

The University of Texas at San Antonio

# UTSA Physics and Astronomy

***Friday, March 1, 2024 at 11:00 AM, AET 0.204***

## ***From Photons to Chemical Bonds***

***Dr. Prashant K. Jain***

*University of Illinois at Urbana-Champaign*

The interaction of light with molecules can be used to access new modes of chemical reactivity; however, this interaction is often difficult to use universally. I will describe how plasmonics turns out to be a general strategy for interacting photons with molecules and activating chemical transformations. This strategy involves the use of heterogeneous catalysts consisting of plasmonic nanoparticles. Plasmonic excitation of the catalyst generates electronically and vibrationally excited states that alter the chemical activity at the interface and even induce the very activity. I will describe how catalysts based on plasmonic nanoparticles enable the use of light as a redox equivalent in chemical reactions to drive non-equilibrium chemical processes, modify product selectivity, photosynthesize fuels, and boost electrochemical transformations. The ultimate vision is a future in which plasmonic excitations can enable or direct chemical transformations with bond-level precision.



**Bio:** Prashant K. Jain earned his PhD in physical chemistry working with M. A. El-Sayed at Georgia Tech. He then became a postdoctoral fellow at Harvard University. After a Miller Fellowship at UC Berkeley, he joined the University of Illinois Urbana-Champaign faculty, where he is the G. L. Clark Professor of Physical Chemistry, a Professor in the Department of Chemistry, and a Professor in the Materials Research Laboratory. He is also a University Scholar and an Affiliate Faculty Member of Physics and the Illinois Quantum Information Science and Technology (IQUIST).

Prof Jain's lab studies nanoscale light-matter interactions and energy conversion. He has published over 115 papers, cited over 32,000 times. His work has been recognized by the Presidential Early Career Award in Science and Engineering, a Guggenheim Fellowship, the Leo Hendrik Baekeland Award, the ACS Kavli Emerging Leader in Chemistry Award, the ACS Akron Award, the ACS Unilever Award, the Beilby medal, the Sloan Fellowship, the NSF CAREER Award, and also selection as MIT TR35 inventor and Beckman Young Investigator. Prashant is a Fellow of the American Physical Society, a Fellow of the Royal Society of Chemistry, a Fellow of the American Association for the Advancement of Science (AAAS), and a Kavli Fellow of the National Academy of Sciences.

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