Robert J. Cava selected as MRS Medalist for work on 3D topological insulators

Robert J. Cava, Department of Chemistry, Princeton University, has received the 2016 Materials Research Society (MRS) Medal. He is cited for his "pioneering contributions in the discovery of new classes of 3D topological insulators." Cava will be recognized during the Award Ceremony at the 2016 MRS Fall Meeting in Boston.

Cava has worked in combining physics and chemistry to create accessible materials that can be widely studied through a process of understanding the physics and how to embody the materials. Although topological surface states were first found on the edges of thin buried layers of HgTe in quantum wells fabricated by molecular beam epitaxy, their discovery soon thereafter on the surfaces of bulk crystals of Sb-doped Bi grown by Cava caused a rise of interest and activity in the field.

Theorists at the University of Pennsylvania had predicted the existence of the exotic states on the surface of crystals of Sb-doped Bi. Once observed, however, the states turned out to be very complex and were therefore not satisfactory for in-depth study. Physicists asked Cava to think of a not-predicted compound that might have better surface states based on what he understood about the materials science of Sb-doped Bi. He proposed, and then grew crystals and proved, with experimental physicist collaborators, that Bi_2Se_3 would be a better host for topological surface states than Sb-doped Bi. Bi_2Se_3 is now considered the "hydrogen atom of topological insulators" because it is an excellent prototype for testing ideas and theories in this field.

Cava continued to make contributions to address questions about the physics of topological surface states by translating those questions into materials terms, and then finding new compounds or altering known compounds. Cava has collaborated extensively with physicists to understand the physics they are trying to probe in topological insulators, and through physics-materials feedback, develop model compounds in single-crystal form.

Through interactions with experimental and theoretical physicists, Cava learned of a new kind of topological insulator where surface states are present due to the protective character of the surface symmetry (the so-called "topological crystalline insulators") and has grown crystals of those compounds that show the existence of the surface states in $Pb_{1-x}Sn_xTe$.

Cava has more than 690 publications and 15 patents. His recognitions include the Linus Pauling Award (ACS), Stephanie Kwolek Award in Materials Chemistry (RSC), James C. McGroddy Prize in New Materials (APS), and the Humboldt Research Award. He is a Fellow of the Neutron Scattering Society of America, The American Ceramic Society, and the American Physical Society. His research emphasizes the relationships between chemistry, crystal structure, and electronic and magnetic properties of non-molecular solids; synthesis, structure, and physical property characterization of new transition-metal oxides, chalcogenides, intermetallics, and pnictides; and the study of the properties and materials chemistry of superconductors, magnetic materials, transparent electronic conductors, dielectrics, thermoelectrics, topological insulators, geometrically frustrated magnets, and correlated electron systems.

Andrea Alù to present Kavli Foundation Early Career Lectureship in Materials Science

Andrea Alù is the Temple Foundation Endowed Professor in the Department of Electrical and Computer Engineering at The University of Texas at Austin. He will be presenting the Kavli Foundation Early Career Lectureship in Materials Science on Thursday, December 1, at the 2016 Materials Research Society (MRS) Fall Meeting in Boston.

Alù is a leader in the areas of nano-optics, metamaterials, and plasmonics. He and his group have introduced the concept of cloaking and low-scattering objects and sensors using metasurfaces. They have also presented groundbreaking advances in the realization and use of nanoclusters and metamaterials to realize optical nanocircuits and nanoantennas, ultrathin broadband circular polarizers, and enhanced optical magnetic response. Alù has also

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introduced hybrid metasurfaces based on multiple-quantum-well substrates for giant, concentrated nonlinear response at mid-infrared frequencies, and he has initiated the concept and realization of magnetic-free integrated isolators and circulators for sound, radio waves, and light based on mechanical motion and temporal modulation.

He received the 2016 Edith and Peter O'Donnell Award in Engineering, 2015 National Science Foundation Alan T. Waterman Award, 2014 IEEE Microwave Theory and Techniques Outstanding Young Engineer Award, 2013 Optical Society of America (OSA) Adolph Lomb Medal, 2011 Issac Koga Gold Medal (URSI), and is a Fellow of the American Physical Society, IEEE, and OSA. Alù has written more than 320 papers and has edited one book.

Ellen D. Williams to present the Fred Kavli Distinguished Lectureship in Materials Science address

Ellen D. Williams, Director of the Advanced Research Projects Agency (ARPA-E) in the US Department of Energy (DOE), will give the talk, "Advanced Research Projects Agency-Energy: Innovation for Impact," at the 2016 Materials Research Society (MRS) Fall Meeting in Boston.

Prior to Senate confirmation for her role in ARPA-E, Williams served as a senior advisor to the US Secretary of Energy on the DOE's technology transfer policies, issues, and plans. She recommended and helped establish the department's new Office of Technology Transitions to expand the impact of the department's extensive research and development activities.

She joined DOE from BP, where she had been the chief scientist since 2010. There, she was responsible for assurance of technology programs, and strategic research and program development. Her priority actions included developing the Advisory Oversight structure for BP's Gulf Research Initiative, running a multi-university research program on natural resource constraints in the context of energy (the Energy Sustainability Challenge), and establishing cores of scientific excellence and innovation in key disciplinary areas essential to BP's long-term technical competitiveness.

Williams worked for more than 30 years in academia, obtaining her PhD degree at Caltech in 1981, and then moving to the University of Maryland, where she became a Distinguished University Professor in the Institute of Physical Science and Technology and the Department of Physics. She founded the University of Maryland Materials Research Science and Engineering Center and served as its director for 15 years. In parallel, Williams has worked extensively in providing technical advice to the US government, primarily through the Departments of Energy and Defense.

Williams is a member of the National Academy of Sciences, a Fellow of the American Physical Society (APS), American Vacuum Society, and American Academy of Arts & Sciences, and has been recognized with awards from the APS and MRS. She has a distinguished history of professional service, including chairing the development of the National Academy of Sciences report on Technical Issues for the Comprehensive Test Ban Treaty.

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