Long-Qing Chen receives 2014 Materials Theory Award

The Materials Research Society (MRS) has named Long-Qing Chen of The Pennsylvania State University (Penn State) as the recipient for the 2014 Materials Theory Award for "his pioneering work in the development of the phase-field method and its applications in the computational modeling of mesoscale structures and their dynamics in inhomogeneous materials." Chen will be recognized at the 2014 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 understanding of the structure and behavior of materials."

With a multidisciplinary background in such fields as the phase transformation in metal and ceramic materials; the thermodynamics, kinetics, micromechanics, electro- and magnetostatics of materials; and applied mathematics as well as an extended experience in computational modeling, Chen is able to address novel effects appearing in interdisciplinary areas where the most exciting advancements are expected.

Chen is a pioneer in the area of computational modeling of the evolution of structurally inhomogeneous materials, where his group at Penn State developed corresponding phase-field models for the past 20 years. His work enabled the prediction of materials microstructures during processing, synthesis, or in service.

His group has led the development and applications of phase-field models for domain evolution in nanoscale ferroelectrics and multiferroics, grain growth in polycrystalline systems, and precipitate microstructure evolution in elastically inhomogeneous systems, domain evolution in multiferroic composites and magneto-electric devices, simultaneous evolution of phase and defect microstructures, and advanced numerical algorithms for phase-field models based on the Fourier-spectral method.

Chen received his BS degree in Materials Science and Engineering from Zhejiang University, China, in 1982. He continued his studies in Materials Science and Engineering, receiving a MS degree from the State University of New York at Stony Brook (1985) and his PhD degree from the Massachusetts Institute of Technology (1990). After postdoctoral studies at Rutgers University, Chen joined the Department of Materials Science and Engineering at Penn State, where he has established a distinguished career: He was appointed Assistant Professor in 1992; Associate Professor in 1998; and Professor of Materials Science and Engineering in 2002. In 2013, he was appointed Distinguished Professor in Materials Science and Engineering. He has published more than 400 articles. Chen is a Fellow of the American Physical Society, the American Society for Metals, and MRS. He has received numerous awards for his accomplishments, including the 2003 Penn State Faculty Scholar Medal in Engineering; the prestigious Guggenheim Fellowship in 2005; the ASM Materials Science Research Silver Medal in 2006; and The Minerals, Metals & Materials Society Electronic, Magnetic, & Photonic Materials Division Distinguished Scientist/Engineer Award in 2011.

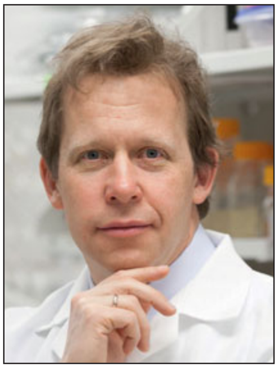
Mercouri G. Kanatzidis selected as MRS Medalist for nanostructured thermoelectric materials

Mercouri G. Kanatzidis, the Charles E. and Emma H. Morrison Professor in the Department of Chemistry at Northwestern University, has been named to receive the 2014 Materials Research Society (MRS) Medal. He was cited for "the discovery and development of nanostructured thermoelectric materials." Kanatzidis will be recognized at the 2014 MRS Fall Meeting in Boston.

In permanently changing the field of thermoelectric materials research by shifting the paradigm from a bulk homogeneous materials problem to a nanoscience problem that requires nanoscale engineering, Kanatzidis opened paths for future advances that led to performance breakthroughs. By doubling the figure of merit (*ZT*), Kanatzidis's thermoelectric materials enable devices to operate at 14% efficiency, up from 7% before these breakthroughs. Industrial development of these materials is now under way. These nanostructuring phenomena , as demonstrated by Kanatzidis and his group, have been validated by theoretical studies and have led to a new paradigm for discovering advanced thermoelectrics.

Kanatzidis and his team then created hierarchical structures that integrate the nanoscale with the mesoscale, and which further lower the thermal conductivity by scattering phonons not possible with the nanostructuring alone. To this the research team added electronic band structure engineering between the thermoelectric phase and a second nanostructuring phase, thereby raising the power factor. This led to a significant advance in *ZT* to 2.2 at 800 K.

For his discoveries, Kanatzidis obtained over 22 patents, and he has over 800 publications. After obtaining a BSc degree from Aristotle University in Greece, Kanatzidis received his PhD degree in chemistry from the University of Iowa in 1984. He was a postdoctoral research associate at the University of Michigan and Northwestern University from 1985 to 1987, and moved to Northwestern in the fall of 2006 from Michigan State University where he was a University Distinguished Professor of Chemistry since 1987. He also holds an appointment at Argonne National Laboratory and is Editor in Chief of the *Journal of Solid State Chemistry*. He is a Fellow of the American Association for the Advancement of Science and MRS. His other honors include the Morley Medal from the American Chemical Society and the Alexander von Humboldt Prize.



Sharon C. Glotzer and Nicholas A. Kotov jointly named MRS Medalists for nanoparticle self-assembly

The Materials Research Society (MRS) has announced that the 2014 MRS Medal will be shared by a research team from the University of Michigan–Ann Arbor: Sharon C. Glotzer, Stuart W. Churchill Collegiate Professor of Chemical Engineering, and Nicholas A. Kotov, Joseph B. and Florence V. Cejka Professor of Engineering. Glotzer and Kotov are cited for "foundational work elucidating processes of nanoparticle self-assembly." They will be recognized during the award ceremony at the 2014 MRS Fall Meeting in Boston.

Glotzer and Kotov are each distinguished and influential scientists in their own right, yet their collaborative research has made the highest impact on the field of nanoparticle self-assembly. Glotzer provided predictive computer simulations and theoretical insight to explain the definitive experiments conducted by Kotov. Together, they succeeded in explaining almost a dozen different and unexpected self-assembled nanostructures observed by Kotov and they correctly predicted several more, within a single theoretical framework. Common to all these structures is the delicate balance of repulsive and attractive forces arising from van der Waals, hydrophobic, electrostatic, and entropic interactions. They demonstrated that subtle changes in the ligand binding density on the surface of the nanoparticle, ligand charge, and even nanoparticle polydispersity can produce profound structural changes in the assemblies. Most recently—through their partnership in developing theory, simulation, and experiment— Glotzer and Kotov predict, and explain, the first self-organized terminal structures comprised of proteins and inorganic nanoparticles. They published their results in the May online edition of *Nature Communications*. This multidisciplinary partnership is a model for materials research worldwide.

Glotzer introduced the concept of patchy particles in *Nano Letters* in 2004, and followed this with several papers in which these ideas were elaborated. She argued that the many degrees of freedom arising from the shape and interaction anisotropy inherent to nanoparticles, colloids, and proteins, for example, could be simplified for the purposes of self-assembly to a coarse model of hard shapes with sticky patches. Objects that are comprised of billions of atoms can thus be described simply, within a unifying framework, regardless of material type. In *Nature Materials* in 2007, Glotzer and her colleague Mike Solomon provided the conceptual framework for patchy particles, demonstrating the many orthogonal "dimensions" of anisotropy possible for patchy particles that could affect assembly. In the seven years since publication, this article has received almost 1000 citations, and has changed the way the community thinks about nanoparticle assembly, making possible the very recent shift in nanoparticle synthesis and assembly from that of trial and error to design. The patchy particles concept has infiltrated its way into nearly all work on nanoparticle self-assembly.

Kotov is acknowledged as the first to have recognized the concept of nanoparticle assembly into ordered structures, in his 2002 publication in *Science*. This work is credited with creating the currently expanding field of nanomaterials in which nanoparticle shape and interactions