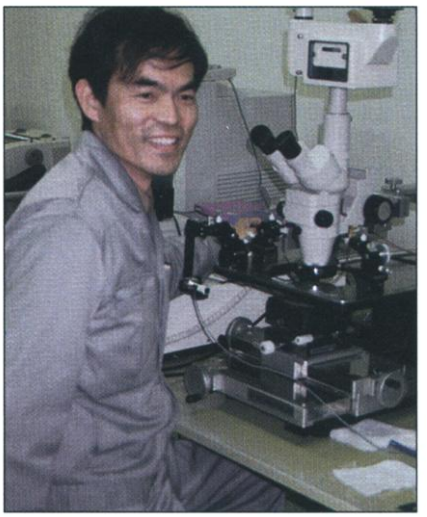
JAPAN

Blue Laser Pioneer Seeks Greener Pastures

Shuji Nakamura is something of a national hero in Japan. The 45-year-old materials scientist's pioneering work on blue light–emitting diodes (LEDs) has been held up as an example of how Japanese researchers can outperform their colleagues in the United States and Europe, and it has paid off handsomely for his employer, a small Japanese chemical company. But when Nakamura decided to leave industry for academia, he says his destination was a no-brainer: the United States. "Even if you produce some superb invention, your salary and position don't improve [in Japan]," he says.



California dreaming. Nakamura has left Nichia for UC Santa Barbara.

Nakamura's arrival this month at the University of California, Santa Barbara (UCSB), will strengthen its already strong program in compound semiconductor materials. He also hopes it will send a message to his native country to rethink its veneration for seniority and credentials over objective measures of performance. Combined with a stifling bureaucracy, the rigid academic hierarchy prevents scientific stars from shining as brightly as they might elsewhere. "It's a very silly salary system," fixed by law and based strictly on seniority, says Leo Esaki, a physics Nobelist and former president of the University of Tsukuba. Other regulations make hiring technicians and assistants nearly impossible, and collaborations with the private sector are also restricted. In contrast, says Nakamura, "American university professors have a lot of freedom."

Nakamura stunned the optoelectronics world several years ago when he beat out dozens of well-funded academic labs and such industrial heavyweights as Sony and Hewlett-Packard to the development of blue LEDs and, later, blue semiconductor lasers (*Science*, 21 March 1997, p. 1734). The shorter wavelengths allow for a fourfold increase in the storage capacity of CD players and CD-ROM drives over current equipment, which uses infrared lasers to read the digital signals. In addition, blue LEDs join previously developed red and green LEDs to complete the palette of primary colors, enabling long-lasting, energy-efficient LEDs to dominate such niche applications as sports stadium displays. And white LEDs, which combine red, blue, and green LED structures in one device, could eventually make conventional light bulbs obsolete.

Nakamura's success was based on new fabrication methods for gallium nitride, a material most researchers felt was too difficult to handle. His employer, Nichia Chemical Industries, announced its creation of the blue LED in 1993 and started shipping samples of its blue semiconductor lasers early last year. Thanks largely to Nakamura's research, Nichia's sales have more than doubled in 4 years, to $390 million in 1998.

With the blue laser now headed for production, Nakamura says he was looking for new challenges. And although he won't criticize his former employer, he admits that he wasn't entirely happy with his position or his compensation. The move dispelled those clouds. His Santa Barbara salary will be "above-scale," he says, and he has received a $3 million package to set up his laboratory. "Researchers like Nakamura have an international market value," says Esaki, who 40 years ago left another tiny Japanese company—which later became Sony Corp.—for the greater research support and better pay of IBM's T. J. Watson Research Center in Yorktown Heights, New York, before returning to Japan in 1992. "And Japan has to recognize this if it wants to attract and keep such people." A Nichia spokesperson declined to comment on Nakamura's pending departure, and Matthew Tirrell, dean of UCSB's College of Engineering and a professor in the materials science department, says simply that "we are delighted to have Shuji Nakamura join us."

Even as Nakamura levels his broadside, Japan may be missing an opportunity to improve the academic environment for talented researchers. It is planning to turn the national universities into semi-independent entities, but a spokesperson for the Ministry of Education, Science, Sports, and Culture (Monbusho) says the ministry is leaning toward preserving the status of faculty as national civil servants, subject to all current laws and restrictions. "Most faculty want to continue as national employees because of the employment security," says the spokesperson, although he notes that a final decision has not yet been made.

Nakamura believes that such a decision will encourage even more potential or current academics to head overseas. And that exodus, he says, "should say to the Japanese government that current conditions are not very attractive." –DENNIS NORMILE

BIOTECHNOLOGY

Both Sides Claim Victory in Trade Pact

After 5 years of bitter negotiations, delegates from 130 countries finally hammered out a global treaty that will govern the trade of genetically modified organisms (GMOs). The treaty formalizes the process by which countries can refuse to accept biotech products, an apparent blow to the biotech industry. Even so, both proponents and critics of biotechnology came away from the negotiating table at 5:00 a.m. in Montreal on 29 January claiming victory.

One reason for the unexpected compromise may be that the wording of the new treaty is decidedly ambiguous. For instance, the treaty allows countries to refuse to import GMOs based on a "precautionary principle"—that is, even without "sufficient scientific evidence" that the products could cause environmental harm or threaten human health. Elsewhere, however, the treaty stipulates that such rejections be based on "credible" scientific evidence.

The treaty focuses on living modified organisms such as seeds and fish that can colonize an ecosystem. It calls for the creation of a clearinghouse for information about such GMOs. Exporters will be required to register new products with the database, which will be run by the United Nations, and provide scientific information about how they were created and tested. Exporters must also seek permission from importing countries to ship the new products the first time.

At issue is the safety of GMOs, a topic that has pitted the United States, Canada, and a few other agriculture-exporting countries against the GMO-wary European Union (E.U.) and most developing countries. Asserting that GMOs are safe and a valuable tool for agriculture, the U.S.-dominated team, known as the Miami group, agitated for relatively unrestricted trade in GMOs.

"The Miami group got virtually everything it wanted," asserts Val Giddings of the Biotechnology Industry Organization in Washington, D.C. Giddings points out, for example, that the treaty excludes pharmaceuticals, in which the United States has a major stake, and it will not supercede trade agreements under the World Trade Organization (WTO), which encourages relatively

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