

## John T. Yates, Jr. 1935–2015

### Pioneer of Modern Surface Science

John T. Yates, Jr., Professor of Chemistry at the University of Virginia, member of the US National Academy of Sciences, and a pioneer of modern surface science passed away on September 26, 2015. He will be badly missed not only by the surface science community, but by the scientific community at large.

Born in Winchester, Virginia, on August 3, 1935, Yates went to undergraduate school at Juniata College in Huntingdon, Pennsylvania, and received his BS degree in chemistry in 1956, and his PhD in physical chemistry from the Massachusetts Institute of Technology in 1960 under the guidance of Professor Carl W. Garland. After serving for three years as assistant professor at Antioch College in Yellow Springs, he joined the National Bureau of Standards, Gaithersburg (now the National Institute of Standards and Technology). During his time in Gaithersburg (1965–1982), he was a Senior Visiting Scholar at the University of East Anglia, Norwich (1970–1971), and Sherman Fairchild Distinguished Scholar at the California Institute of Technology (1977–1978). He joined the University of Pittsburgh in 1982 as the inaugural R. K. Mellon Professor of Chemistry, and as the Founding Director of the University of Pittsburgh Surface Science Center. In 1994, he received a joint appointment in the Department of Physics. In 2006, he retired from the University of Pittsburgh and moved to the University of Virginia as professor and Shannon Research Fellow.

Throughout his spectacular career, Yates' research encompassed the fields of surface chemistry and physics, with specific focus on the structure and spectroscopy of surface species, the dynamics of surface processes, and the development of new methods for research in surface chemistry with a particular emphasis on desorption by electronic transition. In this area, his name will forever be connected with the technique of ESDIAD (electron-stimulated desorption ion angular distribution) developed by him and his colleague Theodore Madey. This novel technique enables determination of the direction of chemical bonds in molecules adsorbed on single crystal surfaces. It is based on a Coulomb explosion within a chemical bond by electronic excitation leading to ejection of an ionic fragment, and thus provides information about the structure and motion of the probed adsorbed species.

Apart from further detailed studies of adsorbed molecules by infrared spectroscopy and thermal desorption, Yates extended his interests in more recent years to photochemistry on semiconductor surfaces, in particular  $\text{TiO}_2$ . This material exhibits the ability to convert photon energy into chemical energy, which activates adsorbed molecules. This process occurs through the production of electron–hole pairs followed by charge transfer to adsorbed species.  $\text{TiO}_2$  activated in this way is a widely used photocatalyst which may also be applied in environmental chemistry. In this context, Yates combined his professional activities with one of his hobbies: astronomy. His last lecture in Berlin in December 2013 was entitled “Photochemical Processes on  $\text{TiO}_2$  Semiconductor Surfaces and in Astronomical Ices in Deep Space”. He often proudly showed his photographs of stars taken in Virginia.

Yates was an exceptional scientist and a gifted communicator. His book *Experimental Innovations in Surface Science* with hand-drawn sketches, which he collected from researchers around the world, was a revelation for many. Yates published more than 750 scientific papers on surface chemistry and physics, and he is among the 100 most-cited chemists in the world. His professional accomplishments have been recognized by many prestigious awards and honors, including a Humboldt Research Award in Marburg in 1994, and the Gerhard Ertl Lecture in Berlin in 2013. Yates was a kind, patient, trusted, and generous mentor and advisor to many students, postdocs, and collaborators with whom he interacted. He was an inspirational undergraduate and graduate teacher. His innumerable lectures at conferences are legendary, and remembered by anyone who ever attended.

Yates was an outstanding scientific citizen who actively served learned societies, academies, and funding bodies, and was also engaged in evaluation procedures and conference organization.

John is survived by Kerin, his wife, his two sons, and six grandchildren. We will keep his memory alive, both within and beyond the German surface-science community.

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