



NanoSquare Newsletter (English) Vol. 10

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NanoSquare Newsletter

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Contents

- On the NanoSquare program entering PHASE-II
Prof. Toshiji Tada, Dean of Graduate School of Science P1
- Profiles of Tenure-Track Faculty Members (Sixth Term) P2
- The 25th N2RC Seminar
- The 26th N2RC Seminar P3
- The 6th NanoSquare Café
- The 7th NanoSquare Café P4
- NanoSquare Event Calendar FY2013



On the NanoSquare program entering PHASE-II Prof. Toshiji Tada Dean of Graduate School of Science

The NanoSquare program has completed its government-subsidized five-year stage (PHASE-I) and is making its transition this fiscal year to the second stage (PHASE-II), which will be basically self-funded by Osaka Prefecture University (OPU). We are currently summing up PHASE-I, in preparation of undergoing an ex-post assessment this autumn. As well-publicized already, in the interim assessment of PHASE-I, the program received very high commendations from the government: an “S” in the overall evaluation as well as “S” in all the individual evaluations. I believe this is a result of OPU’s excellent institutional design combined with brilliant personnel participating in and working diligently under the program. It goes without saying that the strong support from OPU to the university-wide program also contributed to the outstanding achievements.

The high standard of research achievements of the 14 Tenure-Track Faculty Members (TTFMs) in PHASE-I of the NanoSquare program is eminently shown by 29 awards — including 3 from the Minister of Education, Culture, Sports, Science and Technology — as well as the publication of papers in high-impact journals, such as *Nature*, *JACS*, *Nano Letters*, and *Nature Materials*. While the research and development expenses provided to the 14 TTFMs in 5 years amounted to 290 million yen, the external funds obtained by the TTFMs in those years (including those scheduled for approval) amounted to 750 million yen, which is about 2.6 times the amount provided. Just looking at the PRESTO program of Japan Science and Technology Agency (JST) as an example, 7 TTFMs have conducted research under that program. These examples seem to explicitly demonstrate that the NanoSquare program has been making progress successfully, from a cost-benefit and other per-

spectives. I even feel that the program possibly points to one direction that a research-oriented university could take.

I hear that TTFMs are devoting themselves to research and education on a daily basis, in order to become tenured faculty members and join the departments of their choice. This system of assigning TTFMs to the departments of their choice, first started by OPU, is probably unprecedented in the world. The first case of assignment to a department of choice is about to begin. I hear about the many requests, from the departments, to receive the TTFMs. I greatly hope that OPU will be increasingly invigorated by the TTFMs, who were developed through the NanoSquare program, in “concert and competition” with the faculty members of the departments.

In PHASE-II, the NanoSquare program aims to develop further, through the strong support of the University, the on-going international open recruitment for the seventh-term tenure-track positions, and other activities. At the same time, the university-wide implementation of the tenure-track system has begun. This is undoubtedly a ripple effect of the NanoSquare program. I look forward to the enrichment of OPU’s tenure-track system under an excellent institutional design.

Finally, I would like to ask for the support and encouragement, of the relevant members, for the NanoSquare program. I would like to end this article, hoping for a further leap forward for the program in PHASE-II.



Profiles of Tenure-Track Faculty Members (Sixth Term)

Dr. Ikuhiko Nakase

● Biography ●

PhD in Pharmaceutical Sciences at Kyoto University (2005). Research associate at Department of Chemistry, University of Washington (USA) (2005-2006). Assistant Professor at Institute for Chemical Research, Kyoto University (2006-2013). Special Lecturer at Osaka Prefecture University (2013-).



● Research ●

Cellular regulation technology based on cell engineering ((i) development of intracellular delivery system using cellular nanomaterials with cell specificity, (ii) cell manipulations using artificial receptor-ligand system for application to cell therapy).

● Comments ●

I would like to strongly contribute to innovations for future therapies and the nurturing of young scientists.

Dr. Hidekazu Ikeno

● Biography ●

Master of Engineering and PhD in Materials Science and Engineering at Kyoto University. Served as a JSPS research fellow, a post-doctoral scholar at Kyoto University, a postdoctoral scholar at Utrecht University, a research fellow and an assistant professor at Fukui Institute for Fundamental Chemistry in Kyoto University, and took up this position in April, 2013.



● Research ●

Computational materials science based on quantum mechanics, and the nano-scale characterization of materials using electron spectroscopy.

● Comments ●

I would like to convey the fun of nano-science to many students, and would also like to contribute to the further development of nano-science through my research activities.

The 25th N2RC Seminar

Third Term Tenure-Track Faculty Member

Dr. Rie Makiura

Highly-ordered porous organic-inorganic hybrid compounds, so called metal-organic frameworks (MOFs) have been receiving considerable attention. The rich variety of materials arising from the unlimited possible combinations of metal ions and organic ligands and the presence of regulated pores and cavities can lead to a number of potential applications ranging from industrial use to medical purposes. In the 25th N2RC Seminar held on March 7, 2013, we invited two young researchers from Australia who lead MOF related research. Dr. Christian J. Doonan from the University of Adelaide explained the fundamentals of what MOFs are, as well as new



Fig. 1: Dr. Falcaro in his lecture

types of porous materials which are only composed of organic molecules. Dr. Paolo Falcaro from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) introduced advancements on the control of MOF positioning. This approach is important because in order to take full advantage of MOF properties in integrated devices, the ability to precisely locate the ultra-porous crystal is required. A tenure-track lecturer, Dr. Rie Makiura, who acted as the facilitator, also works on MOF, targeting MOF thin films in particular. We had active discussions with all participants. Both Dr. Doonan and Dr. Falcaro visited Japan as a part of an Australia-Japan collaborative program. They mentioned that they would like to welcome Japanese researchers to Australia next time and deepen exchanges.



Fig. 2: Lively discussion with Dr. Doonan

The 26th N2RC Seminar

Third Term Tenure-Track Faculty Member
Dr. Shiho Tokonami

On April 17, 2013, the 26th N2RC Seminar was held at the Science Hall, Nakamozu Campus. Professor Flavio Maran from University of Padova, who has strenuously studied Nano-biotechnology using electrochemistry, was invited to give us a lecture titled "Insights into Properties of Monolayer-protected Gold Au25 Clusters (including results on cells)." The lecture started from the synthesis method of gold clusters (Au25), and consisted of the kinetics of electron



Fig. 1: Dr. Flavio Maran in his lecture

transfer in a catalytic reaction, an analysis of electron transfer in biologically-relevant systems, electrochemical biosensors, and cellular imaging using gold clusters. We had over 120 participants from inside and outside of the university, and had active discussions after the lecture. It was a great opportunity for us to listen to extensive research in nanoscience based on electrochemistry from a broad standpoint in terms of foundations and applications. I believe that such a lecture could help junior faculty and students, who constituted a majority of the participants, and enhance creativity in their research work.



Fig. 2: Lively discussion after the lecture

The 6th NanoSquare Café



Second Term Tenure-Track Faculty Member Dr. Yasuhiro Sakamoto



Fig. 3: Active discussion in a relaxed atmosphere

The 6th NanoSquare Café was held on December 12th, 2012 on the Nakamozu campus of OPU. This event was one of the regional contributions by the NanoSquare program, and I gave a talk this time, titled "Electron Microscopy: Into the Nanoworld." The talk was presided over by Mr. Hiroshi Osumi from the Research Organization for University-Community Collaborations, and 25 participants enjoyed listening to my presentation in a relaxed atmosphere. I started with the difference between optical and electron microscopy, and the history

and types of electron microscopy. I also talked about the Nobel Prize in Chemistry for 2011 awarded to Dr. Daniel Shechtman "for the discovery of quasicrystals," and showed several

electron microscopy images such as a diatom. In the last half of my talk, I introduced my research of ordered porous materials in order for the audience to get a flavor of what state-of-the-art materials are. The audience showed great interest in the topics and enjoyed an active discussion.

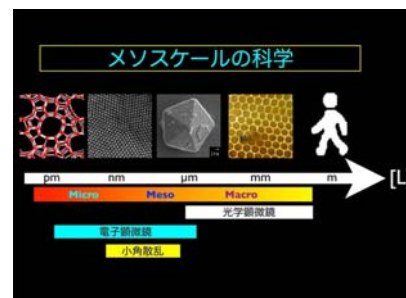


Fig. 4: One of the presentation slides

The 7th NanoSquare Café



Second Term Tenure-Track Faculty Member Dr. Yasushi Takahashi

The 7th NanoSquare Café (hereinafter referred to as Nano Café) was held on March 19, 2013, as the signs of spring were beginning to appear. With the goal of contributing locally, the Nano Café took many measures in order to present research to general participants in a more friendly and easy to understand way. The theme presented was “Achievements and Potentials of Lasers.”

In the first half of the presentation, I explained with the use of some experiments how light technology is pervasive in our lives. Spectro-sheets (transparent films) were handed out to all the participants and they were able to see that although an LED only emits white light, it actually contains many different colors of light. I also showed that the infrared light emitted by television remotes can be seen through a cell phone camera; through this demonstration the participants were able to realize that our world is overflowing with many different lights.

In the latter half of the presentation, I introduced more than half a century of history until the invention of the laser and I explained how the scientific study of light contributed greatly to the development of science



Fig. 1: The presentation and the participants

and technology in the 20th century. I also made a special introduction of the latest achievements of the silicon laser I am currently researching.

In the results of the questionnaire, I received many comments, such as, “Even though I am not a professional it was easy to understand,” “It was fun,” and “The content was extremely interesting,” so I feel extremely pleased.

Keeping in mind the importance of an opportunity like the Nano Café, I would like to continue to research, educate, and contribute to society with integrity from here on.

NanoSquare Event Calendar 2013	NanoSquare Café		
	9th	November 20, 2013	“Thermoelectric Conversion Technology” Guest Speaker: Dr. Atsuko Kosuga (N2RC, Osaka Prefecture University)
	10th	Around March, 2014	Guest Speaker: Dr. Shiho Tokonami (N2RC, Osaka Prefecture University)
	N2RC Seminar		
	28th	Around November, 2013	To be determined
	NanoSquare Workshop		
	7th	November 27, 2013	
	Open Lab at the Nanoscience and Nanotechnology Center		
	November 1, 2013	Laboratories of Tenure-Track Faculty Members at N2RC (Nakamozu Campus, Osaka Prefecture University)	
	Around February, 2014	Laboratories of Tenure-Track Faculty Members at N2RC (Nakamozu Campus, Osaka Prefecture University)	



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The front picture shows the autumn foliage on the Nakamozu campus of Osaka Prefecture University.