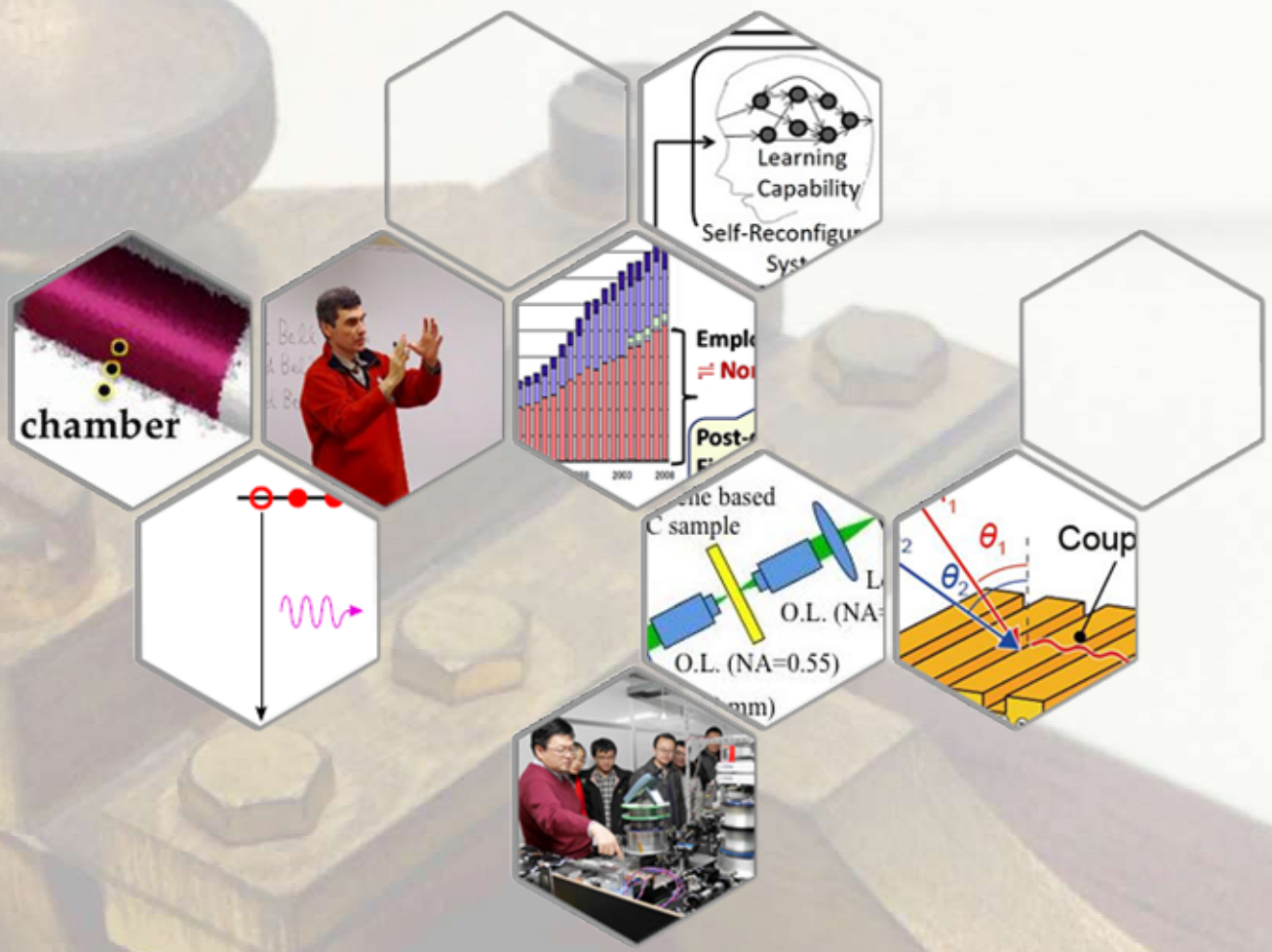
The University of Electro-Communications

UEC e-Bulletin

Updates on research, innovation, and events at UEC:
Unique and Exciting Campus in Tokyo

Vol.13, March 2017



The University of Electro-Communications 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

Feature

Research Highlights

Topics

News and Events

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

UEC Museum of Communications

Sharing science and technology of the past for visions of the future

A walk through the UEC Museum of Communications is like walking through a three dimensional encyclopedia of the history of cutting edge wireless communications technology including 'spark gap transmitters'; 'Lieben Tube'; Fleming oscillation valve; photomultiplier tube used for neutrino detection at the Kamiokande Observatory that led to the 2002 Noble Prize in Physics for Masatoshi Koshiba; and Japan's first nuclear magnetic resonance system developed by UEC in 1950.

The exhibits at the Museum reflect the history of innovative research and development at UEC, Tokyo, that was founded in 1918 as the Technical Institute of Wireless Communications to educate and train radio operators in recognition of the importance of radio communications following the Titanic disaster in 1912.

The Museum consists of seven exhibition rooms spread over two floors of a dedicated building at the center of the UEC, Tokyo, campus in Chofu. Here are some of the most popular exhibits at the Museum.

The building housing the UEC Museum of Communications.

Embossing Morse Telegraph System (Corridor)

Perhaps one of the most unusual exhibits is the replica of an Embossing Type Telegraph Key System or "Embossing Morse Telegraph" given by Commodore M.C. Perry as one of many presents to the Tokugawa-Bakufu government in 1854. Notably, Commodore Perry's colleagues actually demonstrated the telegraph system by transmitting messages in English, Dutch and Japanese across wires stretching about a 'mile' near Yokohama bay.

Replica of the Embossing Type Telegraph Key System given as a present by Commodore Perry to the Tokugawa-Bakufu government in 1854.

Close-up view of the recording device to emboss Morse code on a strip of paper.

Relay Computer AL-1 made by CASIO (Room 2)

This pioneering "programmable relay calculator" was manufactured by Casio Computer Co. Ltd in 1962 and is internationally recognized as one of the major breakthroughs in modern computing. Underscoring the importance, Japan's Center of the History of Japanese Industrial Technology officially registered it as 'Future Technology Heritage' in 2014. Furthermore, the Information Processing Society of Japan has officially certified the Al-1 as an "information processing technology heritage".

Relay Calculator AL-1 made by CASIO

Edison Phonograph (Room 2)

This working exhibit is an Edison Phonograph Standard Model D made in 1911. It consists of a cylinder record player driven by a spring and a sapphire needle that runs through a narrow groove on the cylinder record resulting in sound that is amplified by the large speaker. There are two types of cylinder records: the wax version plays for two minutes and the Amberol type for four.

Thomas A. Edison invented the cylinder phonograph in 1877. He continued to improve the cylinder phonograph until 1929 competing with the disc record invented by Emile Berliner in 1889.

Hallicrafters Model DD-1 Skyrider Diversity Receiver (Room 3)

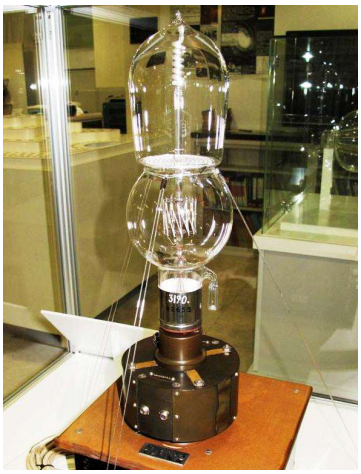
The DD-1 diversity receiver that is enclosed in a single cabinet was produced in 1937-38 by the Hallicrafters Company for 'diversity reception' that is effective in reducing fading signals in shortwave communication. Notably, the DD-1 receiver on display at the UEC Museum is the only one in the world existing in complete condition.

Recreation of a classroom for training wireless telegraph engineers (Room 5)

This room offers unique insights into vocational training facilities for radio engineers in Japan at the Technical Institute of Wireless Communications, the forerunner of UEC. The desks and instruments on display were actually used in 1960s. The front row near the instructor is the receiver's desk where trainees receives Morse code via speakers and wrote it down by hand or typing. The rear side is the desk where trainees sent Morse code. When a trainee is tapped keys according to a textbook, the codes were recorded on tape. Later, trainees used the tape to check the results of their classwork.

Lieben Tube (Room 6)

The exhibit is a rare example of this famous tube that was invented in Austria about 100 years ago and used by Germany in World War One for radio communications. The tube was produced by AEG-Telefunken and is on loan from Tekniska Museet Museum of Science and Technology, Stockholm, Sweden. The tube is a 'triode' filled with mercury vapor, measuring 30 cm long and 10 cm in diameter, with the two glass tubes joined at the center producing its unique shape.

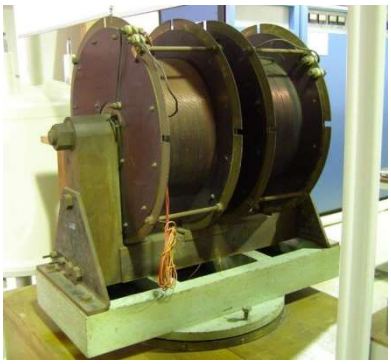


Early development Fleming Valve (Room 6)

The Fleming Valve was invented by J.A. Fleming (UK) for use in a radio receiver.This one is believed to have been made around 1910 and is exhibited with other pioneering vacuum valves.

Nuclear Magnetic Resonance magnet (Room 7)

This MRI magnet was developed by UEC researchers in 1959 and was the first such unit in Japan. This system became the prototype for the much advanced MRI systems used for medical care all over the world. UEC researchers have also contributed to the development of electron spin resonance, laser spectroscopy, kite-like antenna, and the understanding of the functions of the brain.



Further information
http://www.museum.uec.ac.jp/

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

Nanoparticle-polymer composites boost holographic data prospects

Holograms offer a means of increasing data storage density that may help to meet the demands of ever decreasing device sizes and increasing memory requirements. Kohta Nagaya, Eiji Hata and Yasuo Tomita at the University of Electro-Communications in Japan demonstrate that coaxial holographic digital data storage in a thiol-ene based nanoparticle-polymer composite can achieve competitive symbol error rates and signal-to-noise ratios.

Using changes in refractive index to optically record data, holograms record in three dimensions instead of being limited to the surface alone, thereby increasing the amount of data recorded. To diminish symbol error rates and increase signal-to-noise ratios the recording material must undergo large refractive index changes with a high recording sensitivity and be resilient to shrinkage during the process.

Inorganic nanoparticle-polymer composites are excellent candidates for meeting holographic data storage criteria, and the UEC researchers have already demonstrated holographic storage in nanoparticle-polymer composites by use of thiol and ene-monomers, 'so-called thiol-ene monomers'. By shifting the storage medium within a few tens of micron-size beam spot during the recording process holographic shift-multiplexing storage was achieved.

Now the UEC researchers have demonstrated co-axial holographic data storage in thiol-ene based nanoparticle-polymer composites. Coaxial data recording positions the reference beam around the signal beam and has been proposed as a means of increasing data density and transfer rates for a more competitive data storage technology.

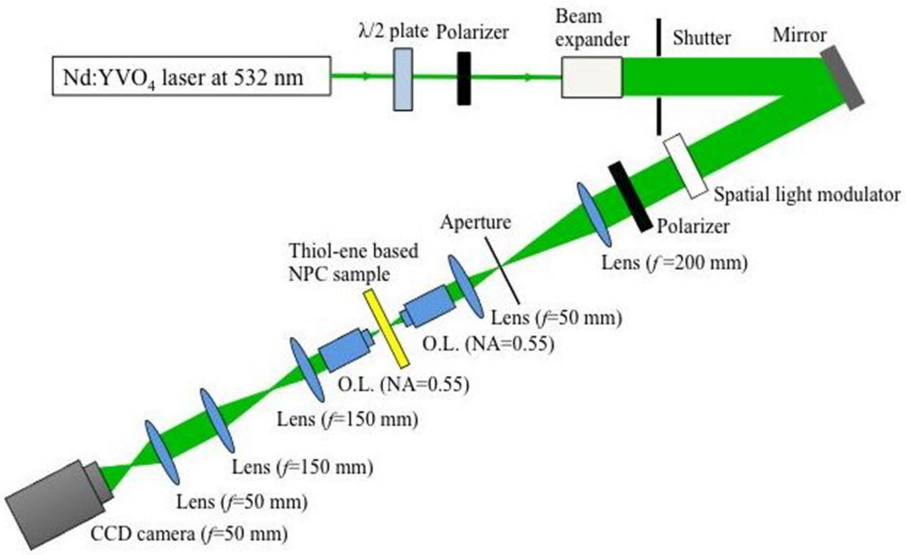
The researchers used silica nanoparticles uniformly dispersed to secondary thiol and an allyl triazine triene monomer components. Optimum symbol error rates (less than 10^{-4}) and signal-to-noise ratios (higher than 10) were achieved when silica nanoparticles were used at 25 vol.% concentrations and the composition of thiol-ene monomers was stoichiometric.

The researchers conclude, "These results show the usefulness of thiol-ene based nanoparticle-polymer composites as coaxial holographic data storage media."

Reference

Kohta Nagaya, Eiji Hata, and Yasuo Tomita, Readout fidelity of coaxial holographic digital data page recording in nanoparticle-(thiol-ene) polymer composites, *Jpn. J. Appl. Phys.* **55** 09SB03 (2016).

Department of Engineering Science, University of Electro-Communications, Chofu, Tokyo 182-8585, Japan



Optical setup for coaxial holographic digital data page recording. O.L.: objective lens.

Professor: Yasuo, TOMITA (Ph.D., California Institute of Technology, 06/1989)
Current research areas: Photonic Nanocomposite Materials, Nonlinear Optics, Neutron Optics, Information Photonics, Liquid Crystal Photonics
Current research subjects: Nanocomposite Volume Gratings for Wearable Display Devices, Holographic Data Storage, Cascaded High Order Nonlinear Optical Effects in Nanocomposite Materials, Holographic Slow Neutron-Optic Devices, Phase Transition Dynamics during Holographic Polymerization in Nanocomposite/Polymer-Dispersed Liquid Crystal Materials
Personal website: http://talbot.es.uec.ac.jp/

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

Relativistic effects pack a punch in high-temperature plasma collisions

"The interaction of highly charged heavy ions with electrons is one of the most important atomic processes in high-temperature plasmas," explains University of Electro-Communications researcher Nobuyuki Nakamura in his recent *J Phys* B topical review. These high-temperature plasmas occur in a surprisingly large range of scenarios from astrophysical plasmas and solar corona, to fusion reactors and even laser-induced plasmas for short wavelength nanoscale photolithography, raising the stakes for understanding their behaviour. Nakamura's review summarises how the relativistic effects resulting in the "Breit interaction" can play a significant role in these processes.

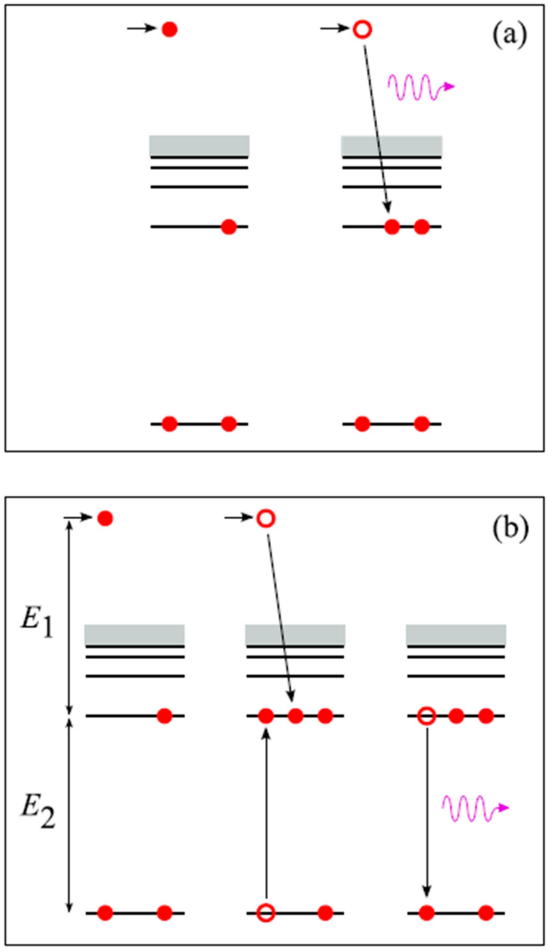
The Breit interaction introduced by G Breit in 1930 is the relativistic effect involved in interactions between electrons. In many cases - such as the calculation of atomic energy levels - the correction to the standard Coulomb interaction is small. The Breit correction remains small even for energy level calculations of heavy ions, where atoms with a high mass are stripped of many of their electrons so that they are strongly charged.

However when a highly charged heavy ion resonantly captures an electron, the Breit interaction can become dominant. This 'dielectric resonant recombination' process is accompanied by energy radiation for stabilisation, and is prevalent in high-temperature plasmas. The Breit interaction can enhance the resonance effects by a factor of two. As Nakamura points out in his review, the Breit interaction is also responsible for the strong dependence on proton number observed in the experimental resonance strength, and helps to explain serious discrepancies with existing theory observed in polarization measurements of resonance processes.

Reference

Nobuyuki Nakamura, Breit interaction effect on dielectronic recombination of heavy ions, *J. Phys. B: At. Mol. Opt. Phys.* **49** 212001 (2016).

Institute for Laser Science, The University of Electro-Communications, Chofu, Tokyo 182-8585, Japan



Schematics of (a) radiative recombination and (b) dielectronic recombination processes. Radiative recombination is a non resonant process in which an x-ray photon with an energy of hv is emitted. Dielectronic recombination is a resonance process, which is possible only when $E_1 = E_2$.

Associate Professor: Nobuyuki NAKAMURA (Doctor of Science from UEC 1996/09)
Current research areas: Atomic physics, Plasma physics
Current research subjects: Studies of spectra and dynamics of highly charged heavy ions
Personal website: http://yebisu.ils.uec.ac.jp/nakamura/

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

Spectrometry: Miniaturising near-infrared devices

The development of compact, handheld devices to measure spectra in the near-infrared (NIR) wavelength range would have a wide range of applications, including medical diagnostics and self-monitoring of blood glucose levels.

Many spectrometers are designed with gratings incorporated - this allows the device to detect different wavelengths of incident light separately and provides a more detailed sample analysis. However, grating-based micro-spectrometers require an optical path of a certain length to ensure good resolution, therefore placing limitations on shrinking the size of the device.

Now, Tetsuo Kan at the University of Electro-Communications in Tokyo and co-workers have developed a micro-spectrometer capable of detecting NIR spectra using a Schottky photodetector and a gold-based grating, the combination of which means a lengthy optical path is unnecessary.

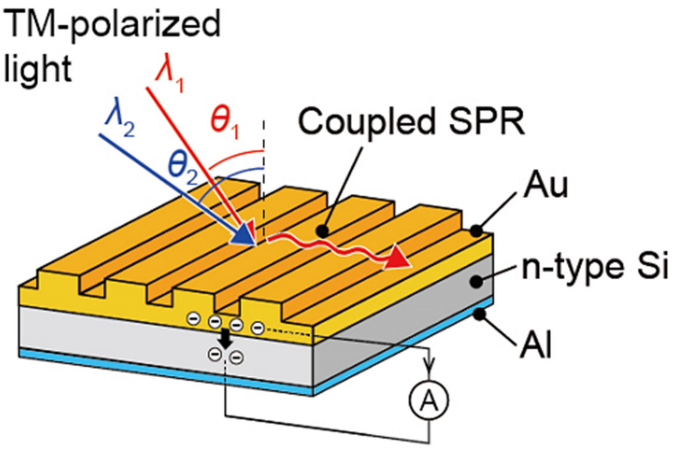
Their design makes use of the phenomenon known as 'surface plasmon resonance' (SPR) - the oscillation of electrons on a surface where negative and positive permittivity materials meet, following stimulation by incident light. The team placed the gold grating directly onto the surface of a photodetector made from a silicon substrate (see image). The photodetector uses the resulting SPR created on the surface of the gold to generate a photocurrent.

When different wavelengths of light hit the device, the angle of the SPR changes. By converting the different photocurrents back into their corresponding light wavelengths, the team could differentiate between different wavelengths of light at high resolution. The new micro-spectrometer performed comparably to a commercial spectrometer when tested with NIR light. Crucially, the design is also compatible with semiconductor fabrication.

Reference

Chen, W., Kan, T., Ajiki, Y., Matsumoto, K., & Shimoyama, I. NIR spectrometer using a Schottky photodetector enhanced by grating-based SPR. *Optics Express* **24** (22) (2016) doi: 10.1364/OE.24.025797

The University of Electro-Communications
UEC e-Bulletin
Vol.13, March 2017



Researchers at the University of Electro-Communications in Tokyo have developed a micro-spectrometer using a photodetector and a gold-based grating suitable for measuring light in the NIR range.

Associate Professor: Tetsuo, KAN (Ph.D. from the University of Tokyo 2006/03)
Current research areas: MEMS(Micro Electro Mechanical Systems)
Current research subjects: Plasmonic and metamaterial MEMS devices
Personal website: http://www.ms.mi.uec.ac.jp/

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

Hybrid rockets: Optimizing performance using design informatics

Single-stage sounding rockets are used to transport scientific equipment into, or just beyond, Earth's atmosphere to measure phenomena such as aurora. Recently, scientists have begun designing rockets with hybrid engines, which work by alternating between different phases of solid fuel and liquid or gas oxidizers. Hybrid rockets are cheaper, safer and cleaner than those with conventional solid fuel engines.

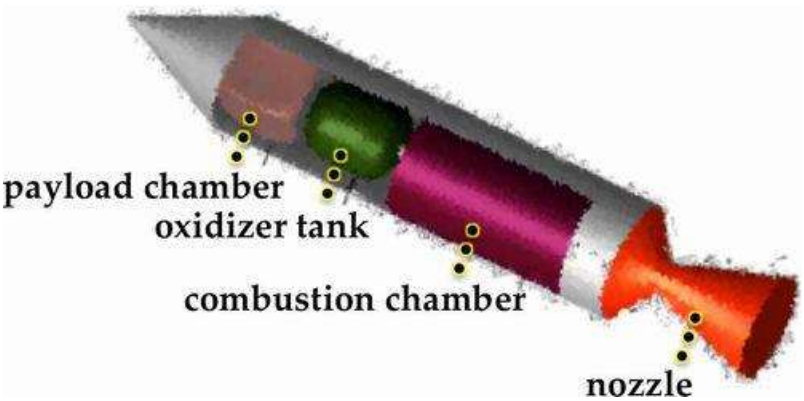
While hybrid rockets are still largely in the design and prototype phase, there has been considerable progress in the design technologies used to model and predict optimal rocket performance. Now, Kazuhisa Chiba at the University of Electro-Communications in Tokyo, together with scientists across Japan, have demonstrated the potential advantages of an 'extinction-reignition' protocol in hybrid rockets using a novel design informatics (DI) platform.

Computer-based DI allows researchers to investigate hybrid rocket advantages during concept design by illustrating many elements of the physics of rocket launch and flight in one 'bird's eye view' design space. Chiba's team wished to determine whether firing the rocket engines more than once ('extinction-reignition') was beneficial to the overall flight path stability, distance and duration of flight in the lower thermosphere.

The team ran the computer model thousands of times, each time tweaking different variables - such as extinction time between first and second combustion - to determine the potential advantages of an extinction-reignition protocol and the optimal rocket design. Their results indicate that, while downrange distance was not extended, the time spent in the thermosphere was prolonged. Further exploration of the data generated suggested a hypothesis to extend downrange in future.

Reference

1. Chiba, K., Yoda, H., Kanazaki, M., & Shimada, T. Extinction-reignition superiority in a single-stage sounding hybrid rocket. *Aerospace Science and Technology* **58** (2016)



Research conducted at the University of Electro-Communications in Tokyo uses novel design informatics computational analysis to determine the optimal design of hybrid rockets. The simulations showed an 'extinction-reignition' protocol for hybrid rockets travelling to the thermosphere could prove beneficial.

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

Associate Professor: Kazuhisa, CHIBA (Ph.D. from Tohoku University 2005/03)
Current research areas: Aerospace engineering, Intelligent informatics
Current research subjects: Sign detection via mining for transonic buffet data, A novel flap mechanism on transonic aircrafts
Personal website: http://www.di.mi.uec.ac.jp/chiba/index_e.html

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

Insights into the health of non-regular workers in Japan

Shinobu Tsurugano MD., PhD.
Associate Professor, Health Care Center, University of Electro-Communications, Tokyo.

Shinobu Tsurugano is the occupational health physician at the UEC Health Care Center responsible for monitoring the health of staff and students at UEC. Tsurugano graduated from Miyazaki Medical School in Kyushu, and specializes in clinical psychosomatic medicine. Her research covers preventative and industrial medicine with the current focus being the health of non-regular employees in Japan.

"The main aim of my current research activities is to increase the 'visibility' of the health conditions of non-regular workers in Japan," says Tsurugano. "Namely, to clarify the effect of non-regular employment on the health of employees in Japan, where according to government figures published in 2013, approximately 21 % of men and 55% of women were non-regular employees--that is not permanently employed." This research is based on analysis of statistics published by government agencies including the Ministry of Health, Labour and Welfare.

Notable findings

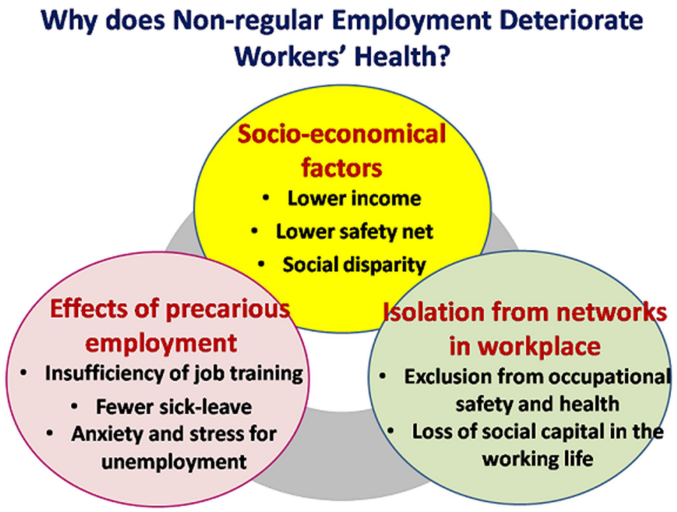
Statistics up to 2010 for Japan show that approximately 52% of all researchers in academia are non-regular employees including post-docs, fixed term contract researchers, and part-time lectures. "Analysis of a survey by the Union of University part-time Lectures indicated even people with high academic qualifications felt stress due to uncertainties about their future as non-regular university employees," explains Tsurugano.

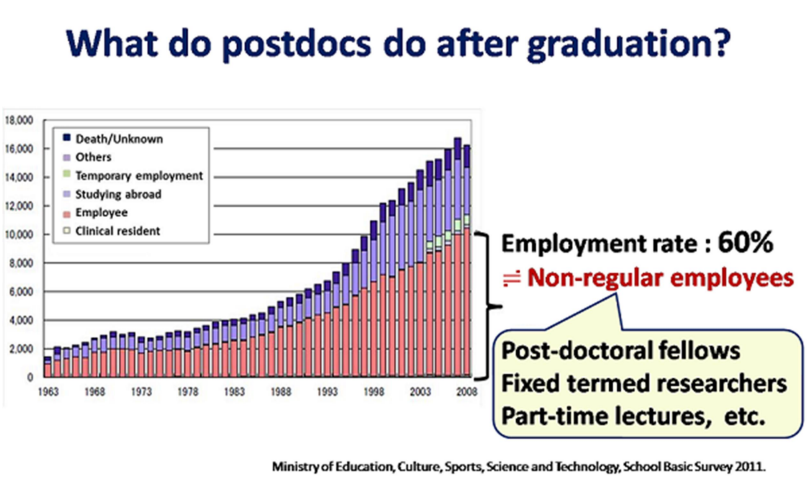
Women working as part-timers were less affected by stress than men. "We think that this is because many of the women choose to work part time or as non-regular workers, but men do not," says Tsurugano.

Tsurugano says the health of non-regular workers-both male and female-still requires much more research. "My goal as a medical doctor specializing in industrial health and working in academia is to support scientists and engineers cope with stress and other issues related with their working conditions."

1. Non-regular workers and their health among women in Japan, Mariko Inoue, Mariko Nishikitani, Shinobu Tsurugano , Industrial Health, 54, (2016)
2. Full-time workers with precarious employment face lower protection for receiving annual health check-ups, Inoue M, Tsurugano S, Nishikitani M, Yano E, Am J Ind Med. 55, 884, (2012).
3. Job stress strengthens the link between metabolic risk factors and renal dysfunction in adult men, Tsurugano S, Nakao M, Nomura K, Takeuchi T, Yano E Tohoku, J Exp Med. 226/ 2, 101, (2012).
4. Effect of social inequality on workers' health in a Japanese national survey, Nishikitani M, Tsurugano S, Inoue M , Yano E, Soc Sci Med. 75/ 3, 439, (2012).
5. Precarious employment and health: analysis of the comprehensive national survey in Japan, Tsurugano S, Inoue

M, Yano E., Ind Med. 50/ 3, 223 (2012).





Assistant Professor: Shinobu, TSURUGANO (Ph. D. from University of Tokyo 2000/03)
Current research areas: Preventative and industrial medicine, Psychosomatic Medicine, Social Epidemiology
Current research subjects: Impacts of unstable employment on workers' health
Personal website: http://kjk.office.uec.ac.jp/Profiles/67/0006621/prof_e.html

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

Innovative molecular robotics: Chemical reaction circuits for intelligent molecular robots

Satoshi Kobayashi Professor, Department of Communications Engineering and Informatics, Graduate School of Informatics and Engineering

Satoshi Kobayashi is one of the key members of the interdisciplinary project, "Development of Molecular Robots Equipped with Sensors and Intelligence", funded supported by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT). "Our goal is to develop functional molecular robots," says Kobayashi. "These robots are autonomous and react to their surroundings via functional molecular devices such sensors, actuators, and computers. My role in the project is to design molecular computer, that is logic circuits, for constructing intelligent molecular robots."

Figure 1 shows the main features of the molecular computer being developed by Kobayashi and his colleagues at UEC. Notably, DNA molecules carry out most the information processing and the main problem to resolve is how to transform DNA molecules to the other molecules and vice versa.

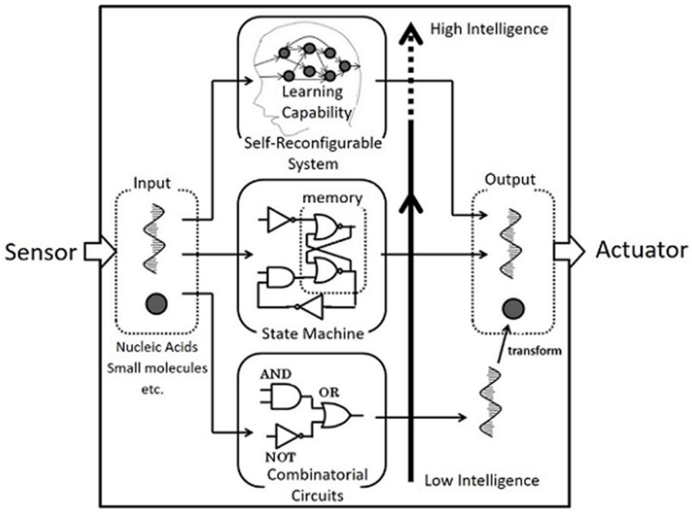
Notably, Kobayashi has proposed implementing molecular robots using analog computing devices, amplifier, adder, multiplier, and divider that are time-responsive (Fig.2). "These devices can be implemented by using simple reversible strand displacement reactions such as seesaw gates," says Kobayashi. "Under these conditions, the computation is defined as being in steady state."

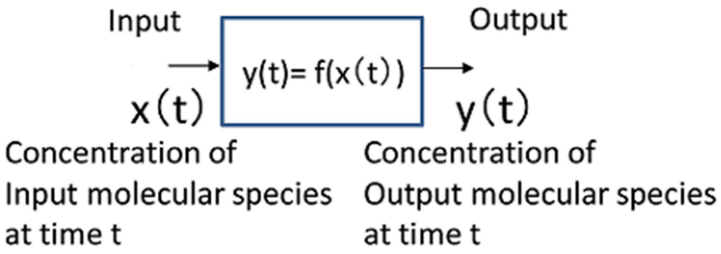
"Molecular robots are expected to find a wide range of applications, including in medicine," says Kobayashi. "In the future, we will need expertise in control theory and much faster molecular computing devices. The ultimate challenge is developing ways of constructing an actual system composed of all the individual parts. We still need many new ideas! "

References

1. Engineering multistate DNA molecules: a tunable thermal band-pass filter, John A. Rose, Ken Komiya, Satoshi Kobayashi, *Micro & Nano Letters*, 11, 595, (2016).
2. Molecular computers for molecular robots as hybrid systems, Masami Hagiya, Nathanael Aubert-Kato, Shaoyu Wang, and Satoshi Kobayashi, *Theoretical Computer Science*, 632,4, (2016).
3. Molecular Robots with Sensors and Intelligence, Masami Hagiya, Akihiko Konagaya, Satoshi Kobayashi, Hirohide Saito, and Satoshi Murata, *Acc. Chem. Res*. 47, 1681, (2014).

Molecular Computing System in Molecular Robot





Professor: Satoshi, KOBAYASHI (Doctor of Engineering from the University of Tokyo 1993/03)
Current research areas: Theory of informatics and Life / Health / Medical informatics
Current research subjects: Learning Theory of Formal Languages, Grammatical Inference, Inductive Inference, Formal Language, Application of Learning Theory to Biological Sequence Analysis, Learning Theory, Genome Sequence Analysis, Theory of Molecular Computing, DNA Computing, and Molecular Computing.
Personal website: http://www.comp.cs.uec.ac.jp/satoshi/index.html

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

2016 Tenure Track Research Reports Meeting

Faculty of the University of Electro-Communications Tenure Track Program describe their latest research findings at the '2016 Tenure Track Research Reports Meeting', 13.30-16:30, 2nd March 2017.

This year, ten tenure track assistant professors presented their latest results and plans on a diverse range of areas covering: big-data analysis for design and improvements of services; theory of molecular self-assembly of proteins; theory of voice recognition; software-defined optical networks; next generation network security; data science for e-learning and assessing examination reviewers; visualization of gas and liquid two-phase flow; new plasticity processing technology; optical imaging for non-contact vital sign measurement; and electron transfer system in DNA under in vivo environment.

The meeting was opened by UEC President Takashi Fukuda who encouraged the speakers to work diligently to achieve their goals and to enjoy the experience as members of the UEC tenure track program. The talks were followed by questions and comments from an audience of 40 participants, representing the wide range of research being pursued at UEC, Tokyo.

UEC President Takashi Fukuda opens the meeting with words of encouragement for the speakers.


Kazushi Okamoto, "Analysis of large-scale data for design and improvements of services".


Shinnosuke Seki, "Developments in theory of molecular self-assembly"


Toru Nakashika, "Voice conversion based on Boltzmann distribution".

Nattapong Kitsuwan, "Design of optical networks".

Bagus Santoso, "Next generation network".

Masaki Uto, "Analysis of rating data for e-assessment".

Koji Enoki, "Visualization of gas-liquid two-phase flow".

Shohei Kajikawa, "New plasticity processing technology".

Guanghao Sun, "Optical imaging for non-contact vital sign measurement".

Makiko Tanaka, "Electron transfer system in DNA under in vivo environment".

Presidential Advisor, Adarsh Sandhu, gives closing remarks.

The University of Electro-Communications
UEC e-Bulletin Vol.13, March 2017

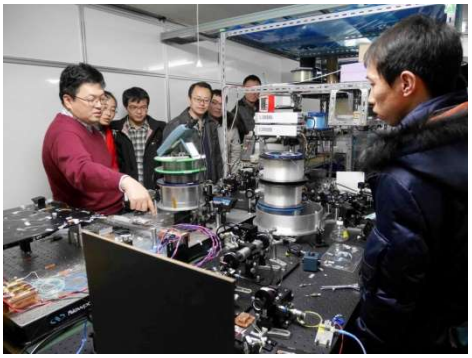
Harbin Engineering University students and faculty participate in international academic exchange on 'Advanced Photonics and Laser Technology' at UEC, Tokyo.

A delegation of eight outstanding students accompanied by three faculty members from Harbin Engineering University (HEU), College of Science, were invited to visit the University of Electro-Communications (UEC, Tokyo) to participate in a program, 'Advanced Photonics and Laser', held between 15 to 21 January 2017.

Keynote lecture on "Development of Quantum Photonic and Nano Fiber" by Professor Kohzo Hakuta, Director of the Center for Photonic Innovation.

This program is jointly organized as a collaboration project by the Center for Photonic Innovation and Institute for Laser Science at UEC, Tokyo and the HEU College of Science. Furthermore, the program is also jointly supported by the Japan Science and Technology Agency (JST), the Japan-Asia Youth Exchange Program in Science, Sakura Science Plan.

On the first day, after the inauguration ceremony and ice-breaking session, an overview of the HEU College of Science's key research activities was given by the HEU School of Science Vice Dean, Professor Jianzhong Zhang. In the afternoon, the delegates visited the UEC Communication Museum to deepen their understanding of telecommunications and information technology. The museum houses a unique and valuable collection of telecommunications exhibits, ranging from early twentieth century telecommunications instruments to Japan's first nuclear magnetic resonance system and radio clock, both developed by UEC, Tokyo.



Visit to the Shirakawa Laboratory that is engaged in the development of high power fiber lasers.

On the second day, the delegates visited the Center for Photonic Innovation and received a keynote lecture on "Development of Quantum Photonic and Nano Fiber" by Professor Kohzo Hakuta, Director of the Center for Photonic Innovation. In the afternoon, visitors were able to participate in experiments on advanced research photonic innovation under the guidance of researchers at the center. In the evening, the delegates walked to Jindaiji temple, near to UEC, Tokyo, to experience Japanese culture and enjoy the famous Jindaiji soba. It was a fulfilling day for both the hosts and visitors.

On the third day, UEC, Tokyo arranged a visit to the National Museum of Emerging Science and Innovation (Miraikan, Tokyo) and the Association for Technological Excellence Promoting Innovative Advances (TEPIA), to explore developments in the latest cutting-edge technology. During the trip, the participants

experienced the cutting-edge science and learnt about Japan's outstanding exhibition methods of science. On the way to TEPIA, the delegates had stopped by the Gundam Front Tokyo in Odaiba, to see the iconic full-sized Gundam Statue and enjoy another kind of advanced science and technology in Japan.


Participants at the "Advanced Photonics and Laser" joint symposium.

On the fourth day, the delegates visited the UEC, Tokyo, Institute for Laser Science, which is the only laser and atomic optical research facility in Japan, and internationally recognized for its contributions to laser science. The visit started with a brief overview of the institute's key projects, research activities and accomplishments by the center director Professor Hitoki Yoneda, followed by a laboratory tour of other groups (Shirakawa Laboratory, Musha Laboratory, Tokuragawa Laboratory, Katsuragawa Laboratory and Minoshima laboratory) affiliated with the center. The laboratory tour gave the delegates first-hand knowledge of the latest laser research including ultra-short pulse lasers, single frequency laser light source modulation, and optical combs (optical frequency comb).

On the final day of the program, a co-organized symposium on "Advanced Photonics and Laser" was held. Students and young researchers from both institutions actively participated in discussions on a wide range of topics, including laser sensing, fiber lasers, micro optical tweezers, quantum resonators by nanofibers, ultra-short pulse lasers, ultrafast attosecond pulse train, and optical combs. The speakers and title of talks are as follows:


Group photograph after the joint symposium.

Morning Session: Harbin University

1. Yushi Chu, "Bismuthate related Active Medium"
2. Zhangjun Yu, "Distributed Birefringence Dispersion Measurement for Polarization Maintaining Fibers"
3. Min Zhang, "Single Fiber Optical Tweezers"

Afternoon Session: UEC Photonic Innovation Research Center and Institute for Laser Science (Hakuta Lab, Shirakawa Lab, Katsuragawa Laboratory, Minoshima Lab)

1. Jameesh Keloth, "Fabrication of Photonic Crystal Nanofiber Cavities for Cavity QED"
2. Shotaro Kitajima, "Ultrashort Pulse Laser based on New Ceramic Materials"
3. Chuan Zhang, "Arbitrary Manipulation of Optical Amplitude and Phase and its Application to Generation of Ultrafast Atto Pulse Train"
4. Akifumi Asahara, "Ultrafast Spectroscopy using Dual Optical Frequency Combs"

After the symposium, the participants gathered for a farewell dinner. In addition to acknowledging their participation in the program, the delegates also received a Sakura Science Plan completion certificate from Professor Kohzo Hakuta.

This program enabled friendly, engaging, and productive discussion between students and faculty members from both institutions. The UEC, Tokyo organizers look forward to continued collaboration with Harbin Engineering University in the future.

The University of Electro-Communications
UEC e-Bulletin
Vol.13, March 2017

Space Science and Radio Engineering (SSRE) Symposium held at UEC, Tokyo

The Space Science and Radio Engineering (SSRE) Symposium was held on 14-15 February 2017 at the University of Electro-Communications (UEC), Chofu, Tokyo.

Dr. Baker (Virginia Tech., USA / ISEE, Nagoya Univ.)

The SSRE has been hosting the workshop annually at UEC as a platform to present new research findings in space science and radio engineering.

At this year's meeting, there were more than 50 participants including invited speakers from overseas.

This is a unique workshop in terms of the interdisciplinary nature of the topics presented. Specific areas covered were space plasma physics (ionosphere, magnetosphere, and aurora), atmospheric electricity (thunderstorm and lightning, and weather), seismo-electromagnetics, electromagnetic compatibility, synthetic aperture radar, and astronomy. The talks were united by Maxwell's equations describing electromagnetic phenomena.

Prof. Gomes (Univ. of Putra, Malaysia)

There were 15 oral talks (15 minutes presentation and 5 minutes for discussion and questions) given during the workshop. The discussion sessions after the talks were very active.

This workshop this year included the following talks during the new international sessions introduced for the first time.

Dr. Ponomarenko (Univ. of Saskatchewan, Canada / ISEE, Nagoya Univ.)

1. J. B. Baker (Virginia Tech., USA / ISEE, Nagoya Univ.)
   "Hemispheric observations of polar cap patches and the tongue of ionization"
2. C. Gomes (Univ. of Putra, Malaysia)
   "Lightning sferics; HF to VHF frequency bands & broadband"
3. P. Ponomarenko (Univ. of Saskatchewan, Canada / ISEE, Nagoya Univ.)
   "Effects of ionospheric refractive index on SuperDARN data"

Group photograph of the participants

The University of Electro-Communications (UEC) in Tokyo

is a small, luminous university at the forefront of pure and applied sciences, engineering, and technology research. Its roots go back to the Technical Institute for Wireless Commutations, which was established in 1918 by the Wireless Association to train so-called wireless engineers in maritime communications in response to the Titanic disaster in 1912. In 1949, the UEC was established as a national university by the Japanese Ministry of Education, and moved in 1957 from Meguro to its current Chofu campus Tokyo.

With approximately 4,000 students and 350 faculty, UEC is regarded as a small university, but with particular expertise in wireless communications, laser science, robotics, informatics, and material science, to name just a few areas of research.

The UEC was selected for the Ministry of Education, Culture, Sports, Science and Technology (MEXT) Program for Promoting the Enhancement of Research Universities as a result of its strengths in three main areas: optics and photonics research, where we are number one for the number of joint publications with foreign researchers; wireless communications, which reflects our roots; and materials-based research, particularly on fuel cells.

International Public Relations
The University of Electro-Communications
1-5-1 Chofugaoka, Chofu, Tokyo 182-8585
E-mail : kokusai-k@office.uec.ac.jp
Website : http://www.uec.ac.jp/eng/

