Center for Nanoscale Science Renewed at $18 Million for Six Years

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The Center for Nanoscale Science, a National Science Foundation Materials Science and Engineering Center (MRSEC), has again successfully renewed its NSF support in the highly competitive MRSEC program. The new iteration of the center encompasses two of NSF's Big Ideas — "Quantum Leap" and "Harnessing the Data Revolution."

More than 20 Penn State faculty are involved in the MRSEC's two new interdisciplinary research groups (IRGs). IRG1, 2D Polar Metals and Heterostructures, is led by Joshua Robinson, professor of materials science and engineering and Jun Zhu, professor of physics.

It pioneers new methods of encasing two-dimensional metals in graphene to achieve exceptional optical properties and intriguing potential for quantum devices and biosensing. Before the IRG's pioneering work, only gold among metals was known to resist oxidation in the air. Penn State researchers are now extending that critical property across wide swathes of the periodic table.

IRG2, Crystalline Oxides with High Entropy, is led by Jon-Paul Maria, professor of materials science and engineering and Ismaila Dabo, associate professor of materials science and engineering. It seeks to write a new chapter in the crystal chemistry rulebook by creating materials that take advantage of the enormous number of ways that different kinds of atoms can be arranged onto a common crystal lattice.

This innovative technique enables Penn State researchers to put atoms into environments that they normally do not assume, with potential applications across a wide domain, from new energy materials to new quantum devices, guided by a close interplay of theory, computation, data and experiment.

"These two intriguing research directions define new materials platforms– whole classes of new materials – that are being pioneered here at Penn State," says Vin Crespi, the director of the Center for Nanoscale Science.

The MRSEC also provides career development opportunities for dozens of graduate students with a focus during this renewal on sustainability in research practice and outcomes. A recently launched educational website, "Mission: Materials Science," will expand its content and reach out to youth audiences through a new partnership with the local Discovery Space museum.

Outreach through participation in summer science camps, STEM programs for students who are blind or visually impaired, and partnerships with universities that serve underrepresented students will remain core to the Center's mission.

Program Director for Education and Outreach Kristin Dreyer said, "The best and most effective messengers for communicating important science concepts to youth and public audiences and inspiring the next generation of materials scientists are current researchers themselves. My colleague, Tiffany Mathews, and I get to help make those opportunities happen and provide the necessary support for our members to do it successfully."

The Center for Nanoscale Science is among eight MRSECs successfully renewing their funding along with three new centers, and has been funded continuously since 2000.

According to NSF, "The U.S. economy and its competitiveness depend on innovation, an essential part of which is fueled by technological breakthroughs in basic research. Our comfort, work, and well-being depend on the development of new materials for anything ranging from smart electronics to implantable medical devices."

Read the original article on The Pennsylvania State University.