UDaily
Friday, November 7, 2008

Antoniewicz wins national metabolic engineering award

1:56 p.m., Nov. 7, 2008----Maciek Antoniewicz, University of Delaware assistant professor of chemical engineering, received the Jay Bailey Young Investigator Best Paper Award in Metabolic Engineering at Metabolic Engineering VII: Health and Sustainability, held in mid-September in Puerto Vallarta, Mexico.

Maciek Antoniewicz

The award recognizes outstanding research accomplishments by young researchers who "have advanced the frontiers of metabolic engineering through originality and creativity of experimental or computational concept application."

Antoniewicz's research is aimed at providing a fundamental understanding of the function and regulation of complex biological processes that emerge through the interaction of genes, proteins and metabolites at multiple metabolic and regulatory levels. He was recognized for his development of the Elementary Metabolite Units (EMU) framework, which was reported in the January 2007 issue of *Metabolic Engineering*.

The work also was recently highlighted by Faculty of 1000 Biology, which recognizes important advances in 24 fields ranging from bioinformatics, biochemistry and biotechnology to microbiology, molecular biology and metabolic and endocrine science.

"The EMU method allows us to study biological systems in great detail by drastically reducing the complexity of biological networks without any loss of information," Antoniewicz says. He explains that Metabolic Flux Analysis (MFA) provides a key to understanding cell physiology and regulation of metabolism, but an important limitation of MFA as it is currently carried out is the large number of equations that need to be solved.

"The EMU framework is based on a highly efficient decomposition method that identifies the minimum amount of information needed to simulate the labeling of isotopes within a reaction network using knowledge about the atomic transitions occurring in the network reactions," Antoniewicz explains. He draws on the gluconeogenesis pathway as an example of the efficiency of the approach. Using his framework, analysis of this pathway requires only 354 EMUs, compared to more than 2 million isotopomers, the unit used in the traditional approach.

UDaily is produced by the Office of Communications & Marketing
The Academy Building
105 East Main Street
University of Delaware
Newark, DE 19716 • USA
Phone: (302) 831-2792
email: ud-ocm@udel.edu
www.udel.edu/ocm

"The framework has enabled the dynamics of biological networks to be analyzed in a much more computationally efficient way," Antoniewicz says. "In a recent study, we reconstructed a simplified *E. coli* model and found that application of the EMU-based algorithm to this system led to a 5000-fold reduction in computational time." Others have already applied the algorithm to genome-scale modeling.

"Maciek, who just started his academic career here at UD a little over a year ago, is off to a great start," Norman Wagner, Alvin B. and Julia O. Stiles Professor of Chemical Engineering and chairperson of the Department of Chemical Engineering, says. "His exciting work is already having an impact in the field. Within the first year alone, this one paper was cited by other researchers 20 times."

"This is a very competitive award that is given only once every two years," Terry Papoutsakis, the Eugene du Pont Chair of Chemical Engineering at UD, says, "and Maciek is the second UD chemical engineering faculty member to win it in the past few years. We and the rest of the community expect a lot from him."

Kelvin Lee, Gore Professor of Chemical Engineering and director of the Delaware Biotechnology Institute, was the 2002 recipient of the Bailey award.

Antoniewicz, who was awarded a DuPont Young Professor Grant earlier this year, joined the UD faculty in 2007. He earned bachelor's and master's degrees from Delft University of Technology in the Netherlands and holds a doctorate from the Massachusetts Institute of Technology.

Article by Diane Kukich
Photo by Kathy Atkinson