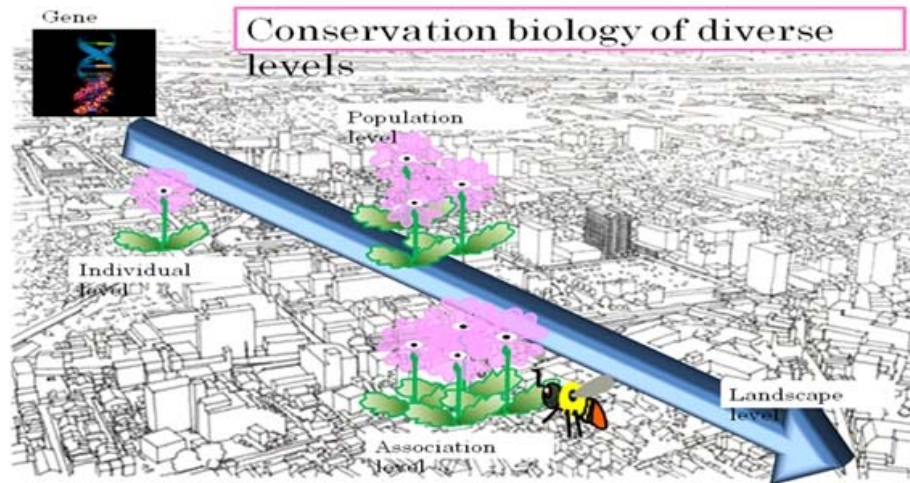


Prof. Michiko MASUDA

Field: Conservation biology, Reproductive ecology, Management of park.

Research Keywords: Population dynamics, River management, Seedling emergence, Phenology, Regeneration, Endangered species, Biological Invasion.

Dr. Masuda researches to improve the knowledge on environment managements by focusing on how biodiversity is occurred. She is interested in the endangered species and the invasion of alien species, which is essential to understand the nature and evolutions. Also her research is extended for environment remediation targeting the ammonia removal characteristics of porous concrete with zeolite in river systems.



Awards and References:

- [1] Nagai encourage prize(2014)
- [2] Useful opinion of judging committee(2013)
- [3] Technical prize(2012)
- [4] M. Masuda et al., Int. Conf. GEOMATE 13(35) 136 - 143 (2017)
- [5] M. Masuda et al., Int. Conf. GEOMATE 15 (49) 53 - 58 (2018)

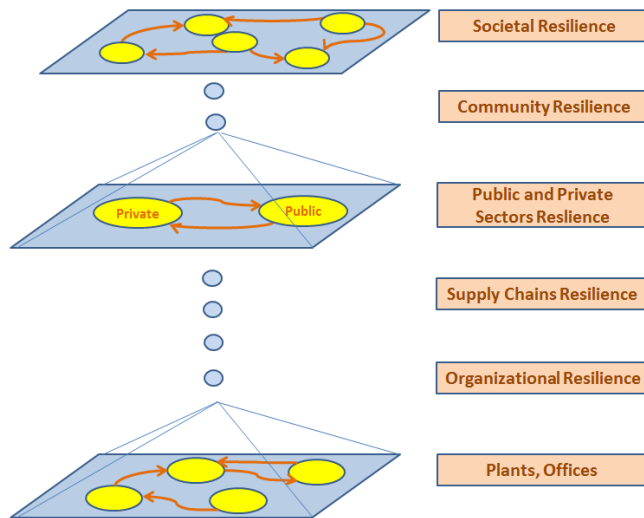


Prof. Kenji WATANABE

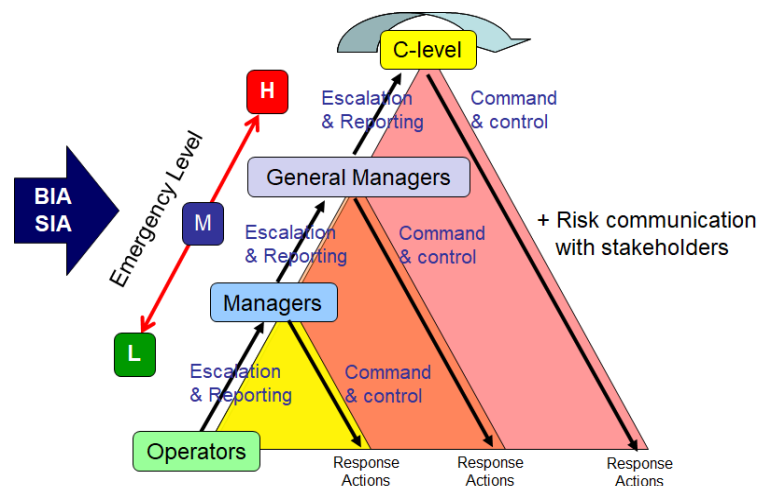
Field: Risk management, Risk Management, Business Continuity Management (BCM), Critical Infrastructure Protection

Research Keywords: Business/Social Impact Analysis, Area-BCM, Disaster Resilience, Public-Private Partnership (PPP), interdependency, cross-sector exercise

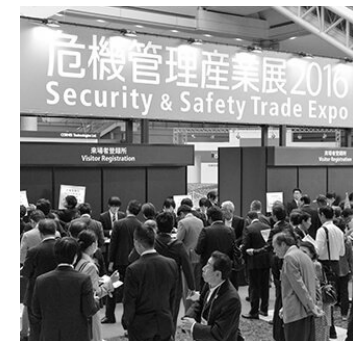
Dr. Watanabe researches risk managements for continuing business operations and critical infrastructures. Based on field works and advisory to governmental agencies, Dr. Watanabe group has guided over a wide range of organizations in both private and public.



Layers of resilience



Emergency response based on impact analysis



References :

- [1] Watanabe and Hayashi, PPP(Public-Private Partnership)-Based Business Continuity of Regional Banking Services for Communities in Wide-Area Disasters, Critical Information Infrastructure Security, CRITIS 2015, LNCS 9578, 67-76 (2016)
- [2] Haraguchi et al., Building Private Sector Resilience: Directions After the 2015 Sendai Framework, Journal of Disaster Research Vol.11 No.3, 535-542 (2016)
- [3] Aoyama et al., Developing a Cyber Incident Communication Management Exercise for CI Stakeholders, The 11th International Conference on Critical Information Infrastructure Security (2016)
- [4] Watanabe, Establishing Social Resilience with PPP-based BCM, Improving Disaster resilience and Mitigation - IT Means and Tools, NATO Science for Peace and Security Series, 63-72 (2014)



Assoc. Prof. Atsushi SATO

Field: Structural Engineering, Construction & Building Technology

Research Keywords: Earthquake, Cold-formed steel, Bolted moment frame, Bearing Friction, Seismic design

To achieve safe and comfortable human life, sustainable building is critical in current society. Dr. Sato aims to minimize damages from the building collapse. His dedications have improved building designs and constructions and reduced the number of victims. His research focuses on a building structure that enables us to predictable the global behavior and repairable even if the structure suffers damage under earthquake.



References:

- [1] A. Sato et al., Proceedings of The 13th Nordic Steel Construction Conference (2015)
- [2] The 17th Taiwan-Korea-Japan Joint Seminar on Earthquake Engineering for Building Structures (2015)
- [3] A. Sato et al., Journal of Architecture and Planning (Transactions of AIJ) Vol. 80(2015)
- [4] A. Sato et al., Journal of Structural Engineering. A (2015)
- [5] A. Sato and U. Chia-Ming. EARTHQUAKE SPECTRA., vol. 29, pp259-282 (2013)

Please feel free to contact:

creative.eng@adm.nitech.ac.jp

<http://cr.web.nitech.ac.jp/en>

NITech Creative Engineering Program;

<http://cr.web.nitech.ac.jp/en>

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