Wang

Electrical Engineering Professors Receive $476,663 NSF GOALI Award

Tampa, FLa. (October 12, 2010) — Jing Wang, assistant professor of electrical engineering and the principal investigator (PI), Gokhan Mumcu, assistant professor of electrical engineering and co-PI, were awarded a $476,663 three-year National Science Foundation GOALI grant, titled "Antenna-Coupled ALD-Enabled Metal-Insulator-Insulator-Metal Diodes for High Responsivity and High Resolution THz/Infrared Focal Plane Arrays." This collaborative effort involves Kubilay Sertel, PhD, research scientist and co-PI, from The Ohio State University through a $150,000 sub-award while partnering with the GOALI collaborator, Nikolai Kislov, PhD, the president for Nano CVD Co., a startup company located at the USF Research Park.

The objective of this research is to develop a new class of room temperature metal-insulator-insulator-metal tunnel diode detectors and monolithically integrate them within novel miniature antenna focal plane array configurations for high resolution and high responsivity THz/infrared imaging as well as energy harvesting. The approach is to enhance nonlinearity of the diodes up to 30THz by using dual tunnel junctions and employ a system level design by addressing issues of antenna-diode impedance mismatches, compact antenna size, inter-element electromagnetic couplings, and bandwidth.

"We will leverage a GOALI industry-university and cross-university interdisciplinary team for this investigation along with approaches that focus system-level design," said Wang. "The advances could eventually result in paradigm shift in the way THz/infrared radiation is going to be detected."

The program is focused on challenges associated with system-level integration of antenna coupled metal-insulator-insulator-metal diodes for high performance THz/infrared imaging. Metal-insulator-insulator-metal diodes proposed herein offering sensitive detection of radiation up to 30THz. The critical goals of high resolution and high responsivity will be achieved through novel approaches in antenna miniaturization, non-uniform array layouts, and compact impedance matching networks. Ultra-wideband imaging and energy harvesting will be accomplished with novel broadband arrays and computational electromagnetics modeling.

The outcomes will impact a broad range of applications including environmental, biomedical, material science, homeland security, and renewable energy. The effort is well aligned with synergistic research in the area of medical THz imaging and infrared renewable energy at both universities. The project will provide a system level design opportunity to graduate students, impact the curriculum at both universities, and leverage ongoing programs to attract underrepresented students to engineering.

For more information, please visit the following award websites:

http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1029067
http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1028911

The University of South Florida is one of the nation's top 63 public research universities and one of only 25 public research universities nationwide with very high research activity that is designated as community engaged by the Carnegie Foundation for the Advancement of Teaching. USF was awarded $380.4 million in research contracts and grants in FY 2008/2009. The university offers 232 degree programs at the undergraduate, graduate, specialist and doctoral levels, including the doctor of medicine. The USF System has a $1.8 billion annual budget, an annual economic impact of $3.2 billion, and serves more than 47,000 students on institutions/campuses in Tampa, St. Petersburg, Sarasota-Manatee and Lakeland. USF is a member of the Big East Athletic Conference.

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