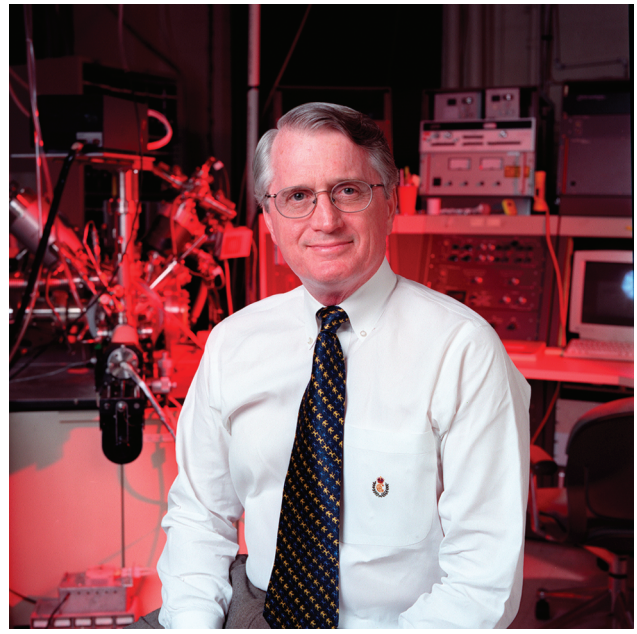

Preface to the Festschrift in Honor of Professor D. Wayne Goodman

It is with great pleasure that we dedicate this issue of *The Journal of Physical Chemistry C* to Professor D. Wayne Goodman in honor of his 65th birthday. The collection of articles provided in this issue recognizes his many contributions in the areas of surface science and catalysis, and includes articles from many of Wayne's students, postdoctoral associates, collaborators, and friends.

D. Wayne Goodman was born in Glen Allen, Mississippi, on December 14, 1945. As a young boy he was in love with football, airplanes and, as a proper southern "gentleman", good storytelling. Wayne eventually "saw the light" (metaphysically at least) and decided to stake his future on a career in science, to "wrestle Mother Nature's secrets from an unwilling keeper of physical laws". Wayne attended Mississippi College in Clinton, Mississippi, where he got a B.S. in Chemistry with Honors in 1968, and perhaps inspired by the changing social climate of the times, moved to the much more cosmopolitan city of Austin, in the big state of Texas, to do graduate work in physical chemistry at the University of Texas.

In Austin, Wayne performed thesis work under the supervision of M. J. S. Dewar involving the measurement and analysis of the photoelectron spectra of inorganic molecules. These were exciting interdisciplinary studies that involved a strong collaboration with A. H. Cowley and touched on a number of important areas in physical and inorganic chemistry. The new capabilities of photoelectron spectroscopy to study the electronic properties of molecules were just being tested and were being complemented with newly developing quantum-chemical methods based on molecular-orbital theory. Wayne's thesis examined the correlation between bonding and molecular structure in phosphines and arsines. The research papers of Cowley, Dewar, and Goodman (named in alphabetical order) in this field had a significant scientific impact and are still regularly cited, more than 35 years after their first appearance in the literature. Wayne's multiple endeavors in Austin were rewarded with a Ph.D. degree, 10 published papers, a set of memorable anecdotes about his interactions with M. J. S. Dewar (i.e., more "grist" for future storytelling), a license to pilot good (and bad) airplanes and, by far the "best of all things", his wife Sandy. Our man, now Dr. Goodman, was ready to take on the world.

In 1975, going with the disco spirit of the times, Wayne decided to "dance" into a new hot area of research: surface science. In the context of the oil embargo and energy crisis of the mid-70s, catalysis was recognized as an essential tool for the search of new fuels and new sources of energy, and surface science was beginning to provide the basic principles for a more science-based, rational design of catalysts. Wayne won a NATO fellowship and became an NRC Research Fellow at the National Bureau of Standards (NBS, now NIST) in Washington, DC., where he worked under the supervision of two pioneers in the field of surface science, Ted Madey and John Yates. Wayne followed what is now a common path for training in surface science: studying the chemisorption of simple molecules (e.g., CO, H_2, and methanol) on metals. Subsequently, with Madey, Yates, and Richard Kelley, Wayne produced landmark publications on the molecular-level characterization of the metal-catalyzed CO methanation reaction. Using well-defined single-crystal Ni and Ru model catalysts and a novel "high" pressure catalytic reactor coupled to a traditional surface-science ultrahigh vacuum (UHV) chamber, Wayne provided conclusive evidence that CO methanation is a structure-insensitive reaction. Equally significant was his identification of an adsorbed layer of "carbidic" carbon, generated by the disproportionation of CO, as controlling the kinetics of the reaction on metals. Wayne's work at NBS also provided some of the first indications of the importance of surface modifiers in heterogeneous catalysis. Upon completion of his NRC fellowship, Wayne was hired to the staff at NBS by John and Ted to introduce some molecular-

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orbital thinking into the NBS surface chemistry. This grand idea was never realized, as Wayne's selected direction of research was kinetics on single-crystal catalyst surfaces; NBS never got a single orbital out of his work there!

Wayne's scientific career took off in the 1980s; these were highly productive years that established him as a leading figure in surface science and heterogeneous catalysis. After moving to Sandia National Laboratories, he launched a research program to investigate the effects of electronegative (S, N, O) and electropositive (K, Cs) adatoms on the chemical and catalytic properties of metal surfaces. His data identified the "long-range" effects exerted by some surface modifiers, giving new perspectives on phenomena associated with poisoning and promotion of catalytic reactions and generating many exciting and entertaining discussions at scientific meetings about the definition of "long" in this context. Wayne also developed a research effort focused on better understanding the surface chemistry of alkane hydrogenolysis, cyclohexane dehydrogenation, methanol synthesis, CO oxidation, and NO reduction. This was made possible by Wayne's new advances in the design of novel instrumentation combining high-pressure reactors with UHV chambers for surface characterization. His fundamental studies continued to explore links between surface structure and surface reactivity, and helped establish an approach followed by many research groups in subsequent years. By the mid-80s, Wayne was flying high in his scientific career (as well as in the skies).

Wayne accepted an offer of a faculty position in the Department of Chemistry at Texas A&M University in 1988, and has been at College Station ever since, facing increasingly more challenging problems in catalysis and learning the secrets and implications of being an Aggie (such as having to erase all his favorite Aggie jokes from his storytelling memory). As they say in Austin: Nothing is impossible for a man from UT. The academic environment of Texas A&M also added a new dimension to Wayne's life, the joy of teaching general chemistry to undergraduates. "Professor" Goodman applied his drive for excellence to teaching with outstanding results, and his lectures quickly became very popular among the students.

Within a few short years of his arrival to Texas A&M, Wayne was also able to set up one of the best laboratories for surface-science studies in the United States. In the early 1990s, following on work that was initiated at Sandia, his group performed systematic studies of the physical and chemical properties of bimetallic surfaces and strained metal overlayers. Clear correlations were found between the electronic perturbations induced by bimetallic bonding and variations in the chemical and catalytic activity of the constituent metals. After making a significant impact in this area, Wayne shifted his attention to the chemistry of oxide surfaces and the interaction of metal particles with oxide supports. His group developed key models of metal/oxide interfaces for imaging (and imagining) the structure of supported heterogeneous catalysts. In the late 1990s, his studies on the chemical activation of supported Au nanoparticles received wide recognition and led to the publication of many papers, a significant number of citations, and numerous invited lectures all over the world. More recently, he has performed elegant kinetic and spectroscopic studies on the synthesis of vinyl acetate over metal alloys and has unraveled key phenomena for the preparation of oxygenates. Finally, within the last couple of years, Wayne has revisited his early interest in CO oxidation on metals and has re-examined the possible role of oxide films in this catalytic reaction. In so doing, he is once again at the center of many lively discussions in the literature and at scientific meetings. Wayne is still very active in teaching and research, and his scientific career continues to soar.

Wayne Goodman has published over 500 papers in surface science and heterogeneous catalysis. His work in these areas over the last 30 years has helped to transform catalysis from a primarily applications-oriented discipline to a highly sophisticated scientific enterprise. For these scientific accomplishments, Wayne has received many awards and honors. From the American Chemical Society, he received the Ipatieff Prize in catalysis (1983), the Kendall Award in Colloid and Surface Chemistry (1993), the Arthur W. Adamson Award for Distinguished Service in Advancement of Surface Chemistry (2002), and the Gabor A. Somorjai Award for Creative Research in Catalysis (2005). Wayne was a Robert Burwell Lecturer for the North American Catalysis Society (1997) and has been elected fellow of the Royal Society of Chemistry, the Institute of Physics, and the American Vacuum Society. He has served as an Associate Editor of the *Journal of Catalysis*, and as a member of the Editorial Boards of *Surface Science*, *Applied Surface Science*, *Langmuir*, *Catalysis Letters*, *Journal of Molecular Catalysis A*, *Chemical Physics Letters*, and the *Journal of Physics: Condensed Matter.*

It is a great honor for us to be counted among the friends and collaborators of Prof. D. Wayne Goodman. His infectious enthusiasm for science and his offbeat sense of humor have brightened and enriched our lives. After working with Wayne and also experiencing his human side—being "gently" prodded to reach deeper scientifically, listening to his stories, and internalizing his insights (sometimes related to the stories, sometimes not)—who would not want to "become a hero" in surface science? It is with great pleasure that we dedicate this special issue of the *Journal of Physical Chemistry* to Professor D. Wayne Goodman on the occasion of his 65th birthday.

Michael A. Henderson

Charles H. F. (Chuck) Peden

Jose A. Rodriguez

Janos Szanyi

John T. Yates Jr.

Francisco Zaera

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