

SMU Department of Mechanical Engineering

SEMINAR

"Nature's Nanomotors: Billions of Years of Darwinian Engineering"

Dr. Pia Vogel

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Southern Methodist University

Friday, February 25, 2011

3:00 p.m. – 4:00 p.m.

Huitt-Zollars Pavilion

Abstract: Enzymes, Nature's work horses, have evolved to efficiently perform cellular work. Some enzymes carry out chemical reactions, others pump molecules across cellular membranes, and others again perform actual mechanical or physical work, like the proteins that cause our muscles to contract. This seminar will give an overview of some of the proteins that perform actual mechanical work, for example the cellular motor proteins kinesin and myosin. I will then elaborate on two specific enzymes we are studying in our lab. One of them, the multidrug resistance P-glycoprotein, functions as a cellular sump pump and is thought to be root cause for the resistance of some cancers to chemotherapy. The second enzyme, the FoF1-ATP synthase, is an acid-driven power plant that generates almost all of the cellular fuel, ATP, which is produced on this planet. It also is recognized as the most efficient rotary nanomotors known to date.

Bio: Pia D. Vogel joined the Department of Biological Sciences at SMU in 2002. After completing her undergraduate work at the Universität Kaiserslautern, Germany, she received her Diplom in Chemistry, equivalent to a Masters of Sciences, in 1984 and her Doctorate of Natural Sciences (equivalent to Ph.D.) in Biochemistry in 1987 from the same University. Dr. Vogel then joined the State University of New York Medical Center in Syracuse, NY, as a post-doctoral fellow. She worked in the lab of the 1997 Nobel Laureate, Paul D. Boyer, at UCLA as a visiting scientist. Dr. Vogel then returned to the Universität Kaiserslautern, Germany, where she completed the advanced degree of "Habilitation" which provided her with the *venia legendi* in Biochemistry. The Habilitation is required at most European Universities to obtain faculty positions at Associate or Full Professor level. Vogel held a faculty appointment at the Universität Kaiserslautern, where she taught Biochemistry, Molecular Cell Biology, Molecular Biology and Organic Chemistry. Since joining SMU, Dr. Vogel's expertise in teaching and research has centered in Biochemistry and Bio/Nanotechnology. Her research employs state-of-the art biophysical techniques to study the structure and molecular dynamics of enzymes that are metabolically and pharmacologically important. Her work has been published in 35 peer-reviewed papers in top tier journals and she has authored and co-authored four short textbooks on Biochemistry, Biotechnology and Nanotechnology topics that are used for distance education courses in Germany and Europe. Her work has been funded by the *Deutsche Forschungsgemeinschaft*, the American Heart Association and the National Science Foundation. Dr. Vogel was recipient of the Prize for Exceptional Accomplishments from the Kreissparkassen Foundation, Germany. She also holds an Honorary Professor degree from the Shanxi University in Taiyuan, China.