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NICT

EMC for Energy Saving Devices

−Characteristics of radiation noise from LED lamps and its influence for digital broadcasting−

Wu Ifong

Researcher, Electromagnetic Compatibility Laboratory, Applied Electromagnetic Research Institute

After receiving the D.E. degree in electrical engineering and electronics, Wu joined the National Institute of Information and Communications Technology (NICT) in 2007, as a researcher. He has been engaged in research on the electromagnetic compatibility of radio communication systems. Dr. Eng.

Introduction

Since the Great East Japan Earthquake in March 2011, not only company but also household awareness on energy conservation has increased, as power-saving efforts are under way in many aspects nationwide due to the strain of power demands. With the Ministry of the Environment embarking on energy saving assistance, measures for households and office buildings as well as energy-saving device market expansion, the introduction of the Top Runner Program*1 and the Energy Saving Labeling Program*2 have shown significant results in the improvement of high-efficiency energy-saving devices. Meanwhile, electric appliances equipped with switching regulators*3 are increasing in order to achieve low-power-consuming, high-efficiency energy-saving devices. However, when a switching regulator switches between on and off modes, noise is generated between the switching frequencies and its harmonic frequencies, and there are cases reported where the noise spectrum spans from VHF to UHF bands. Because of this, concerns are being raised about electromagnetic interference issues such as reception interference for communications/broadcasting of FM radio, multimedia broadcasting, and digital terrestrial broadcasting due to electromagnetic noise from energy-saving devices and electromagnetic interference waves that occur near energy-saving devices (Figure 1).

In June 2012, the Ministry of Economy, Trade and Industry and Ministry of the Environment urged light bulb manufacturers and electronics retailers to switchover to more power-efficient LED lamps and called for restraint in the manufacturing and sales of large, power-consuming incandescent bulbs. LED lamps are gaining attention as highly energy efficient, low power-consuming, long-life lamps due to their use of semiconductor devices in small, lightweight switching regulators. In order to achieve a small, lightweight switching regulator, you must increase the switching frequency; however, this causes switching noise to occur in a broad spectrum from low to high frequencies. This noise not only flows on power lines but is emitted towards the outside and can have adverse effects on other electronic devices and radio equipment. When streetlights of a shopping center are replaced with LED lamps all at once, there are cases where this has caused television reception interference (at the time, analog broadcasting). At our Electromagnetic Compatibility Laboratory, in regards to an electromagnetic environment that can be thought as further increasing in complexity, we are aiming to unravel the various mechanisms of electromagnetic interference and to specify causes that form noise by researching as we develop analysis methods that can identify the numerous interference causes and assess method for evaluating interference impacts on communications systems. We will introduce characteristics of noise generated from LED lamps that we have uncovered and their effects on digital broadcasting.

Analysis of Radiation Noise from LED Lamps and its Characteristics

The characteristics of radiation noise reflect its generation mechanism. In figure 2, an example is shown of the radiation noise waveform from an LED lamp measured in time-domain. This noise, an impulsive noise that periodically occurs in synchronization with the switching power supply, is an extremely short pulse with a duration of approximately 0.1μs. This cycle coincides with LED lamp switching cycles and can determine the source of

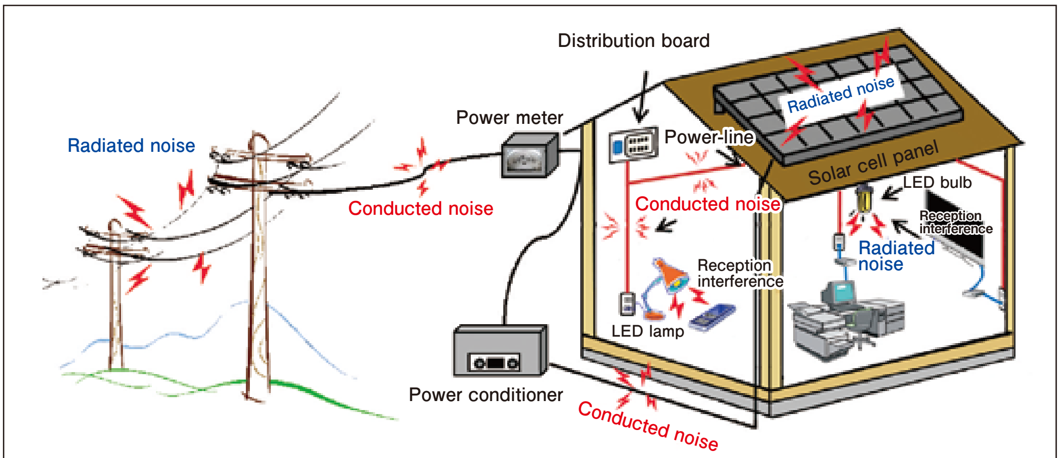


Figure 1●Interference in communication/broadcasting system due to radiation noise from energy-saving devices

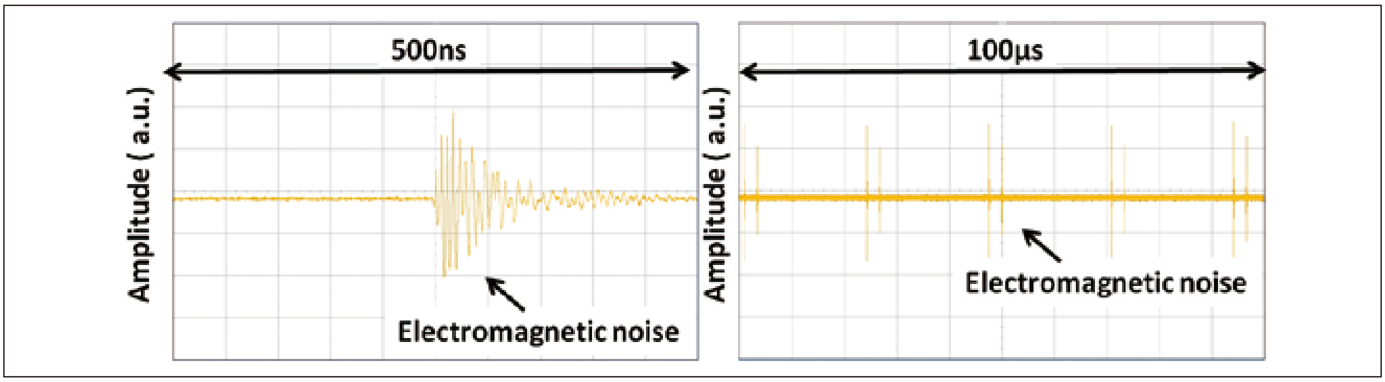


Figure 2●Radiation noise waveform from LED lamp

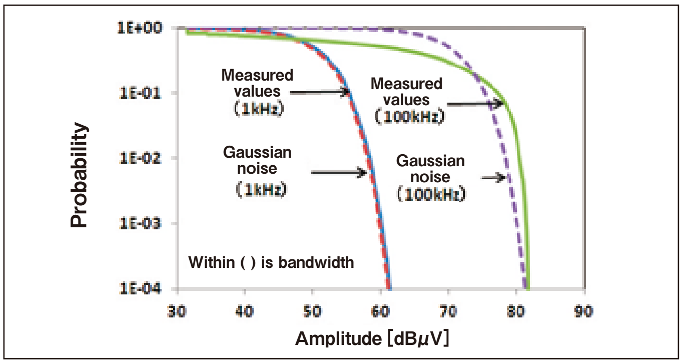


Figure 3●An example of APD of radiation noise from LED lamp compared with theoretical value of Gaussian noise

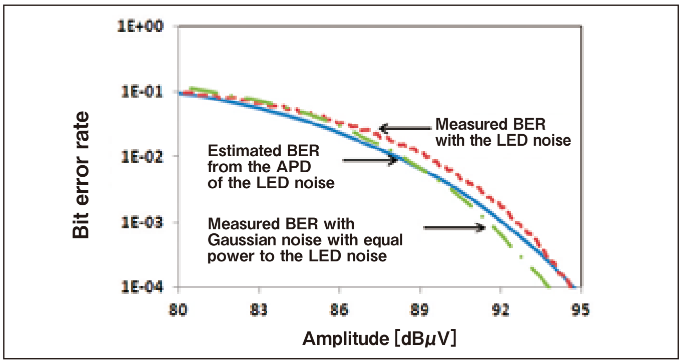


Figure 4●Intercomparison of measured BER of digital broadcasting signal with LED noise, measured results with Gaussian noise with equal power and estimated results from APD of LED noise.

noise generation by checking against the LED lamp blinking cycles. Furthermore, the noise level is dependent on the product, and the noise waveform and spectrum varies depending on the wiring of the power source connected to the LED lamp.

We have found that Amplitude Probability Distribution (APD)*4 has a good correlation with bit error rate (BER) characteristics when noise interferes with digital radio systems. Figure 3 shows one example of an APD measured result of radiation noise from an LED lamp. Noise emitted from an LED lamp is impulsive noise in which amplitude distribution differs from Gaussian noise (called Rayleigh distribution) when the observing bandwidth is broad. However, when the bandwidth observing noise becomes narrower than the switching frequency (normally several tens of kHz), radiation noise from the LED approaches Gaussian noise.

The Influence of LED Lamp Radiation Noise on Broadcasting

Although a part of the whitespace was reallocated to multimedia broadcasting for mobile terminals following the closure of analog transmissions in July 2011, most effects of LED noise on these new mobile reception services have not been studied. We have conducted studies on methods that estimate quality deterioration of digital wireless communications systems caused by noise from APD measured results of noise emitted from various electrical and electronic devices. Figure 4 shows the comparative result between BER of digital broadcast signal measured with LED noise, 1) BER estimated from APD of LED noise, and 2) BER with Gaussian noise which had the same power to LED noise. As shown in figure 2, noise from LED lamps is impulsive noise; however, in transmission systems used in terrestrial digital broadcasting which is a multiplex of narrow-band (1kHz) signals, LED noise has nearly a similar effect as Gaussian noise, which means that the noise behaves nearly Gaussian when its bandwidth is reduced to 1kHz.

Future Prospects

Given the increasing efficiency, life-cycle and low-cost of LED lamps, the demand for LED lamps is expected to rise in the future for it can reduce environmental cost. Furthermore, cases where scalable implementation of LED lamps among business are expanding, as companies seek energy efficiency in office and retails. However, there have been reports of noise superimposed in synchronization with the power-supply frequency having harmful effects on digital communications and broadcasting systems by installing large amounts of LED lamps in one location, and there is concern that these cases will increase in the future. It has so far been up to engineers to specify the source of noise in electromagnetic environments. In the future, we will work on studying ways of identifying noise and assessing the effects on digital communications and broadcasting systems in electromagnetic environments.

Glossary

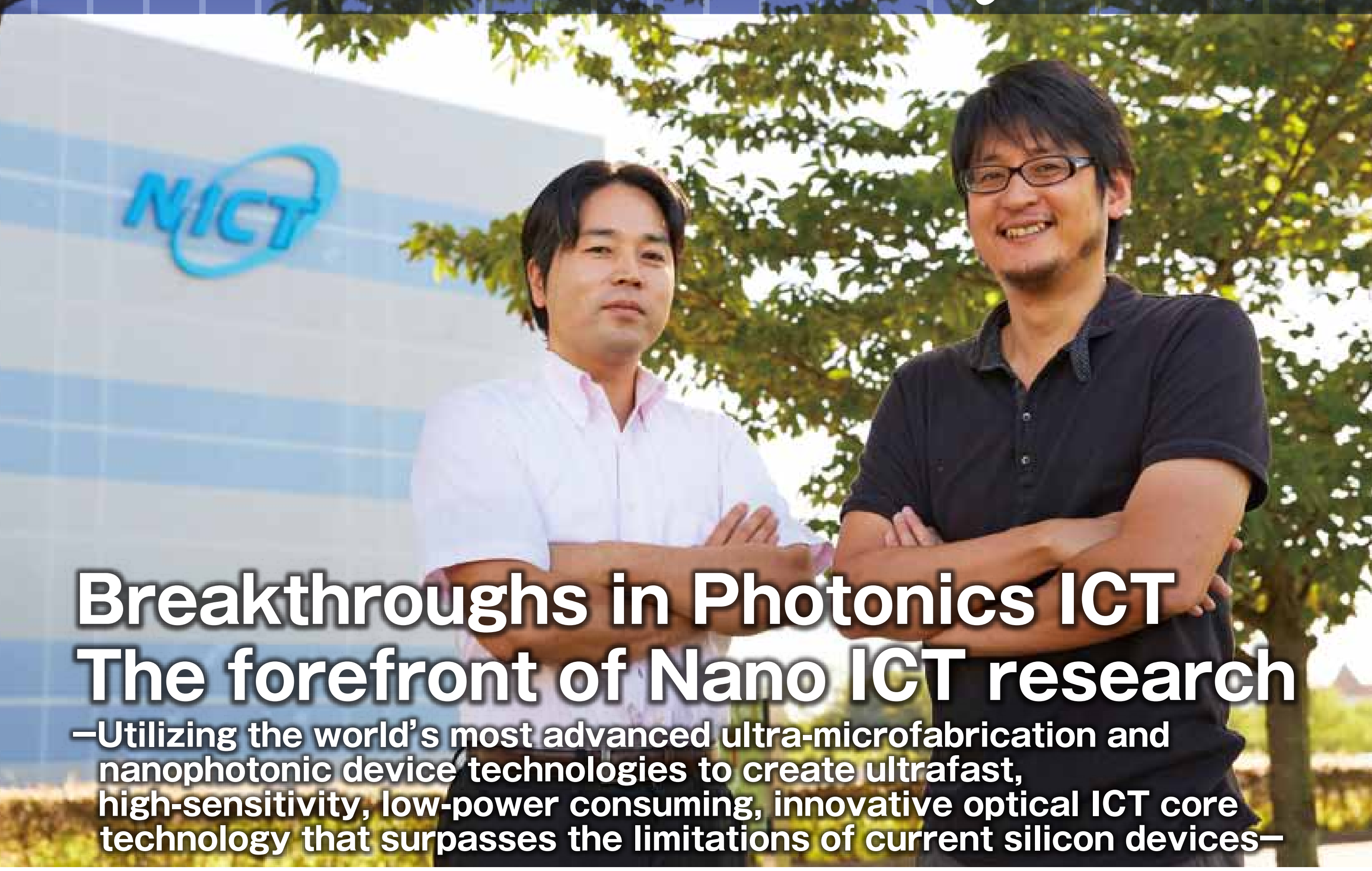
***1 Top Runner Program**
A system for devices prescribed based on the Law Concerning the Rational Use of Energy such as luminaire and refrigerators that aims, as a benchmark, for energy-saving performance higher than the most energy-efficient products on the market today (top runner).

***2 Energy Saving Labeling Program**
A system that indicates the standard energy-saving efficiency and energy-saving standard attainment rate of devices prescribed based on the Law Concerning the Rational Use of Energy. It indicates using energy-saving labels (e mark) with colors based on the degree of attainment relative to the standard.

***3 Switching regulator**
A type of stabilizing power supply device that commutates/controls output voltage using a semiconductor switch as a means to convert and adjust electrical power.

***4 Amplitude Probability Distribution (APD)**
An expression of statistical distribution of noise envelope amplitude which gives the time-rate when the noise amplitude exceeds a certain threshold.

Showcase on Research from the Laboratory



Breakthroughs in Photonics ICT
The forefront of Nano ICT research

—Utilizing the world's most advanced ultra-microfabrication and nanophotonic device technologies to create ultrafast, high-sensitivity, low-power consuming, innovative optical ICT core technology that surpasses the limitations of current silicon devices—

Left / Shin-ichiro Inoue, Ph.D. (Engineering) Senior Researcher, Nano ICT Laboratory, Advanced ICT Research Institute
Right / Shigehito Miki, Ph.D. (Engineering) Senior Researcher, Nano ICT Laboratory, Advanced ICT Research Institute

Here at the Nano ICT Laboratory, Advanced ICT Research Institute, we are conducting research that aims to establish innovative optical control technology that enhances optical modulation speed, optical detection efficiency, and power consumption performance to levels difficult to reach with existing technology by taking advantage of superior organic material with optical-electronic capabilities, superconducting materials, and nanostructured unique optical-electronic device capabilities in order to control environmental load and, at the same time, realize high efficiency and speed of information-communications.

Now let' s take a look at leading-edge research in "Organic Nano ICT" and "Single-Photon Detection Technology."

Holding the Key to "Overcoming Limitations" Nanophotonic Devices

Researcher: Shin-ichiro Inoue

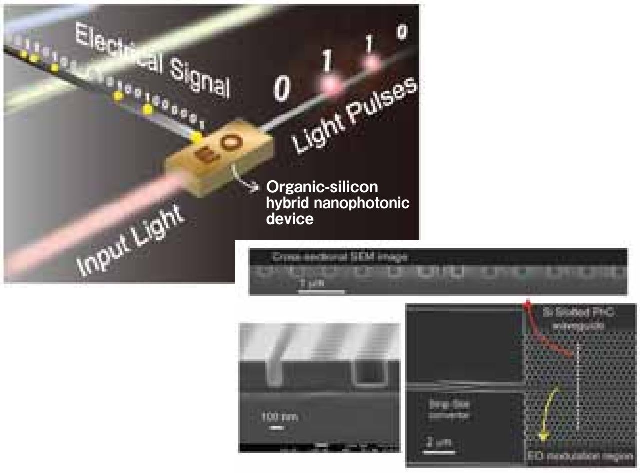
Integration of ultrafast nanophotonic devices through a hybrid of organic material and silicon photonics*1

In the midst of huge expansion and diversification of information-communications networks exemplified in recent years by cloud computing and smartphones, information-communication volume is expected to rapidly increase, leading to an explosive rise in network device power consumption. Conventional electronic router systems and silicon CMOS technology*2 are already reaching their physical limits in order to meet the conflicting performance demands of both accelerating information-communications speed-volume and energy-conservation requests from society. To address these problems, it is essential that we make a fundamental shift away from traditional electrical signal processing towards optical signal processing.

*1 Silicon Photonics
Technology that integrates differing functions in various optical devices on a single silicon chip. It has superior integration and can realize mass production and low-cost of components by diverting from existing CMOS processes.

*2 CMOS (Complementary Metal Oxide Semiconductor) Technology
A silicon LSI chip fabrication technology that uses CMOS, a standard semiconductor structure.

As information processing becomes more optical, not only thermal and processing-speed issues will be resolved, but also power consumption can be drastically reduced. However, optics has properties such as diffraction limits and little interaction between materials, and with existing technology, sizes in electronic components will become much larger. In order to realize genuine integrated optical circuits such as on-chip ultrafast optical communications, a critical challenge is how to realize optical devices on an extremely small scale similar to electronic devices. For this, the key to further rapid progress in future information-communications is research in "nanophotonic devices" that enable optical confinement and control in micro-sized spaces. At the Nano ICT Laboratory, we believe that the "integration of organic materials and silicon photonics" will lead to revolutionary breakthroughs in optical integration and optical signal processing, and we are undertaking research on unique nanophotonic devices. To advance optical information processing, development of technology that integrates electronic integrated circuits with superior complex signal processing performance and optical integrated circuits with exceptional high-speeds and energy-conservation is indispensible, particularly important being the integration of an electrooptic (EO) modulator that converts electronic signals to optical signals. In conventional optical modulators that use lithium niobate (LN) and silicon, optical modulation speeds are limited to approximately 40GHz, but with the use of organic EO polymer, ultrafast optical modulation speeds above 100GHz are possible. Moreover, it has a much larger EO coefficient than those of LN, which enables low-voltage devices. Conversely, we once thought that organic material was not suitable for integration due to its small refraction index. However, light can be confined in the nanoregion by realizing a silicon-hybrid structure because organic material can combine with various types of other materials. Therefore, by integrating the advantages of both silicon photonics and organic material technologies, we believe that the integration of ultrafast optical control devices can be realized for the first time.



●Schematic diagram of an EO optical integrated chip and electron micrograph of a silicon-integrated nanophotonic component

The nanophotonic structure also enables the creation of terminable optical states called "slow light" where optical speeds are artificially decelerated to approximately 1/100. This uses a periodic structure of the order of light wavelength called "photonic crystal," and, by using the slow light effect, the Nonlinear Optical Effects of materials are substantially enhanced. Thus, it further reduces optical device size and makes significant low-power consumption feasible. Combining these technologies is expected to minimize the size of electronic and optical devices and enable the development of ultimately ultrafast integrated optical/electronic circuits that replace bottlenecked parts of electronic integrated circuits on a single chip with optics.

■ Building Nano-Optical Devices Establishment of processing technology and process development

In order to realize the ultimate nano-optical device, hybridization of technology and development of extremely high-precision, ultrafine processing technology on a nano-order-scale are essential. However, organic material differs from semiconductor material in that microfabrication processes have not been established and many issues such as processing damage and control of polar orientation of chromophores in the nanoregion make it difficult to be processed. Optical device theoretical calculation processes are also very critical factors. We proceed with a layout of the optical device structure by 3-dimensionally designing various device structure models and testing and analyzing the actual device characteristics in a computed simulation. The important point here is that we have to replicate with high-accuracy the organic/Si-hybrid optical device structure designed on a nano-order-scale within the actual microfabrication process.

To overcome these technical problems, a cleanroom environment is essential where the entire process can be done consistently, including material development, nano-processing, and evaluation. NICT is the only research group worldwide comprehensively advancing research from this type of organic material development to nanophotonic device production/evaluation, expanding highly characteristic research as it strengthens both technologies and facilities.

●Cleanroom

■ Future Prospects

More than 60 years have passed since the technology changed "from vacuum tubes to transistors." It is possible in the next 10 years that, like the revolutionary development of electronic computers, a fundamental change in information-communications technology will occur due to a shift "from electronic to optical chips" along with the new silicon photonics trend. At the Nano ICT Laboratory, making the integration of silicon photonics and organic materials our keyword, we are realizing low-power consumption, integration, and ultra-high speeds in optical modulation devices, and moreover, working towards solving important issues focused on the application of long-term durable, reliable organic nanophotonic devices, taking advantage of the strength of having a research lab environment where the entire process is consistent, from material development to device production/evaluation.

Hybrid devices of organic materials and silicon photonics use the optical functionality of organic material and allow development towards unprecedented, new optics technologies such as all-optical switches, optical buffers, and ultrasensitive biological sensors. Integrating the mutual advantages of both organic optical functionality and nanophotonic device technology is expected to make great contributions in a wide range of optical ICT fields such as next-generation ultrafast optical communications above hundreds of Gbps, high-capacity green ICT, and advanced optical sensing networks.

Shin-ichiro Inoue

Senior Researcher, Nano ICT Laboratory, Advanced ICT Research Institute

Profile

After completing a doctoral course at Tokyo Institute of Technology and serving as RIKEN (The Institute of Physical and Chemical Research), Special Postdoctoral Researcher and Assistant Professor, Institute for Materials Chemistry and Engineering, Kyushu University, Inoue joined NICT in April 2010. He is engaged in research and development in optical electronics, nano-microfabrication, organic nonlinear optics, and nanophotonic devices. He holds a concurrent position as Associate Professor, Graduate School of Engineering Faculty and Engineering, Kobe University. He has received many awards including the Tejima Doctoral Dissertation Award, Funai Information Technology Promotion Award, Ando Incentive Prize for the Study of Electronics, The 3rd RIKEN FRS Promotion Award, and Research Award by Research Foundation for Opto-Science and Technology. When not immersing himself in work, he enjoys spending time with his children.

Remark from Researcher

Nanophotonic device and optical/electronic fusion technology not only contributes to low-power consumption and faster information-communications networks but also enables flexibility and diversified applicability of optics, and by spreading to all information equipment and advanced technology, from within LSI chips to biochips, it holds the potential for revolutionary breakthroughs in our ever-expanding advanced information society. Pursuing a wide range of fundamental research from nano and bio ICT to brain information, the Advanced ICT Research Institute utilizes the characteristics unique to micro-sized, high-performance, flexible organic nanophotonic devices to continue contributing to new technological innovations in information communications from ultrafast, extremely-low-power consuming optical integrated devices to the realization of bio-optical chip integration.

Establishing Next-Generation Photon Detection Technology in Superconductive Device Research

Researcher: Shigehito Miki

Detecting single photons with superconducting material exhibiting unique physical properties [SSPD]

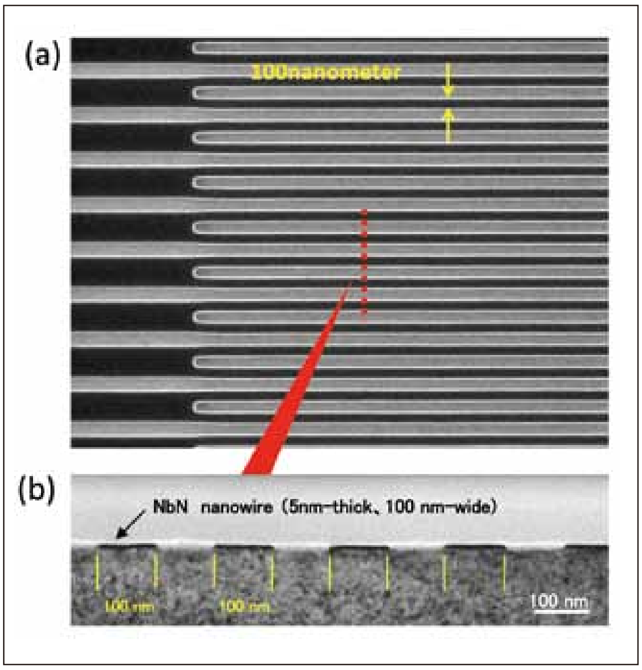
Superconducting materials exhibit unique physical properties not shown in other materials such as perfect conductivity, perfect diamagnetism, and flux quantization. At the Nano ICT Laboratory, research and development is being conducted on various sophisticated devices using these physical properties. The fact that superconducting devices must be cooled to ultra low temperatures is often seen as a drawback, but because ultra low temperature environments can minimize thermal noise to an extremely small scale, it is the best for producing ultrasensitive “detectors” otherwise impossible with other materials. In particular, the superconducting nanowire single-photon detector system (SSPD) is currently gaining attention from various research fields such as quantum information communications as a technology that provides much higher performance compared to the traditionally used avalanche photodiode (APD).

The electrical resistance of superconductors becomes zero below superconducting critical temperature (Tc), however when a single photon enters, the superconductive state is destroyed locally. It is essential that the superconductor is processed into the nanowire in order to generate electric resistance caused by the breakdown of this local superconductive state and detect single photons with high-sensitivity. Moreover, in order to cause photon incidence efficiently onto the ultra nanowire, arranging the nanowire in a meandering shape and enlarging the light-receiving area are also necessary.

Creating Superconductive Nanowire in a Cleanroom

As previously mentioned, in order to efficiently detect photons, you must produce narrow and long superconductive nanowire. At the Nano ICT Laboratory, we are developing superconducting devices in the Advanced ICT Research Institute’s cleanroom laboratories equipped with the world’s most advanced technology in terms of niobium nitride—single crystal thin film deposition technology. With this film-formation technology,

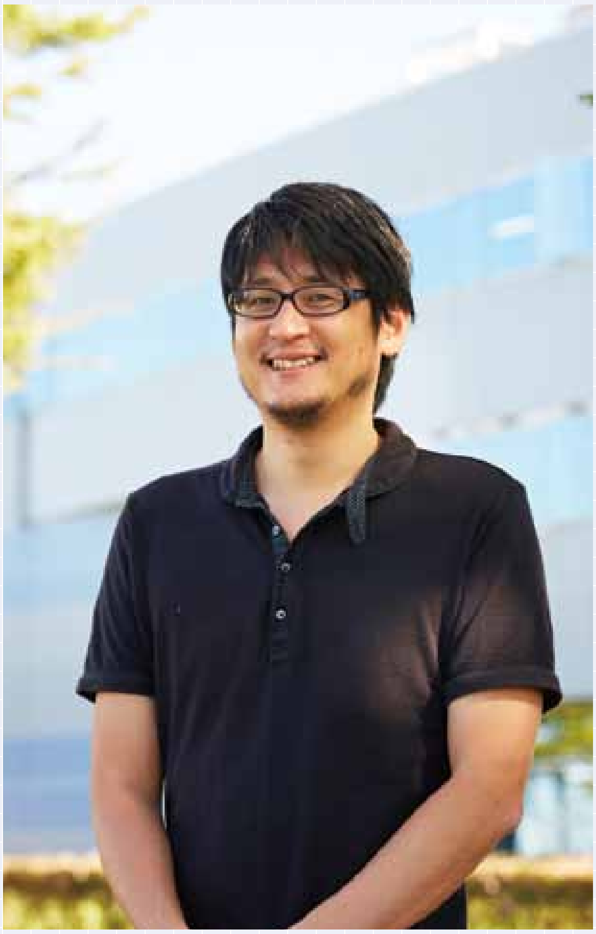
●Superconducting niobium nitride film-generating instrument in a cleanroom we can produce NbN film that can demonstrate superconductivity even in 4-nanometer-thick film compsed of several atomic layers. Furthermore, using ultra-microfabrication technology that utilizes electron beam lithography systems and etching equipment, we have achieved fabricating nanowire of approximately 100 nanometers in width and realized SSPD devices. At this time, the total distance of one nanowire within a SSPD component is almost 20,000 times that of the nanowire width, extending up to 2 millimeters. The entire SSPD component fabrication process can be done inside a cleanroom using various tuned and constructed instrumentation, and therefore, test production of devices with new structures and optimized device designs can be rapidly performed.



●SSPD diagram

Further Advancement of Photon Detector Performance

Beginning in 2006, SSPD research and development at NICT brought about a cooling system for SSPD in 2008 and succeeded in capturing a value of approximately 1-2% in system detection efficiency at a communication wavelength band (1550nm). At this stage, it is still a low detection efficiency compared with the rival component, APD, however, when we considered its characteristics such as the overwhelmingly low dark count and comprehensively evaluated it, we showed that SSPD has substantial advantages. Moreover, thanks to later structural revisions, detection efficiency reached over 20% mid-2010 and showed just by this efficiency rate that it exceeded APD values. Here at the Nano ICT Laboratory, we aim to make large contributions to the development of future information-communications technology by realizing single-photon detectors with ultimate performance that can respond to the needs of various fields including quantum information-communication technology.



Shigehito Miki

Senior Researcher, Nano ICT Laboratory, Advanced ICT Research Institute

Profile

After completing a doctoral course at Graduate School, Kobe University and serving as a researcher of Basic Research Program (CREST) at the Japan Science and Technology Agency, Miki joined NICT in October 2005. As a student, he belonged to a collaborative course between Kobe University and NICT and since then has been engaged in superconductivity at the Advanced ICT Research Institute, first as a trainee. He received the 146 Committee award, Japan Society for the Promotion of Science, encouragement award for outstanding lecture, Japan Society of Applied Physics, The Best Paper Award of Superconducting Division, Japan Society of Applied Physics, as well as The Young Scientists' Prize of the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology. No matter how busy, he values spending time with his family on days off and enjoys visiting many different places together.

Remark from Researcher

With the aim to create new information-communication device technology, we are conducting fundamental optical-electromagnetic-quantum devices that use superconductivity circuit technology research, superconductive-optical interface research-development, and applied research for quantum-information communications/ultrafast photonic networks. High-speed, highly-sensitive photon detection technology is a critical component in various research fields including quantum information-communications technology, and photon detectors using superconductivity have advantages in wideband, high-sensitivity, and speed that outdo existing semiconductor photon detectors. We are conducting research and development on superconducting nanowire single-proton detectors system (SSPD) in order to realize proton detectors whose ultimate performance exceeds the limits of conventional photon detectors.

Awards

Recipient(s) ● **Toshio Iguchi** / Director General, Applied Electromagnetic Research Institute

◎Award Date：March 16, 2012

◎Name of Award：

Maejima Hisoka Award

◎Details：

For developing an algorithm that estimates highly-precise three-dimensional distribution of rainfall rate from data of the world's first spaceborne precipitation radar on the Tropical Rainfall Measuring Mission's satellite. The algorithm was adopted as a standard processing algorithm at NASA and JAXA and enabled the understanding of an accurate three-dimensional structure of rainfall distribution over the ocean and unexplored areas that was previously unobservable.

◎Awarding Organization：

Teishin Association

◎Comment from the Recipient(s)：

I am deeply grateful to all those involved including those who recommended me for receiving the Maejima Hisoka Award. The algorithm development tied to this award was a result of collaborative work within a group, so it pains me to accept this award individually. I am happy that activities in this kind of field were recognized by this award and hope that similar activities will continue to advance into the future.

Recipient(s) ● **Yoshinari Awaji** / Research Manager, Photonic Network System Laboratory, Photonic Network Research Institute
Naoya Wada / Director, Photonic Network System Laboratory, Photonic Network Research Institute

From left: Yoshinari Awaji, Naoya Wada

◎Award Date：April 27, 2012

◎Name of Award：

Ichimura Academic Award

◎Details：

For their contribution in promoting the practical use of ultrafast optical networks with burst and dynamic temporal waveform and wavelength in the research-development of next-generation network by suppressing waveform distortion of burst optical signals, as well as enabling high-speed communication by eliminating waveform distortion in bit signals.For promoting the practical use of ultrafast optical networks with burst temporal waveform and wavelength (optical packet/optical burst switches, dynamic wavelength path networks, etc.) that dynamically fluctuate by suppressing waveform distortion of burst optical signals in next-generation network research-development and at the same time, enabling high-speed communication by eliminating waveform distortion in bit signals.

◎Awarding Organization：

The New Technology Development Foundation

◎Comment from the Recipient(s)：

Just like electronic circuit, amplification in optical communication is one of the basic functions. In that sense, the burst-mode optical amplifier we developed is a basic invention. In order to achieve advanced optical communications, we realized indispensable technology simply and at a low cost. I believe that this award not only recognizes the academic research result but also progress towards active practical use. We plan to voraciously continue research into the future on radical and important topics.

Award certificate

Monument

Recipient(s) ● **Hideki Takenaka** / Limited Term Technical Expert, Space Communication Systems Laboratory, Wireless Network Research Institute

◎Award Date: March 21, 2012

◎Name of Award:

Academic Incentive Award

◎Details:

In recognition of an experiment plan of laser communications using Small Optical TrAnsponder (SOTA) onboard and implementation of error-correcting codes for satellite-to-ground laser communication links, both qualifying for the Academic Incentive Award after rigorous screening.

◎ Awarding Organization:

The Institute of Electronics, Information and Communications Engineers (IECE)

◎Comment from the Recipient(s):

Two sections of our paper on an experiment plan of laser communications using Small Optical TrAnsponder (SOTA) onboard and implementation of error-correcting codes for satellite-to-ground laser communication links were highly regarded by The Institute of Electronics, Information and Communications Engineers (IECE) and received the Academic Incentive Award.

I am deeply grateful to everyone who offered guidance and support including the coauthors and for being able to use this facility. This award is an incentive to continue even more vigorously with my research activities.

Recipient(s) ● **Naoko Yoshimura** / Senior Researcher, Space Communication Systems Laboratory, Wireless Network Research Institute

Corecipients:

Yuichi Kawamoto (Tohoku University)
Hiroki Nishiyama (Tohoku University)
Nei Kato (Tohoku University)

◎Award Date: May 9, 2012

◎Name of Award:

2011 Satellite Communications Research Award

◎Details:

In recognition of the distinguished paper, titled "Study on the Multi-Layered Satellite Constellations to Minimize Packet Delivery Delay"

◎ Awarding Organization:

IEICE Technical Committee on Satellite Communications (SAT)

◎Comment from the Recipient(s):

An achievement in "research-development on satellite network traffic control technology during times of intense traffic" conducted as joint research with Tohoku University, I am extremely honored as a joint researcher.

I hope we can continue collaborating and producing great results together in the future.

Recipient(s) ● **Shoji Yozo** / Planning Manager, New Generation Network Laboratory, Network Research Headquarters
Takayama Yoshihisa / Senior Researcher, Space Communication Systems Laboratory, Wireless Network Research Institute
Toyoshima Morio / Director, Space Communication Systems Laboratory, Wireless Network Research Institute

Corecipients:

Kyo Takuma (Nagoya Institute of Technology)
Eiji Okamoto (Nagoya Institute of Technology)

◎Award Date: May 9, 2012

◎Name of Award:

2011 Satellite Communications Research Award

◎Details:

In recognition of the distinguished paper, titled "An improvement of rate estimation algorithm in the multi-rate LDGM code for the satellite laser communications"

◎ Awarding Organization:

ICICE Technical Committee on Satellite Communications (SAT)

◎Comment from the Recipient(s):

Receiving this prize for our results is gratifying, and we will strive for further results in the future. We are grateful to all those who supported us in advancing our research.

From left: Shoji Yozo, Takayama Yoshihisa, Toyoshima Morio

Recipient(s) ● **Takeshi Takahashi** / Senior Researcher, Security Architecture Laboratory, Network Security Research Institute

◎Award Date: May 17, 2012

◎Name of Award:

General Incorporated Foundation The ITU Association of Japan (ITU-AJ) Award, International Activity Incentive Award

◎Details:

For his contribution to the realization of a global information society through international cooperation activities in information-communications/broadcasting fields and activities related to the International Telecommunication Union.

◎ Awarding Organization:

The ITU Association of Japan (ITU-AJ)

◎Comment from the Recipient(s):

I received this award for contributions to international standardization activities in the field of cyber-security technology. Up to now, I have been contributing to the activities of ITU-T SG17 (cyber-security-related) and taken on editorships of X.1500 that sets information exchange frameworks, X.1570 that stipulates information discovery methods, and X.1205 Supplement 10 that sets guidelines for traceback technology. I am currently active as a draft editor of IETF. This award is an incentive to continue developing into the future constructive activities in this field.

39th International Home Care & Rehabilitation Exhibition 2012

Information Barrier-free Office, ICT Industry Promotion Department

On September 26-28, at the 39th International Home Care & Rehabilitation Exhibition 2012 held at Tokyo Big Sight, NICT exhibited the results of its efforts for elderly and disabled persons.

Aiming for businesses to assist "information-challenged persons," this exhibit has been held since 2006 based on a business plan set to "establish opportunities to publicly announce business results" as it works on promoting businesses that conduct research-development and deliver services for elderly and disabled persons.

This year, a total of 16 employers participated and presented results/demonstrations of research-development including services that assist in communication and daily life for elderly and disabled persons, sound-receiving equipment that corresponds to digital broadcasting for visually impaired persons, and assistive technology for real-time captioning work.

On the first day, we received many visitors including Director-General for Policy Planning: Sakamoto. Many disabled persons and persons from support organizations visited the venue, with visitor numbers at the demonstration exhibition reaching 1,500 and at the results presentations, 200.

At the exhibition, visitors were actively exchanging opinions with participating employers, with over 90% of the participants responding to a survey that the event was "beneficial." It was also reported that participating employers received a total of 120 questions on usage of services they provide and another 16 regarding collaborations and collaborative research on research projects.

We will continue to present and utilize opportunities to share results on our efforts at NICT towards "assisting information-challenged persons" and work on promoting barrier-free information.

●Overview of NICT Booth

●Ministry of Internal Affairs and Communications Director-General for Policy Planning: Sakamoto visited

●Visitors gathered at the tablet terminal demonstration exhibit

●Glimpse of the Results Presentations

Report on “5th Symposium on the New-Generation Network” and “Explanatory Meeting for Japan-EU ICT Coordinated Call”

Network Research Headquarters
Collaborative Research Department

NICT convened the 5th Symposium on the “New-Generation Network” (Host: NICT, Co-host: the Technical Committee on Information Networks (IN), the Communications Society of the IEICE, Support: Ministry of Internal Affairs and Communications (MIC), Cooperation: New Generation Network Promotion Forum) on October 10th at the Belle Salle Yaesu (Tokyo). At a separate venue, NICT also held the Explanatory Meeting for Japan-EU ICT Coordinated Call (in collaboration with MIC).

As new-generation network (NWGN) researches progress from basic examination towards large-scale experimental validations and prioritizing research and development for potent technologies, NICT convened the 5th Symposium on the “NWGN,” aimed at promoting understanding among the general public on NICT’s efforts towards the realization of NWGN. There, NICT reported on its efforts of research and development in industry-academia-government collaborations and exhibited their results. This meeting was conducted in collaboration with the Technical Committee on Information Networks (IN), the Communications Society of the IEICE that will hold an NWGN-themed commemorative event this year marking its 30th year.

Following greetings from host Hideo Miyahara, President of NICT, and MIC, Minister's Secretariat, Director-General for Policy Coordination: Shigeyuki Kubota, Francisco J. Ibáñez, Project Officer of Directorate-General Communication Networks, Content and Technologies European Commission, introduced innovations and research on information-communications technologies of the European Commission as an invited lecture. Afterwards, three reports were given on NICT efforts and discussions were held on establishing NWGN technology. In the industry-academia-government collaboration report session, 10 reports were given based on NICT-sponsored research (New generation network R&D program for innovative network virtualization platform and its applications) and despite the short amount of time for question-and-answers, a lively exchange of opinions followed. A more detailed, technical question-and-answer segment took place later in the industry-academia-government collaborative research result exhibition.

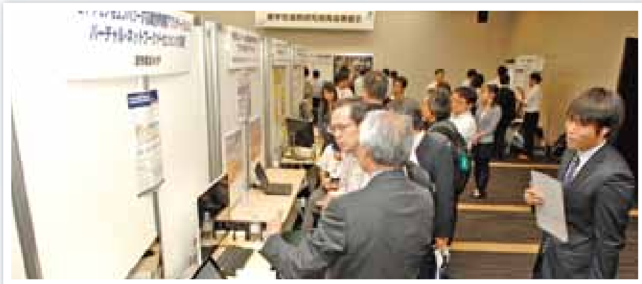
The symposium ended on a high note with 241 participants from related companies, universities and research institutes. We will continue making opportunities to hold other similar symposiums in the future on our efforts to realize new-generation networks and discuss the latest technologies developed at NICT.

In the Explanatory Meeting for Japan-EU ICT Coordinated Call, after greetings from the host representatives (from Ministry of Internal Affairs and Communications and NICT), persons in charge gave explanations on how to apply. NICT explained the guideline and aim of the coordinated call for “Collaborative researches and developments by the cooperation with Europe for the realization of the new generation network” while European Commission member Mr. Ibáñez also shared what Europe thinks about collaborative research with Japan. The venue was filled with over 100 participants, indicating a high level of interest.

This collaborative research-development project of Japan-EU ICT Coordinated Call was based on NICT’s “Commissioned-Research for Advanced Telecommunications-Broadcasting Research and Development” and the European Commission’s “Framework Program 7(FP7).”

Japan-EU ICT Coordinated Call was closed on 29th November.

●Mr. Ibáñez’s lecture



●Exhibition hall

●Glimpse of open recruitment information session

Official YouTube Channel "NICT Channel" Delivering NICT's Activities

To widely disseminate its research achievements and activities, NICT has been delivering information through its official YouTube (video sharing site) channel named "NICT Channel" since June 2010.

NICT Channel can be accessed by clicking the banner below http://www.nict.go.jp/

Recommended Videos

●Introduction Video NICT

●Introduction Video NICT in English

We updated our video that introduces NICT activities, research achievements, and various facilities during this fiscal year.

●**Replaying eight times faster the Scene of NICT Visitors during the Leap Second Insertion**

See the moment of the "Leap Second Insertion" carried out at NICT as well as people gathered to watch the moment on July 1, 2012.

●**How to Use "Kyono Osusume"**

This video introduces an application that can find a sightseeing spot in Kyoto, based on your mood at that time, using results studied from surveys given to 4,000 people.

●**How to Use "AssisTra ~Kyo-no Hanna~"**

This video introduces a sightseeing guide application for iPhone using spoken dialog system released in June 2011. The component technology used in this application including speech recognition, spoken language understanding, dialog management, dialog generation, and speech synthesis are the unique achievements of NICT.

Information for Readers

The next issue will feature technology that automatically translates Chinese patent documents into Japanese and research-development for efficient use of frequencies, and much more.

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4-2-1 Nukui-Kitamachi, Koganei, Tokyo 184-8795, Japan
Tel: +81-42-327-5392 Fax: +81-42-327-7587
E-mail: publicity@nict.go.jp
<NICT URL> http://www.nict.go.jp/

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