

# Princeton University

HONORS FACULTY MEMBERS  
RECEIVING EMERITUS STATUS



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# STEVEN L. BERNASEK



Professor of Chemistry Steven L. Bernasek will transfer to emeritus status on July 1, 2015, after 40 years on the faculty at Princeton. Throughout his career, his work has focused on studies of the fundamental dynamics of chemical reactions that occur at solid surfaces and interfaces. He has made significant contributions to the understanding of the surface chemistry of transition metal oxides, the dynamics of catalytic reactions on platinum and iron surfaces, the structures and mechanisms of formation of self-assembled monolayers, and the functionalization and modification of the surfaces of electronic device materials.

Steve was born in Kansas and was raised on a farm near Holton, Kansas. His early interest in science, especially chemistry, was encouraged by his parents, who provided “laboratory space” in a shed on the farm, perhaps to reduce the smells emanating from experiments first conducted in the basement of the farmhouse. Steve earned his Bachelor of Science in chemistry at Kansas State University, where he received his first exposure to actual research; he experienced the pleasure of seeing the results of his work in his first publication in the *Journal of the American Chemical Society* while still an undergraduate. He went on to earn his Ph.D. in physical chemistry at the University of California–Berkeley in the laboratory of Gabor Somorjai. His work there exposed him to the excitement and complexities of studying surface chemistry, which formed the basis for his long research career at Princeton.

Steve joined the faculty as an assistant professor of chemistry in July 1975, after completing his dissertation earlier that year and a brief postdoctoral stint at the Lawrence Berkeley National Laboratory. He was promoted through the ranks, becoming professor of chemistry in 1986. His work over the years has addressed fundamental questions of the structure and reactivity of surfaces. He was among the first to use the tools of gas phase reaction dynamics, such as molecular beam

scattering and detailed molecular spectroscopic characterization, to learn about the dynamics of reactions involving surfaces. His early study of N atom recombination on iron surfaces showed evidence of significant vibrational excitation of the nitrogen molecules produced, which opened up the fields of state-resolved and state-specific studies of surface reaction processes.

Steve's work at Princeton over the years has been highly collaborative. A long-standing project with colleague Jeffrey Schwartz examined the organometallic chemistry of oxide surface modification and of interfaces important in electronic device construction, and has resulted in joint mentorship of over 20 Ph.D. students. This work led to publication of several highly cited articles detailing the surface chemistry of indium tin oxide (ITO) and methods for controlling the electronic properties of this important transparent electrode material. Collaborations with colleagues Giacinto Scoles and Andrew Bocarsly are also characteristic of his research work. During his time at Princeton, Steve mentored over 50 Ph.D. students, 25 senior thesis students, and 35 postdoctoral associates.

Steve has also provided extensive service to the scientific community through his work with the National Science Foundation. He served as a visiting scientist at the foundation's office in Washington for the academic year 1991–92, during which he managed the research portfolio in analytical and surface chemistry. He continued to manage this program for the NSF as an off-site, part-time program officer until 2007; he returned to the foundation in the fall term of 2014 as interim division director in the chemistry division. This work expanded his interests and pushed him to think outside of the more narrow focus of his own research, which has benefited the careers of several young researchers who got their starts with first awards from the programs he managed.

Steve taught a number of different courses during his time at Princeton, ranging from first-year chemistry courses through advanced undergraduate laboratories, and from physical chemistry courses to the graduate kinetics course. He has especially enjoyed teaching honors freshman chemistry, fondly referred to as Turbo-Chem, to groups of very enthusiastic first-year students. He has been an academic adviser in Rockefeller College for over 25 years, has served several terms as

director of graduate studies in chemistry, was associate chair of the chemistry department for 10 years, and served a brief term as interim chair of the department. He has also been an active member of the Princeton Environmental Institute and the Princeton Institute for the Science and Technology of Materials.

Steve was awarded the American Chemical Society (ACS) ExxonMobil Award in Solid State Chemistry and the ACS Arthur W. Adamson Award for Distinguished Service in the Advancement of Surface Chemistry. He is an elected fellow of the American Association for the Advancement of Science and a fellow of the American Vacuum Society. Steve served as a visiting professor in the Department of Chemistry at the National University of Singapore (NUS) several times over his career, and he has had a long-standing collaboration with researchers there on the molecular modification of semiconductor surfaces.

On his retirement from Princeton, Steve will become the director of the science division of Yale-NUS College. Founded by Yale and the National University of Singapore, this is a new liberal arts college that is adjacent to the NUS campus; it will allow Steve to continue and expand his interactions with his colleagues in that country.