ASU School of Molecular Sciences
Arizona State University

SMS Fall 2024 Eyring Lecture Seminar

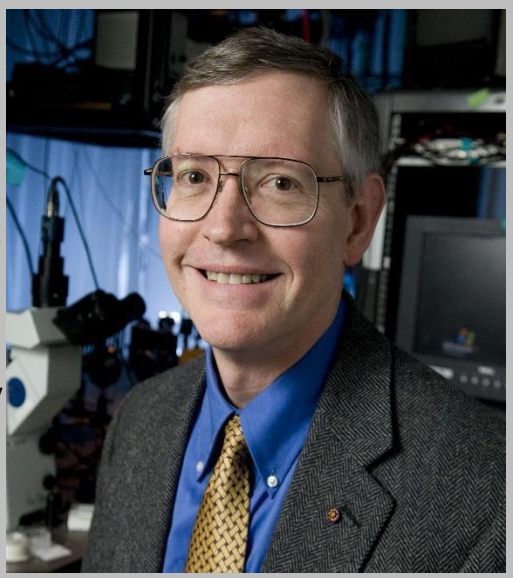
October 24, 2024 | 6pm | Carson Ballroom

"What Is a Single Molecule, and What Can You Do With It?"

A single molecule is ridiculously tiny, about 1 nanometer, roughly 100,000 times smaller than the diameter of a human hair. Yet individual molecules rule the nanoscale activity and structure in our cells and in many nanoscale materials. Thirty-five years ago, single molecules were first detected optically, but how was this done, and how do we really detect a single molecule today, and even more importantly, what good is it? It is an amazing fact that you can even detect the light from single molecules with your own eyes. When a new regime of science is breached, surprises often occur: single molecules show amazing dynamics, blink on and off, and can be controlled by light. Far from being only an esoteric effect, these "switching properties" of molecules can now be used to obtain "super-resolution" to see the tiny nanoscale structures inside cells. Essentially, with tiny single-molecule light sources decorating a structure, the on/off process is used to light up only subsets at a time. A pointillist display then reveals the hidden nanometer-scale structure, opening up a new frontier for understanding and applications. This makes it possible to more fully believe Yogi Berra when he said, "You can observe a lot by just watching!" Even the key RNA molecules of a coronavirus infection look like galaxies inside infected cells.

W.E. (William E.) Moerner, PhD

Harry S. Mosher Professor and Professor
Stanford University
Departments of Chemistry and Applied Physics



W. E. (William Esco) Moerner, the Harry S. Mosher Professor of Chemistry and Professor by courtesy of Applied Physics, has conducted research in physical chemistry, biophysics, and the optical properties of single molecules, and is actively involved in the development of 2D and 3D super-resolution imaging for cell biology. Imaging studies include protein superstructures in bacteria, structure of proteins in cells, studies of chromatin organization, and dynamics of regulatory proteins in the primary cilium.

He attended Washington University as a Langsdorf Engineering Fellow, graduating in 1975 with degrees in Physics and Electrical Engineering (both B.S. with top honors), and Mathematics (A.B. summa cum laude). His doctoral research in physics at Cornell University (M.S. 1978, Ph.D. 1982) employed tunable infrared lasers to explore infrared vibrational modes of impurities in crystals. Professor Moerner's scientific contributions were recognized with the 2014 Nobel Prize in Chemistry "for the development of super-resolved fluorescence microscopy." Among many other honors and awards, Professor Moerner was elected fellow of the American Physical Society, Optical Society of America, American Association for the Advancement of Science, American Academy of Arts and Sciences; and member of the National Academy of Sciences.

*ZOOM Available: https://asu.zoom.us/j/89257678447