James L. Skinner

University of Chicago
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James L. Skinner received his Bachelor of Arts (Chemistry and Physics) from the University of California, Santa Cruz, and his Master of Arts (Physics) and Ph.D. (Chemical Physics) from Harvard University. He was then an NSF postdoctoral fellow at Stanford University. He joined the faculty of Columbia University in 1981, where he was promoted to Professor in 1986. He then moved to the University of Wisconsin as the Director of the Theoretical Chemistry Institute and Joseph O. Hirschfelder Professor of Chemistry in 1990. In 2017 he joined the faculty of the Institute for Molecular Engineering at the University of Chicago, where he is the Crown Family Professor, Deputy Director for Faculty Affairs, and Director of the Water Research Initiative. A few of his many fellowships, honors, and awards include a Guggenheim fellowship (1993), the University of Wisconsin Chancellor's Distinguished Teaching Award (2003), membership in the American Academy of Arts and Sciences (2006), the American Chemical Society Irving Langmuir Award in Chemical Physics (2012), and membership in the National Academy of Sciences (2012). He is also a Deputy Editor of the Journal of Chemical Physics, and the current President of the Telluride Science Research Center. Skinner has over 200 publications in refereed journals and has presented over 300 invited lectures at conferences, universities, and research laboratories. Theoretical spectroscopy of condensed phases, non-equilibrium statistical mechanics, and structure, dynamics, and thermodynamics of liquid and solid water are among his many research interests.

Introduction: Water: Science and Technology

Water plays a crucial role in our lives, our atmosphere and oceans, in biology, and in future technologies for solving global problems. This conference will cover both basic science of water and emerging technologies. It is divided into four sessions, the first of which is on water clusters and interfaces. We can learn much about the interactions in water from clusters, and interfacial water plays the most important role in many circumstances from aerosols to biomolecule hydration.

The second session is on dynamics and spectroscopy of water. As in most systems, the dynamics of water is just as important as the structure, and spectroscopy can help us understand the dynamics, from pure water, to water around ions, other solutes, membranes, etc.

The third session involves metastable water. That is, at a given temperature and pressure, much of the water on earth is not in one of its equilibrium thermodynamic states; rather it is in one of its metastable states, from supercooled water to amorphous ices. The exploration of the metastable phase diagram, as well as of nucleation rates to the equilibrium states, can provide further valuable information about the thermodynamics of the stable states, and also help us understand non-equilibrium processes in the natural environment.

The fourth session is about water technology. We have many pressing global problems involving water, from water availability and treatment for personal use and agriculture, to the need for carbon-neutral energy sources. Speakers in this session will discuss water-related catalysis for solar fuels, and separation science.