

# ECE DISTINGUISHED SPEAKER SERIES



**Dr. Michael Shur**  
Rensselaer Polytechnic Institute

**Host**  
Professor Hui Fang

**Terahertz Sensing  
Technology**

**Wednesday, November 7**

4 p.m. – 5 p.m.

442 Dana Research Center

*Sponsored by the  
Department of Electrical and  
Computer Engineering*

Terahertz sensing is enabling technology for detection of biological and chemical hazardous agents, cancer detection, detection of mines and explosives, providing security in buildings, airports, and other public space, short-range covert communications (in THz and sub-THz windows), and applications in radioastronomy and space research. This lecture will review the-state-of-the-art of existing THz sources, detectors, and sensing systems. As application examples, I will discuss THz space exploration, sensing of biological materials, broadband THz reflection and transmission detection of concealed objects, THz explosive identification, THz nanocomposite spectroscopy, and THz remote sensing. Specifically, two-terminal semiconductor devices capable of operating at the low bound of the THz range will be discussed, with the highest frequency achieved using Schottky diode frequency multipliers (reaching a few THz). High speed three terminal electronic devices (FETs and HBTs) are approaching the THz range (with cutoff frequencies and maximum frequencies of operation above 1 THz and close to 0.5 GHz for InGaAs and Si technologies, respectively). A new approach called plasma wave electronics recently demonstrated terahertz emission and detection in GaAs-based and GaN-based HEMTs and in Si MOS, SOI, and FINFETs and in FET arrays, including the resonant THz detection. It has potential to become a dominant THz electronics technology.

**Dr. Michael Shur** is Patricia W. and C. Sheldon Roberts Professor at RPI. He received MSEE Degree (with honors) from St. Petersburg Electrotechnical Institute, and PhD. and Dr. Sc. Degrees from A. F. Ioffe Institute. He is Fellow of the US National Academy of Inventors, IEEE, APS, OSA, SPIE, ECS, IET, MRS, WIF, AAAS, and Member of Eta Kappa Nu, Tau Beta Pi, ASEE, MTT, Sigma Xi, and Humboldt Society. Professor Shur served as Member-at-Large of the IEEE EDS Board of Governors, Vice-President of IEEE Sensors Council, Chair of the URSI US Commission D, and Associate Editor of IEEE ED Transactions. He is Editor-in-Chief of IJHSES and book series on Electronics and Systems, Member of the Editorial Board of physica status solidi, the Honorary Board of Solid State Electronics, and JSTS International Advisory Committee. He received the IEEE Ebers Award, Distinguished Faculty Naval Research Fellowship, William H. Wiley 1866 Distinguished Faculty Award, Rensselaer Outstanding Engineering Professor Award, Honorary Doctorate, Vilnius University, IET Achievement Medal; ECS Electronic and Photonics award, IET Achievement Medal, Tibbetts Award from USA Small Business Administration for as Distinguished Lecturer for the IEEE EDS, IEEE Sensors Council, and served as Distinguished Lecturer for IEEE MTT. Professor Shur has authored over 1,000 technical publications; given more than 300 plenary, keynote, and invited talks and conference presentations; authored, co-authored, or edited 38 books and 29 book chapters and holds many patents on solid-state devices. The Alexander von Humboldt Foundation in Bonn, Germany named Shur a Humboldt Research Award Winner.



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