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New Frontiers in Terahertz Technology

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.: About This Webinar

Although unique potentials of terahertz waves for chemical identification, material characterization, biological sensing, and medical imaging have been recognized for quite a while, the relatively poor performance, higher costs, and bulky nature of current terahertz systems continue to impede their deployment in field settings. In this presentation, Professor Mona Jarrahi describes some of her team's recent results developing fundamentally new terahertz electronic and optoelectronic components as well as imaging and spectrometry architectures to mitigate the performance limitations of existing terahertz systems. Specifically, she introduces new designs of high-performance photoconductive terahertz sources that utilize plasmonic nanoantennas to offer terahertz radiation at record-high power levels of several milliwatts, demonstrating a more than three orders of magnitude increase compared to the state of the art. She shares that the unique capabilities of these plasmonic nanoantennas can be further extended to develop terahertz detectors, focal-plane arrays, and heterodyne spectrometers with quantum-level detection sensitivities over a broad terahertz bandwidth at room temperatures, which has not been possible through existing technologies. To achieve this significant performance improvement, plasmonic antennas and device architectures are optimized for operation at telecommunication wavelengths, where very high power, narrow linewidth, wavelength tunable, compact, and cost-effective optical sources are commercially available. Therefore, her team's results pave the way for compact and low-cost terahertz sources, detectors, and spectrometers that could offer numerous opportunities such as, medical imaging and diagnostics, atmospheric sensing, pharmaceutical quality control, and security screening systems.



Who should attend:

Researchers, engineers, and developers who are interested in gaining an understanding of terahertz technology and its possible applications. Those who work with imaging, spectrometry, biophotonics, biology, medicine, nanophotonics, quantum, and electronics who want to understand how terahertz technology can be applied within their field.

About the presenter:

Mona Jarrahi, Ph.D., received her Bachelor of Science degree in electrical engineering from Sharif University of Technology in 2000 and her Master of Science and doctorate degrees in electrical engineering from Stanford University in 2003 and 2007. She is currently a professor and Northrop Grumman Endowed Chair in electrical and computer engineering and the director of the Terahertz Electronics Laboratory at the UCLA Samueli School of Engineering. Jarrahi has made significant contributions to the development of ultrafast electronic and optoelectronic devices and integrated systems for terahertz and millimeter-wave sensing, imaging, computing, and communication by utilizing novel materials, nanostructures, and quantum structures as well as innovative plasmonic and optical concepts. The outcomes of her research have appeared in more than 300 publications and 270 invited talks and have been recognized by several prestigious awards including the Presidential Early Career Award for Scientists and Engineers, Friedrich Wilhelm Bessel Research Award from Alexander von Humboldt Foundation, Moore Inventor Fellowship from the Gordon and Betty Moore Foundation, and the A F Harvey Engineering Research Prize from the Institution of Engineering and Technology. Jarrahi is a fellow of the Institute of Electrical and Electronics Engineers (IEEE), Optical Society (OPTICA), American Physical Society (APS), International Society for Optics and Photonics (SPIE), and Institute of Physics (IoP).

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