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New Professor Elected to National Academy of Engineering

Santa Barbara, Calif. -- Noel MacDonald, who joined the College of Engineering at the University of California at Santa Barbara (UCSB) during the winter quarter, has been elected a member of the National Academy of Engineering. MacDonald holds a joint professorial appointment in the departments of Mechanical and Environmental Engineering and of Materials.

"Professor Noel MacDonald is instrumental in the development of the Federal Initiative for Nanotechnology led by the National Science Foundation. This technology is at the molecular scale," said Henry Yang, UCSB Chancellor. "For his contributions to the development of the Scanning Auger Microprobe and Micromachine Micro-Instruments, Noel has just been elected to the prestigious National Academy of Engineering. UCSB is excited and honored to have Noel join our faculty. We are also pleased that Noel will be expected to hold the title of Fred Kavli Chair in MicroElectroMechanical Systems. We are grateful to Mr. Kavli for his generous endowment."

Engineering's Dean Matthew Tirrell noted that with MacDonald's election 14 (out of a total College of Engineering faculty of 110) are members of the National Academy of Engineering. "UCSB is among the top five research institutions in terms of per capita membership in the National Academy of Engineering," said Tirrell. "We knew Noel MacDonald was a world leader in microsystems technology. We were eager to have him join us and are delighted that he has received the well-deserved recognition of election to the National Academy of Engineering."

Two years ago Noel MacDonald took a leave of absence from the Cornell University faculty to direct the Microsystems Technology Office (MTO) at the Defense Advanced Research Projects Agency (DARPA). There 14 program directors decide which research proposals to fund nationally with the office's annual multi-million-dollar research budget. That job gave MacDonald a bird's eye view of high-tech research across America.

Instead of leaving Washington to return to Cornell, where he had directed the Nanofabrication Facility, MacDonald decided to relocate because of "the excellence of the existing nanofabrication, compound semiconductor, fluidics and optics research groups at the UCSB College of Engineering." He also highlights the availability of the on-campus nanofabrication facility.

UCSB is one of the five universities participating in the National Nanofabrication Users Network. The others are Cornell, Howard, Penn State, and Stanford. MacDonald was appointed director of that network in 1996.

Asked what he intends to do at UCSB, he said, "I envision my contribution, along with other faculty and staff, as the creation of a microsystems technology research and teaching program. MacDonald sees microsystems research as a quintessentially interdisciplinary endeavor, best done at a place such as UCSB where interdisciplinary research is a fact of campus life.

He said, "My personal view is that during the next 20 years the really fun things are going to happen at the boundaries of the engineering and science disciplines. UCSB has a culture that supports and nurtures such interdisciplinary research."

The scale of measurement for MicroElectroMechanical Systems (MEMS) is the micrometer, one millionth of a meter. The scale of measurement for nanotechnology is the nanometer, one billionth of a meter. (A meter is equal to 39.37 inches.)

The idea is to use microscopic MEMS to control nanoscale tips, which can be a needle or a probe or micro-tweezers. Think of a MEMS as a hand and its attached nanoscale tips as fingers, which can poke into or push and pull or grasp at the molecular scale.

On the one hand, such a device can enable access to very compactly stored digital data, which in turn means shrinking desktop computers to wristwatch-wearing size. On the other hand, a single MEMS probe can be used to position or assemble molecules on a surface, and the assembly process can be greatly accelerated if a million MEMS probes operate together to assemble molecules.

MacDonald's research has focused on crafting such devices since the mid-'80s when he joined the Cornell faculty as professor of electrical engineering.

Before Cornell he served as director of marketing for Perkin-Elmer's Semiconductor Equipment Group for two years. MacDonald became an employee of Perkin-Elmer because that corporation acquired in 1977 an entrepreneurial business, Physical Electronics Industries Inc., whose development he had assisted as one of four principals beginning in 1970. At Physical Electronics MacDonald developed an electron microscope for analyzing the first few atomic layers of a solid--a Scanning Auger Microscope.

Images

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