NSF grants establish regional science and engineering collaborative consortia

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The National Science Foundation (NSF) has announced funding for three science and engineering research consortia that will forge regional partnerships, including two in the field of materials research: Nebraska-Kansas on ultrafast laser technologies and Louisiana-Mississippi on smart polymers. The third consortium is Arkansas-Missouri's on bioimaging. Each consortium will receive Research Infrastructure Improvement (RII) Track-2 awards of up to $6 million through NSF's Experimental Program to Stimulate Competitive Research.

Collectively, these awards, which span six states, involve researchers from about 20 universities over a three-year period. Each consortium will implement a unique suite of regionally relevant activities for developing a scientifically literate workforce and broadening participation of underrepresented groups in science, technology, engineering, and mathematics (STEM).

The Nebraska-Kansas Consortium will apply ultrafast laser technologies at the intersection of photonics and electronics to investigate how light interacts with matter, one of the grand challenges of atomic, molecular, and optical research. Physicists, chemists, and electrical engineers from Nebraska and Kansas will collaborate on imaging and controlling ultrafast dynamics of atoms, molecules, and nanostructures.

The consortium—headed by principal investigator Fred Choobineh of the University of Nebraska and co-principal investigator Kristin Bowman-James of the University of Kansas—will develop scientific, technological, experimental, and theoretical tools that have applications in laser technology, solar energy capture, nanotechnology, and optogenetics (neuroscientific study of genetically light-sensitized neurons). Education, outreach, and workforce development activities will involve partnerships with small colleges in Nebraska and Kansas, summer workshops for high school physics teachers, and a host of programs for students.

The Louisiana-Mississippi Consortium will develop new experimental and computational tools for accelerating development of smart polymers that have applications in medicine and materials science. The interdisciplinary research team will apply molecular modeling and cyber control strategies across the life cycle of polymer development from bench-top synthesis to product manufacture. The consortium—headed by principal investigator Michael Khonsari of Louisiana State University and co-principal investigator John Hamilton of Mississippi State University—will tailor the design of smart polymers to meet pressing needs in drug delivery, environmental remediation, and nanomaterials. Advances in the science of polymer characterization and materials synthesis will serve as a central theme for education and outreach activities that engage local schools, teachers, undergraduate and graduate students, and industry. By coordinating research with education and outreach, the consortium will work toward strengthening regional economic competitiveness through building a diverse STEM workforce.
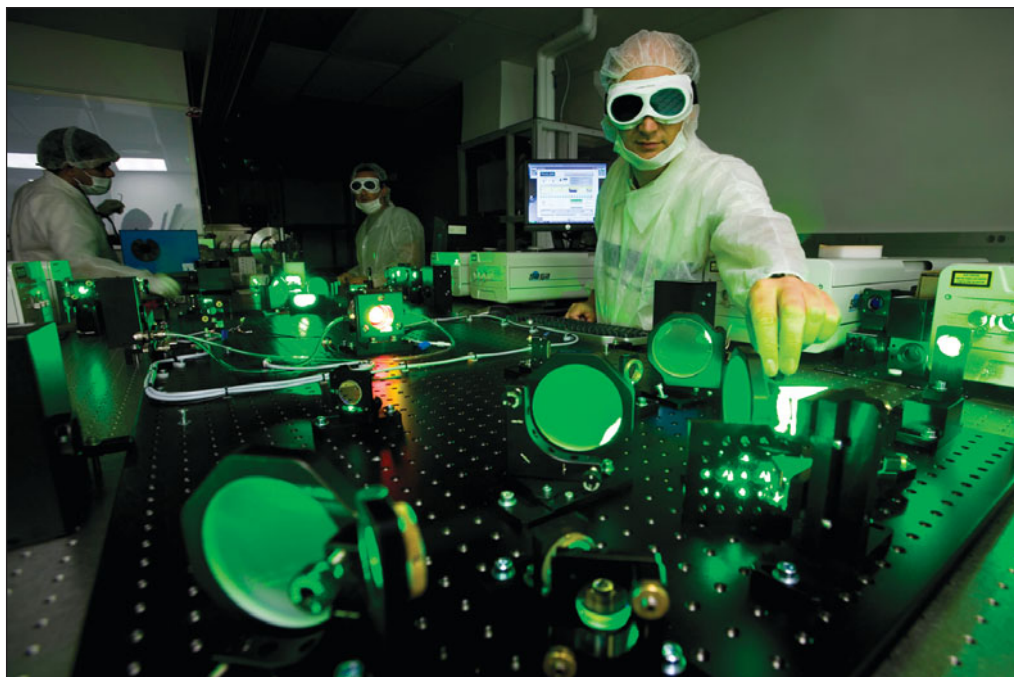
The Nebraska-Kansas Consortium will apply ultrafast laser technologies at the intersection of photonics and electronics to investigate how light interacts with matter. Shown here is the Diocles Extreme Light Laboratory at the University of Nebraska-Lincoln. Credit: University of Nebraska.