# NanoSquare Newsletter (English) Vol. 16

# NanoSquare Newsletter

Osaka Prefecture University

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NanoSquare

大阪府立大学
Osaka Prefecture University

Contents



## Can the faculty-based tenure-track program inherit the legacy of the NanoSquare program?


**Professor Koemon IRIE**
**Dean of Graduate School of Science**


The NanoSquare program has been successful, as evidenced by the book 'The Impact of NanoSquare in Academia' released in March 2016 (available at the NanoSquare office). Hence, it would be meaningful to analyze the key strategies that led the NanoSquare program to such wonderful success since the adoption of the MEXT program, 'Improvement of the Research Environment for Young Researchers', in 2008. The NanoSquare program was one of the government-subsidized SCF programs, which aided young researchers to have an independent research environment by providing research and administrative support. I recognize that the great achievements of the program can be attributed to the fact that the NanoSquare program has exceeded the expectations of the SCF program.

Parallel to the start of the MEXT succession program, our university launched a new faculty-based tenure-track program for recruiting young talented researchers in 2011, in addition to the implementation of the NanoSquare program. An essay by Prof. Masao TOYODA (the JST program officer of the tenure-track system) that appeared in NanoSquare Newsletter Vol. 13 could be useful when considering the current challenges of the faculty-based tenure-track system. I believe that analysis of the success of the NanoSquare program would provide us a clue for conducting the faculty-based tenure-track system of our university.

Although we already have five faculty-based tenure-track members in the Graduate School of Science, I, as the Dean, am not confident to answer whether we are able to provide an independent research environment and adequate support for the researchers and administration staff. Those young researchers are supposed to take their own initiative for their own research, supported by mentors at the university. It may seem that the system is apparently similar to the traditional small group style or the apprentice system. However, it is extremely difficult for a young post-doctoral researcher to start up a new laboratory from scratch and meet the criteria for becoming a tenured faculty member in a five-year period. We have to enable the young assistant professors to become independent researchers. It is expected from us to provide strong and adequate support for the tenure-track members and female researchers, even within the limited budget. Therefore, I would like to reform the traditional system to promote a new tenure-track system and the diversity of human resources in our faculty.

Professor Koemon IRIE

The NanoSquare program has been successful thanks to the good strategies of the university and the full financial support provided by JST. It is the mission of senior faculty members to also establish an even more successful tenure-track program by learning from the successes of the NanoSquare program.

# N2 RC Seminar

## Nakamozu Campus Science Hall

**The 32nd –March 9, Wednesday**
**'A private history and current status of high-Tc iron-based superconductors'**

**Dr. Yoichi KAMIHARA**
Associate Professor
Department of Applied Physics and Physico-informatics
Keio University

**The 33rd –March 29, Tuesday**
**'Quantum transport in van der Waals junctions of graphene and 2D materials'**

**Dr. Tomoaki MACHIDA**
Associate professor
The Institute of Industrial Science
The University of Tokyo


At Science Hall

The 5th term tenure-track faculty member, Dr. Ikuya YAMADA held a seminar. He invited Dr. Yoichi KAMIHARA, Associate Professor in the Department of Applied Physics and Physico-informatics of Keio University. They have known each other since 2008, when JST selected them as individual researchers for a transformative research project on iron pnictides.

### LaFeAs (O, F) -break through of the year-


Dr. Yoichi KAMIHARA

Dr. KAMIHARA became famous in 2008 for publishing his finding of LaFeAs (O,F) with Prof. Hideo HOSONO, from the Laboratory for Materials and Structures at Tokyo Institute of Technology. Since Thompson and Reuter identified his paper as the world's most highly cited paper in 2008, he became a common figure in the media. The audience enjoyed his funny episodes, especially when his name appeared in the Japanese version of Reddit and the biggest BBS in Japan.

### USO!? mystery of superconductors

At the seminar, he covered a range of topics, including the history of superconductors, its direction, materials, and his latest research activities. It was especially interesting when he passionately mentioned a few unidentified superconducting objects (USO, pronounced as uh-so, means false or lie in Japanese) and verified each case in detail. The audience was deeply impressed by the sincerity of his attitude and devotion for fundamental research. Despite the attention he attracts due to his splendid performance in academia, he also seems to be quite a diligent researcher and give much importance to basic research.

In a few weeks later, the 5th term tenure-track faculty member, Dr. Ryo NOUCHI also held a seminar. He invited Dr. Tomoki MACHIDA, Associate Professor of the Institute of Industrial Science of The University of Tokyo.

### Hype up for graphene

Various researchers and industries have said that the size of silicon semiconductor devices can no longer be reduced owing to the so-called 'short channel effect'. As the next-generation material to tackle this limitation, an atomic sheet material with excellent electron transport characteristics such as graphene has drawn considerable attention in recent years. Therefore, every laboratory in the field is making substantial efforts to improve the material due to its ultimate thinness.


Dr. Tomoki MACHIDA

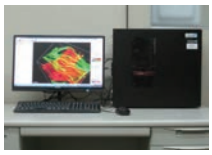
### Up for Sale? 'MACHIDA manual' is awesome

Following this trend, Dr. MACHIDA focused on the study of graphene structures for semiconductor applications. At the seminar, he clearly explained how to create a high-quality thin laminate structure by cleaving and transfer method with a van der Waals layered material. When he explained how to detect a thin layer created by cleaving method and how to decide the point coordinates by an automated method, Dr. NOUCHI could not help asking whether Dr. MACHIDA will put the system on market. Dr. MACHIDA also updated the public on various quantum transport phenomena such as ballistic conduction and Josephson Effect, which are observed in these layered structures. Lively discussions and multiple questions from participants arose, making the seminar overran the allotted time.

## Common Infrastructure

### the 7th term tenure-track faculty member, Masaya HAGIWARA

### Imaris High Resolution Image Analyzing Software



Imaris is software used for 3D and 4D image analysis in life sciences. It can provide a more realistic 3D impression of the data derived from laser microscopy and fluorescent microscopy, and its rendering process allows for the visualization of observed cellular tissues. Cutting the rebuilt 3D images at desired points and angles enables the observation of the cut and inner surfaces. For example, it is possible to create images in such a way as to intuitively watch the change in thickness of blood vessel walls by cutting the rebuilt 3D images. It is also possible to measure and analyze the branched shapes obtained via confocal microscopy. Furthermore, Imaris can calculate the number of cells, cubic content and the coordinates of the obtained images, whilst clarifying them instantly and processing the related statistics.

### Thermal Cycler Dice Real Time System III

The Thermal Cycler Dice Real Time System III quantitatively measures the targeted RNA in samples by monitoring PCR amplification of the RNA amount contained in cells in real -time. Up to 96 samples can be measured simultaneously, with a reaction time of as little as 40 minutes, which significantly improves analysis efficiency. For example, it is possible to verify the presence of specified genes in samples and analyze the differences in gene expression of the same samples cultured under different conditions. The touch panel mounted system enables measurement with a PC-free, compact, and easy-to-use design. Equipped FAM and ROX fluorescent filters provide usability in a variety of applications.

**Advanced research and development in Nanoscience and Nanotechnology, supported by state-of-the-art common infrastructures**

In the NanoSquare program, class-10, 100, 1000 clean rooms, a cryogenic research facility, and state-of-the-art research equipment are installed as shared infrastructures. Below are some of the major equipment in the Nanoscience and Nanotechnology Research Center(N2RC). As one of the features of N2RC, necessary support is provided to young researchers and scientists for advanced research of nanoscience and nanotechnology as this excellent research environment.

## What is the lab tour for future postgraduates?

**NanoSquare organizes a lab tour as an orientation activity for potential students in which the tenure-track faculty members and their recent research activities are introduced. The lab tour is offered every May, November and February to provide opportunities to gain a sense of the actual lives of the young scientists and their students. The lab tour is ideal for undergraduate students looking for labs as well as for potential postgraduate students.**

**Please do not miss this opportunity to meet and converse with our tenure -track faculty members.**

At the tour

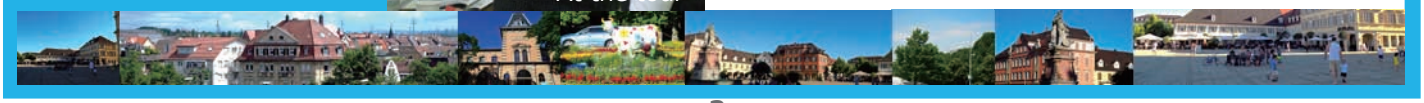
## Tenure-track laboratory tour for future postgraduates

### the 7th term tenure-track faculty member Masaya HAGIWARA

During the spring festival at the Nakamozu campus, we organized a laboratory tour for undergraduates. On May 28, a number of 3rd year undergraduates joined us to explore their desired laboratories.

### How to register? Career path consultation? Don't worry!

After Prof. NOGUCHI's greeting, Dr. NOUCHI introduced our research center. In his introduction, he discussed how the center is operated and managed, and the range of infrastructures available to everyone working here. He also gave detailed guidance on how to apply for a possible career path in our laboratories. Six tenure-track members from the faculty then presented their recent research activities. Having a tea break was a good opportunity for the students to explore each laboratory a bit more closely, and even to have a personal conversation with the lecturers and the students who already work in the labs. I believe this tour helped the students to get a feel for what postgraduate research is really like.




At the café

## The 14th NanoSquare Café
## -Recent Developments in High-Pressure Materials Science-

Ikuya YAMADA, the 5th term tenure-track faculty member

The 14th NanoSquare Café was held on March 12, 2016. A total of 10 guests, varying from active seniors to teenagers about to enroll in high school, were present. The topic discussed was rather broad, ranging from the history of high-pressure materials science to the latest material developments and potential applications.

### Diamonds? High-pressure cooker? Ugly deep-sea fish? Welcome to the world of high-pressure!

Although synthesizing and investigating inorganic compounds under ultra-high pressure is the core area of my expertise, I chose to discuss artificial diamonds, as diamonds are well-known and serve as an interesting introduction to the amazing world of ultra-high pressure. Presenting a module also helped the guests to become familiar with the process of generating ultra-high pressure. As this café aimed to introduce our research activities to the general public, I also explored the application of high-pressure technology in areas such as food science and biological science. I must admit the topic was still rather esoteric (except for earth science), but I found it extremely distinctive and stimulating. During the break, the guests had a closer look at how the actual module was skillfully stabilized and congealed for testing, which led to the introduction of my latest research activity. I shared with the guests my current focus on the synthesis of new catalyst materials and the expectations of this work.

It was a good opportunity for me to meet guests who possessed an enthusiasm for science. I was especially impressed with the parent who invited his son, who had recently graduated junior high school, to this café so as to give him exposure to real science before encountering it at high school.

### What is NanoSquare Café ?

**NanoSquare Café opened in 2010 to introduce young NanoSquare scientists and their recent research activities to local citizens. The café is small; the number of the guests is no more than about 20, so that everyone can relax and enjoy casual discussions with the lecturers. This café is ideal not only for bright and curious local people interested in science, but also for whom has fear of asking ignorant questions for serious professors.**

**Please come and join us at our café. Your ideas about a 'university lecture' will be changed! Please visit our website for more details.**

### FY 2016 NanoSquare Event Calendar

| | | |
|---|---|---|
| Sat. May 28 | Tenure-track laboratory tour for future postgraduates | Bldg. C10, Nakamozu Campus, OPU |
| Sat. Jul 30 | The 15th NanoSquare Café | I-site Namba, OPU |
| Sep (upcoming) | The 2016 autumn N2RC joint research presentation by students | Nakamozu Campus, OPU |
| Nov (upcoming) | Tenure-track laboratory tour for future postgraduates | Bldg. C10, Nakamozu Campus, OPU |
| Fri. Nov 4 | The 10th NanoSquare Workshop | Nakamozu Campus, OPU |
| Sat. Nov 19 | The 16th NanoSquare Café | I-site Namba, OPU |
| Feb (upcoming) | Tenure-track laboratory tour for future postgraduates | Bldg. C10, Nakamozu Campus, OPU |


# NanoSquare Newsletter Vol.16

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NanoSquare Acting Committee
Osaka Prefecture University
MEXT Program to Disseminate Tenure Tracking System


Photos: Early Summer of Ludwigsburg and Stuttgart


The NanoSquare Office
Osaka Prefecture University
1-1 Gakuen-cho,
Naka-ku, Sakai, Osaka 599-8531, Japan
Tel ：+81-72-254-8278
Fax ：+81-72-254-7854
Email：nanosquare2<at>21c.osakafu-u.ac.jp
http: //www.nanosq.21c.osakafu-u.ac.jp