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Cal State Northridge—The Intellectual, Economic and Cultural Heart of the San Fernando Valley and Beyond

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Nanoscience Experimental Lab is 'the Wave of the Future'

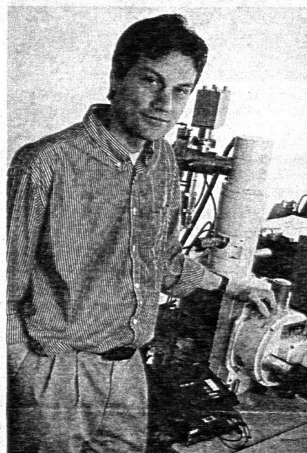
The Postma Lab: From the Very Tiny, Very Great Expectations in the New Frontiers of Science

The College of Science and Mathematics' gleaming new nanoscience experimental laboratory is a dream come true for assistant physics professor Hendrik "Henk" Postma, whose job it was to build from the ground up a state-of-the-art lab to prepare CSUN students for physics' new frontiers.

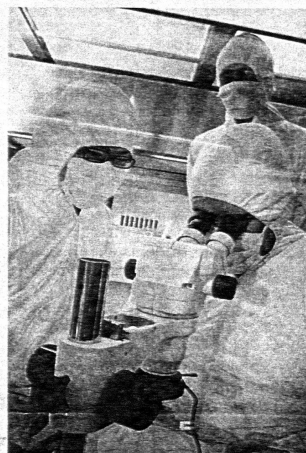
Postma came to Cal State Northridge from the California Institute of Technology expressly for that purpose, and to help CSUN's Physics Department extend its reach into the cutting-edge worlds of experimental nanoscience and nanotechnology.

"CSUN's Physics Department has always been very strong in the theoretical area as well as the experimental, but never in experimental nanoscience, which is what I'm doing," said Postma. "The lab will strengthen that type of research."

Certified in December by Controlled Environmental Regulatory Testing Services (CERTS), the approximately \$300,000 Postma Lab "is the wave of the future," said College of Science



Assistant physics professor Hendrik "Henk" Postma stands next to the Scanning Electron Microscope in the microscopy room of CSUN's new Postma Lab.



Nanoscience students Hankyu Lee (left) and Mike Dickson (at microscope) work together in the Postma Lab's "cleanroom."

and Mathematics Dean Jerry Stinner. "It will add new depth to an already strong department and another dimension to the Cal State Northridge degree in physics."

The lab's interdisciplinary research is dedicated to the investigation of the properties of materials with "intrinsic nanoscale dimensions, such as carbon nanotubes, nanowires, graphene and DNA." The interesting effects of such tiny dimensions, Postma said, are used to derive "novel applications in computation, sensing, and information storage."

One of the problems which the new lab may help solve—in concert with five of Postma's former Cal Tech colleagues—is how to make a hybrid DNA carbon structure, coaxing DNA to wrap around nanotubes—infinitesimal, robust, chemically-resistant tube-like structures—in order to make nanometer-sized circuits using economical self-assembly, rather than arduous and expensive lithographic techniques.

Another dream is to create Nanoscience Lab *continued on page 2.*

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molecular pores out of a solid state material like silicon, so that information in DNA strands passing through the pores can be read and analyzed without the time-consuming task of chopping up strands. If successful, this technique would revolutionize the sequencing of DNA, which is now common practice in research and clinical labs worldwide.

In essence, Postma said, "we're trying to do engineering using biological systems, rather than the other way around."

Located in the basement of Eucalyptus Hall, the lab includes a main laboratory and a microscopy lab, where a highly sensitive Atomic Force Microscope and a Scanning Electron Microscope are housed. A Scanning Tunneling Microscope, the prototype for a required undergraduate physics course, is being built from scratch by graduate student Hankyu Lee.

The main lab features an immaculate "cleanroom" where Postma and students conduct operations requiring the ultimate in pure environments.

In its antechamber is an icy cold shower—for use in the event of spilled chemicals on clothes or skin—and a gowning area in which students don the loose white body suits familiar to science fiction fans.

"The suiting-up process is there to prevent hair and dust from coming off them and contaminating the room or the samples they're

working with," said the professor. Cleanliness, obviously, is the operative word in the Postma Lab. "The kinds of things we do here are very, very small," Postma said, "so even a single dust particle covering any of the devices we make would basically render it useless." An advanced three-stage filtration system helped earn the lab its top "class 1000" rating.

The de-ionized water that comes into the lab "is normally not clean enough for us," said Postma. It must run the gauntlet of three filters before it streams out, purer than pure. "If you have a very clean lab but the water you rinse your surfaces with is not clean, then it's all pointless. You have to be extremely vigilant."

"This is one of the things we offer our students," he said. "They learn how to work in an environment that has to be super clean, which is something that is very counterintuitive. They have to follow procedures with every move they make."

Other imperatives for nanoscience are temperature and humidity control. To maintain humidity at a constant 60 percent—necessary to prevent damage from electrostatic discharge to the lab's ultra-sensitive devices—a self-contained humidity system was installed just for the lab.

Postma's nanoscience students—six graduate students and one undergraduate, mostly physics majors—are urged to be self-motivating. "I tell them, 'This is the dream. How do we get there?'" One student wants

Commerce Department Honors for CSUN



The U.S. Department of Commerce has honored CSUN's College of Business and Economics with a certificate of achievement for its vital role in promoting international trade in the Los Angeles area. Presenting the certificate to accounting and information systems professor Rafi Elfrat (center) is Israel Hernandez, assistant to the U.S. Secretary of Commerce. Joining them at a U.S. Chamber of Commerce meeting is Daniel Blake (left), director of the San Fernando Valley Economic Research Center.

to devise new ways to do solar technology using nanoscience. "I said, 'Go for it.'"

The seven come from diverse backgrounds, some older than the 34-year-old Postma, some new to intensive research. "I think it works well," Postma said. "The students

who come to CSUN from varying backgrounds are very motivated."

A Netherlands native, Postma earned his doctorate at the Delft University of Technology, the country's largest technical university. At Cal Tech, he studied experimental nanoscience as a senior postdoctoral scholar. ■