Steven G. Louie receives 2015 Materials Theory Award

The Materials Research Society (MRS) has named Steven G. Louie of the University of California–Berkeley, as the recipient for the 2015 Materials Theory Award "for his seminal contributions to the development of *ab initio* methods for and the elucidation of many-electron effects in electronic excitations and optical properties of solids and nanostructures." Louie will be recognized at the 2015 MRS Fall Meeting in Boston. The Materials Theory Award, endowed by Toh-Ming Lu and Gwo-Ching Wang, "recognizes exceptional advances made by materials theory to the fundamental understanding of the structure and behavior of materials."

Louie has advanced the frontiers of multiple fields across materials research by developing new concepts, pioneering critical theoretical and computational methods, predicting new properties and materials, providing insights to novel phenomena, and fostering interactions between theory and experiment.

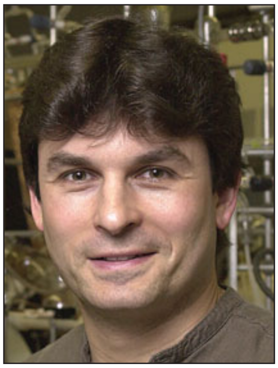
He developed central theoretical ideas and also invested effort to implement and code them into computational software packages, which are now in widespread use, and are essential in explaining as well as predicting the behavior of broad classes of real materials. He applied these methods to a wide variety of important examples, coming up with bold predictions that were later confirmed experimentally, and powerful insights that advanced understanding of the fundamental behaviors of novel and complex solids and nanostructures, enabling exploration of new directions and applications.

Louie is the founder and acknowledged leader of the field of first-principles study of excited-state properties of materials. In 1985, he with student Hybertsen developed a method (based on the GW approximation of many-body theory) that allowed computation of electron excitation (quasiparticle) energies in real materials, including many-electron effects *ab initio* (i.e., without adjustable parameters or empirical input). This breakthrough solved a central problem (the bandgap problem) in electronic structure theory and created a field with a worldwide following, complementing that of density functional theory (DFT) for ground-state properties. In 1998, he with postdoc Rohlfing included electron–hole interactions to his approach, allowing the first *ab initio* calculation of optical properties and phenomena such as photo-induced structural changes.

In addition to these seminal contributions, Louie continues to make important fundamental contributions to many systems of condensed matter and nanoscience with the *ab initio* techniques he pioneered.

Among his many honors, Louie is an elected member of the National Academy of Sciences (2005), the American Academy of Arts & Sciences (2009), and an academician of the Academia Sinica of Taiwan (2008). He is also a Fellow of the American Physical Society (1985), the American Association for the Advancement of Science (2006), and an inaugural Simons Foundation Fellow in Theoretical Physics (2012).

Louie is identified by the ISI Web of Science as one of the most highly cited researchers in physics and nanoscience, with over 50,000 citations. He has trained generations of outstanding students and postdoctoral researchers. Many of them are now leading scientists in Europe, America, and Asia.



Richard B. Kaner selected as MRS Medalist for synthesizing methods

Richard B. Kaner, Department of Chemistry, University of California–Los Angeles, has received the 2015 Materials Research Society (MRS) Medal. He is cited "for the discovery of efficient methods to synthesize water dispersible conducting polymer nanofibers and their applications in sensors, actuators, molecular memory devices, catalysis, and the novel process of flash welding." Kaner will be recognized during the award ceremony at the 2015 MRS Fall Meeting in Boston.

Kaner's most important breakthrough came just 10 years ago while he was trying to develop a method to create high-surface-area polyaniline for use in sensors. He and his students developed an interfacial polymerization technique analogous to that used to produce nylon. However, while in the nylon reaction, the

https://doi.org/10.1557/mrs.2015.248 Published online by Cambridge University Press

polymer remains at the interface between aqueous and organic phases. Kaner demonstrated that when polyaniline forms at the interface between an organic phase containing aniline and an aqueous phase containing oxidant and acid, the doped polyaniline created is hydrophilic and immediately goes into the aqueous phase. This results in nanofibrillar morphology with high surface area and excellent sensing properties. Nanostructured conducting polymers can now be made in a simple, easily reproducible process with inexpensive reagents.

Kaner then showed that by changing the acid used, polyaniline nanofibers could be made in different average diameters ranging from 30 nm to 120 nm. Next, he reported an even simpler synthetic route to conducting polymer nanofibers called rapid mixing. He demonstrated that nanofibers are stable indefinitely in water simply by controlling the pH and salt concentration. With this discovery, Kaner created stable water-based dispersions of pure polyaniline (i.e., polyaniline paints and inks that contain no surfactants).

Kaner started a company, Fibron Technologies, Inc., that demonstrated the efficient synthesis of conducting polymer nanofibers at the 100 L scale. These advances have now been taken over by Water Planet Engineering, which is developing advanced membranes for important separations such as cleaning up the oily water left after hydraulic fracturing ("fracking") to recover oil. Future advances in processable conducting polymers developed by Kaner are anticipated to find applications in many products, including sensors, catalysts, and electronic devices.

Kaner has been recognized as a Distinguished Professor of Chemistry, University of California–Los Angeles (UCLA) (2012), Distinguished Professor of Materials Science and Engineering, UCLA (2012), has received the American Chemical Society Award in the Chemistry of Materials (2012), and is a Fellow of MRS (2011).

Chad A. Mirkin of Northwestern University to give plenary address at 2015 MRS Fall Meeting

Chad A. Mirkin, Director of the International Institute for Nanotechnology and the George B. Rathmann Professor of Chemistry, will give the plenary talk, "Programmable Materials and the Nature of the DNA Bond," at the 2015 Materials Research Society (MRS) Fall Meeting in Boston.

Mirkin's group has shown that when densely functionalized to the surface of a nanoparticle, nucleic acids arrange into a conformal shell that can be used to reliably control the spacing and symmetry of nanoparticle interactions. By elucidating a series of design rules for the nature of DNA bonds, they have assembled over 30 unique nanoparticle superlattices with precise control over particle size, interparticle spacing, and crystal symmetry. Overall, the unique properties of the DNA bond facilitate unprecedented opportunities to study atomic crystallization and energy transfer between nanostructures, and have already shown promise in plasmonic, photonic, and catalytic applications.

Mirkin is a chemist and a nanoscience expert, who is known for his discovery and development of spherical nucleic acids (SNAs) and SNA-based biodetection and therapeutic schemes, the invention of dip-pen nanolithography and related cantilever-free nanopatterning methodologies, On-Wire Lithography (OWL), coaxial lithography, and contributions to supramolecular chemistry and nanoparticle synthesis. He is the author of over 600 manuscripts and over 900 patent applications worldwide, and is the founder of multiple companies.

Mirkin is a member of the President's Council of Advisors on Science and Technology (Obama administration), and the only chemist to be elected to all three US National Academies (Institute of Medicine, National Academy of Sciences, and National Academy of Engineering). He is also a Fellow of the American Academy of Arts & Sciences, the American Association for the Advancement of Science, and MRS. □

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