Information Devices
Professor NAKANO, Yoshiaki

Looking beyond publishing to developing advanced photoelectronic devices with commercial applications

Interviewer: Takashi Mikuriya, professor

—— First of all, Professor Nakano, could you explain what your research is about?

My specialization is called photoelectronics, which is an area of electrical engineering. In electronics, you have one field that uses LSI and other silicone semiconductors, and you have another field making devices that emit and receive light using what are called compound semiconductors, which are completely different from silicone semiconductors. This field is called photoelectronics. Semiconductor lasers are a typical example of a photoelectronic device, and that's what our research has been focused on for a long time. But recently we've realized that there's not much benefit to just being able to emit light--the real source of value is in taking that light and doing something with it. So now our focus is shifting from laser semiconductors to more advanced light-controlling devices such as optical switches and wavelength converters.

—— Professor Nakano, you joined RCAST in April 2002, half a year after the launch of the Super COE (Center of Excellence) Program, isn't that right?

Yes, before that I was in the Electrical Engineering Department at the Hongo campus for a long time. The thing that impressed me most when I came to RCAST was that this is a place which brings together people from different disciplines. In particular, I found it refreshing to have the opportunity to meet researchers from the humanities on a daily basis, something that never happened in the Engineering Faculty. What struck me is how this sort of interdisciplinary environment is conducive to generating new things and new ideas.

—— What are the positives and negatives about working at RCAST? How does it compare to being at Hongo?

The upside is that I have a new frame of reference and I'm working under a completely different set of conditions than before. Even though I'm basically doing the same thing, my environment has changed. And because my environment has changed, the way I look at what I'm doing has also changed, and my approach to things is different too. Since I was at Hongo for so long I just kept on doing the same things in pretty much the same way I always had. My environment didn't change all that much, so I only made incremental adjustments in response to developments in the world at large. But since moving here I've been thrown into a completely different environment and my way of thinking has changed dramatically. I don't know how much longer I'll remain in academia, but in the end it's good to shake things up every now and then. True, it's a big hassle to uproot one's lab and all one's equipment, but apart from that I think there's much to be gained in having a couple such transitions over the course of one's academic career.

On the downside, the process of moving everything, especially all my research equipment, has taken about a year, and I suppose it's possible that the pace of my research has dropped off slightly in some respects. Also, since I teach at both Hongo and Komaba, sometimes I have to make two roundtrips a day between the two campuses, so I spend more time to-ing and fro-ing than I used to. On the other hand, it's good exercise (laughter)...so even that cloud has a sliver lining.

Rigorously assessing research results in economic terms

—— You said that your research has changed dramatically since coming to RCAST. What exactly do you mean?

The Super COE Program had already been in place for about six months when I moved to RCAST, so joining it in midstream, the first thing I did was sit down and reexamine my own research goals to see how I could bring them more into line with the direction of Super COE. I tried to assimilate my research into both the Open Laboratory and TBI projects. First, for the Open Laboratory, I put together a team of people from the university and private industry and devised a platform whereby academia, industry, and government could work together to solve the sticking points in photoelectrical research that the IT industry had run into. Before the Open Laboratory, Hongo didn't have the resources to take on such a large project. In particular, they didn't have the space and they didn't have the human resources either.

As for the TBI project, it's given me the opportunity to think deeply about our research and what might be possible if we were to actually set about commercializing it, rather then just publishing a paper and then forgetting about it. At Hongo I just pursued my research as far as I could and then published a paper, end of story. That's the classic model of pure science. After writing a good paper, I'd take a little break and think about what I wanted to do next. But looking at things in terms of the TBI project, I realized that's not enough. Just publishing a paper doesn't ensure that my ideas will get passed on to someone else. Sure, someone might read that paper and think, Wow, I didn't know that was possible, but they won't necessarily pick up the ball and run with it. There's a big gap between writing something down and publishing it, and seeing it developed on an industrial scale. In academia, we tend to think that when we publish something we can just leave the ball on the ground and someone will come along and pick it up and run with it, but now I realize that's too simplistic. At the very least, if you don't go out and meet them halfway, no one's going to come and take the ball from you. TBI is not just about producing quality research but also about the process of rigorously assessing the economic viability of one's findings. It's fine to do research and publish papers, but that's not going far enough in terms of making an impact on society.

Researchers detached from society and industry are just patting themselves on the back

—— **Before it was enough for scientists simply to publish the results of their research, but through TBI you said you were able to take a step outside the university. Did you find that trying to respond to the demands of society and industry enabled you to look at things in a more three-dimensional way?**

If one is detached from society and industry, then the only assessment of one's research that matters is one's own. In other words, you're just patting yourself on the back. But society is interested in things, not ideas, and it lets you know when your ideas are not commercially viable. That's when you start to think, what can I do with this?

—— **Compared to when you were just publishing papers, you meet different kinds of people, don't you? Did you find you could communicate with them?**

No. Not at first anyway (laugher). In academia everyone is on the save wavelength. We all know what's good, what's bad. We speak the same language. Now, working at RCAST on TBI and other projects, I have many opportunities to speak to lawyers, venture capitalists, people like that, which I didn't when I was at Hongo. I've found that they have a completely different way of looking at things and evaluating things. At first we couldn't understand one another. It's been good training both in terms of learning how to speak so that others can understand me as well as how to interpret what they're saying.

—— **Is that true in the laboratory as well?**

In our lab we have ongoing research projects at various phases of development. In some cases we're looking at ideas that are still in their infancy and quite far from having any practical business applications. Other projects are much further along and it would be a shame if we couldn't commercial them. Since moving to RCAST, our people working on the latter sort of project have gotten a lot of practice communicating with people outside the lab. On the other hand, those involved in more fundamental research don't get to talk directly to investors, but they do have people next to them in the lab who are racking their brains trying to figure out how to make something economically feasible, so that naturally rubs off on them. Engineers tend to think the grass is always greener, so those who are being nagged to keep costs down envy those who are free to do whatever they want without worrying about money. But the ones with complete freedom to do their research don't think of themselves as living in an ivory tower and leeching off the rest of society.

Lab members from foreign countries are playing a central role

—— **How has it been having researchers and students from foreign countries working on the TBI and Open Laboratory projects?**

Over half our members are from overseas and the number of foreign students working in our lab has gradually been increasing over the years. Since the foreign contingent makes up the core of the lab, they don't get special treatment because they're not Japanese and they're playing a central role. In terms of numbers, the majority is from Asia and the Middle East. The breakdown among the Asian countries is quite varied. We always have some Chinese, Koreans, and Taiwanese. We also have people from Indonesia, Malaysia, the Philippines, Bangladesh, Thailand, Singapore...

——**So English is the common language?**

Well, you know, when people first arrive they speak only English, but at some point they start speaking Japanese. That's because they learn to speak Japanese better than we can speak English. In particular, it's astonishing how fast the foreign research students pick up the language.

——**In that case, what sort of role do the Japanese play in the lab?**

Well, they're also a mixed bag. Some of them compete with the foreign students in showing leadership, others don't. The thing is, the foreign students have had to go through a rigorous filtering process to get where they are, whereas the Japanese students have just passed the entrance exam and that's it. They've never really had their feet held to the fire. Just because they were brilliant once, long ago, doesn't necessarily mean that they're still brilliant.

In the aftermath of the IT bubble, business climate is picking up

—— What changes have you seen in the research community in the past five years?

Up until five years ago this field had been the beneficiary of a phenomenal amount of confidence, but when the IT bubble burst all the air suddenly got sucked out of the room. The fallout was particularly noticeable among the industry and business leaders with whom we deal. For the past five years, those of us at the Open Laboratory and TBI have been talking about how to get back on track, but now the wind seems to have changed direction and the storm is blowing over. Lately, the business climate looks to be picking up. In the meantime, society's dependence on telecommunications has only increased. In the beginning, when the IT bubble burst, there was a feeling that telecommunications wasn't important anymore, but it seems that people have stepped back from that view. Actual demand has picked up and information technology itself has advanced. Everything seems to be clicking into place. The Super COE Program has been a driving force over the past five years, and even TBI and the Open Laboratory have come a long way. With the backing of NEDO, the Open Laboratory will be having its debut at an international forum, while the TBI Project has now reached the stage where it's about ready for to be launched.

—— So these past five years have been a significant five years for you personally.

I've experienced culture shock on many different levels during these first five years since coming to RCAST, but I've developed many new collaborative relationships with other researchers and, as I said earlier, by working on the Open Laboratory and TBI projects I've learned how to communicate with people in other fields whom I couldn't communicate with before. All of this has stimulated my own research to a great extent. In that sense, these past five years have been a very good period in my life.

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Links

Nakano Laboratory
http://www.ee.t.u-tokyo.ac.jp/~nakano/lab/index-e.html