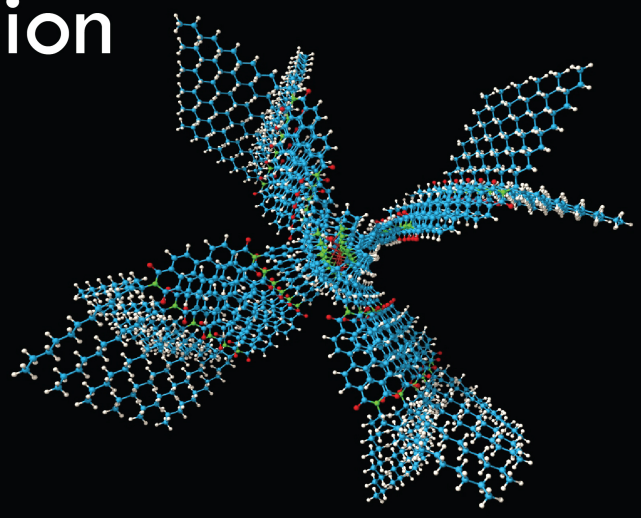
Michael R. Wasielewski

Molecules to Materials: Functional Structures for Solar Energy Conversion



Systems for light-driven fuels and electricity production must be robust assemblies that collect light energy, separate charge, and transport charge to catalysts or electrodes. The primary goal of our research in this field is to understand the fundamental principles needed to carry out these functions within an integrated system. These principles include how to promote and control: 1) energy capture, light-driven charge separation, and long-range directional charge transport; 2) coupling of charges to multi-electron catalysts for fuel synthesis and electrodes for charge collection; and 3) self-assembly of molecular into materials for scalable, low-cost processing from the nanoscale to the macroscale. The central scientific challenge is to develop small, functional building blocks, which also have the appropriate molecules recognition properties to facilitate self-assembly of a functional solar energy conversion system.

Michael R. Wasielewski is the Clare Hamilton Hall Professor of Chemistry at Northwestern University; Executive Director of the Institute for Sustainability and Energy at Northwestern; Director of the Argonne-Northwestern Solar Energy Research Center, a U.S.-DOE Energy Frontier Research Center; and Executive Director of the Solar Fuels Institute, a global consortium of energy research centers. He received his Ph.D. from the University of Chicago and was a postdoctoral fellow at Columbia University. He began his career at Argonne National Laboratory, and advanced to Senior Scientist and Group Leader. In 1994, he joined the faculty of Northwestern University. His research has resulted in over 480 publications and focuses on light-driven processes in molecules and materials, artificial photosynthesis, molecular electronics, and spintronics. Among his recent awards are the 2013 Royal Society of Chemistry Environment Prize, the 2013 Humboldt Research Award, the 2012 Arthur C. Cope Scholar Award of the American Chemical Society, and the 2008 Porter Medal for Photochemistry.

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