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Preface to the Charles B. Harris Festschrift

On April 23rd, 2005, a group of former students, postdoctoral associates, colleagues, and friends gathered at the University of California, Berkeley, to celebrate the 65th birthday of Professor Charles B. Harris and honor his many and varied accomplishments as an inspirational visionary, Renaissance man, and progenitor of outstanding scientists. Charles's long and distinguished career is marked by many significant contributions to the field of physical chemistry, particularly to surface science and solution chemical reaction dynamics. He is a respected leader in scientific research and an extraordinary role model as educator, mentor, and administrator.

In the 1970s, Charles's early scientific achievements included the development of the techniques of Phosphorescence Microwave Double Resonance Spectroscopy (PMDR) and zero-field Optically Detected Magnetic Resonance (ODMR), which were used by a large number of research groups as the primary tools for studying properties of molecules and solids in excited triplet electronic states. The discovery and measurement of energy transfer in solids by a coherent propagating wave packet provided the basis for a unified view of energy transfer in ordered solids.

Another highlight of his work in the 1970s is the pioneering theoretical study of the effects of coupling the electron spins in excited triplet states with intense coherent microwave radiation. This discovery led to the development of new experimental methods that allowed multiple pulsed techniques common to NMR to be applied to excited molecular states with unprecedented sensitivity. These new methods have since been applied to a wide variety of problems in solid-state physics and chemistry. Charles was the first to apply nuclear spin dynamics theories (exchange theory) to the dynamics of vibrational energy exchange in condensed phase, which successfully explained spontaneous Raman scattering line shapes. These theories were subsequently adopted by others to understand the dynamic effects of vibrational energy transfer in a variety of other problems.

In the 1980s, Charles's research group conducted the first detailed studies of electronic energy transfer to metal surfaces under ultrahigh vacuum (UHV) conditions, and the results have led to a unified view of energy transfer to metal surfaces. In addition, it was discovered that certain metal surfaces can enhance the incident electromagnetic radiation by 4 to 6 orders of magnitude. This discovery has important implications in electronic materials for emerging technologies. Around the same time period, Charles's lab was the first to combine theory, computer simulations, and ultrafast pump−probe experiments to study chemical processes in liquids, including caging dynamics, microscopic friction, chemical bond activation, and vibrational relaxation of small as well as large polyatomic molecules including organometallic reactions.

Since the early 1990s, Charles and his students have obtained an extraordinary new view of the electronic properties of interfaces by looking at a single electron interacting with individual layers of molecules deposited on metal and semiconductor surfaces. These experiments offer a novel method for determining the electronic and molecular structure of an

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interface as well as for studying thin film growth, surface phase transitions, and charge localization. These studies have provided fundamental new insights into the physics and chemistry of interfaces and may have significant implications for surface science, molecular electronics, and materials engineering.

Charles coauthored more than 200 publications and has been invited to deliver more than 200 presentations of his research. Since joining the University of California, Berkeley, Charles has mentored more than 70 undergraduate students, graduate students, and postdoctoral researchers. A remarkable number of these students and postdocs have gone on to exciting careers as leaders in the academic and corporate research communities; what better testimony could there be to Charles's skills as a mentor to young scientists?

We would like to thank all the people who have made this project possible, especially the authors who have contributed to this special issue. We are particularly grateful to Vijaya Narasimhan, Charles's administrative assistant, Jennifer Shanoski, a former graduate student in Charles's group, and Meghan O'Hare, editorial assistant to Jin Zhang, for their help in organizing and facilitating this celebration of Charles Harris's accomplishments.

We are honored to bring you this special issue of The Journal of Physical Chemistry B in honor of Professor Charles B. Harris of the University of California Berkeley on the happy occasion of Charles's 65th birthday. We hope that you will enjoy this tribute to an outstanding scholar and educator.

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