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Four Receive Prestigious NSF Award

May 31, 2006 | [by Megan Fellman](#)

EVANSTON, Ill. --- Four faculty members from the Robert R. McCormick School of Engineering and Applied Science at Northwestern University have received Faculty Early Career Development (CAREER) awards from the National Science Foundation.

They are Pablo Durango-Cohen, Bartosz Grzybowski, Hooman Mohseni and Seda Ogrenci Memik.

The CAREER program is a foundation-wide activity that offers the National Science Foundation's most prestigious awards for new faculty members. The CAREER program recognizes and supports the early career-development activities of those teacher-scholars who are most likely to become the academic leaders of the 21st century. CAREER awardees are selected on the basis of creative, career-development plans that effectively integrate research and education within the context of the mission of their institution. The minimum CAREER award size is \$400,000 for a five-year period.

Durango-Cohen, assistant professor of civil and environmental engineering with a joint appointment in the Transportation Center, received a CAREER award for his proposal titled "An Integrated Framework for Infrastructure Management: Exploiting Advanced Inspection Technologies to Support Condition Assessment, Forecasting and Decision-Making."

He will use the award to develop analytical tools to support the management of transportation infrastructure systems. The research is motivated by advances in sensing and communications/information technologies that have resulted in the proliferation of sophisticated instruments to evaluate and measure infrastructure condition and the factors that cause its degradation. In addition, there is a need to address fundamental computational and statistical challenges in order to exploit the abundance and breadth of newly available information. The objective is to improve the process of allocating resources for the preservation and improvement of such complex systems.

In his interdisciplinary research, Grzybowski, assistant professor of chemical and biological engineering, combines elements of inorganic and organic chemistry, physics and materials science to focus on the synthesis of new classes of micro- and nano-structured materials through self-assembly (bottom-up) and self-organization (top-down). In addition to the great practical promise they hold, both the bottom-up and top-down approaches present a range of fundamental questions regarding the nature of spontaneous processes at small scales.

The CAREER award will be used for the “top-down” part of Grzybowski's work. His research group has been able to literally program chemical reactions in space and time such that they progress along predetermined paths to build -- without human intervention -- unique nanostructures and nanodevices. The fundamental aspects of this work focus on how small and reproducible these structures can be made; the practical extensions include new types of optical devices, lab-on-a-chip systems and platforms for screening efficient catalysts and medically active compounds.

Mohseni, assistant professor of electrical engineering and computer science, received the CAREER award for his proposal titled “Avalanche-free Single Photon Detectors Based on Type-II Heterojunctions and Nano-Switches,” which was ranked first out of the 30 proposals in his category.

His research focuses on the realization of novel opto-electronic devices that use electron and photon interactions to reach extremely high performance and functionality.

One example of such devices is a novel single photon detector based on a nano-injector. This research, funded by the CAREER award, is aimed at the realization of the “ultimate light sensor” and will have a significant impact on a wide range of applications including optical tomography, homeland security, non-destructive material inspection, astronomy and quantum cryptography.

Ogrenci Memik, assistant professor of electrical engineering and computer science, broadly addresses automation of the integrated circuit design process in her research. She develops computer-aided design tools and the algorithms driving these tools to sustain the production of next-generation integrated circuits and systems approaching complexities of billion-component levels. Specifically, her work addresses the thermal-aware design paradigm to design chips with controlled heat dissipation for minimizing the effects of excessive temperature levels reached by modern high-performance integrated circuits.

Ogrenci Memik's CAREER award will enable her to develop circuit synthesis techniques as well as analysis and design tools to evaluate, dynamically sense and react to thermal profiles observed on integrated circuits.

Last year's CAREER award recipients were Vicky Kalogera, assistant professor of physics and astronomy; Lincoln Lauhon, assistant professor of materials science and engineering; and James Mahoney, associate professor of sociology and of political science.

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