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since 09-07-04

THz Sensing Technology

Dr. Michael Shur

Rensselaer Polytechnic Institute

Date: Wednesday, November 20, 2013

Time: 5:30 Reception, Dinner (Optional) 6:00 pm, Lecture 7:00

Place: Mitre Building 2

Directions: Google Maps

Free parking.

All IEEE members and guests are welcome to attend.

Cost: Lecture and reception free, optional Dinner $10

Please RSVP (Dinner only) to Roger Kaul, 301-394-3568 r.kaul@ieee.org by November 18th

Abstract:

The ever-increasing demand for data rates/range in modern communication/radar systems coupled with the push towards mm-wave links, has dictated the need for wide tuning range voltage controlled oscillators (VCOs). Traditionally, mm-wave VCOs have been implemented in III-V technologies benefiting from fast device speed and low parasitic capacitance. However, they suffer from the main drawback of high manufacturing cost and limited level of integration.

Mst existing terahertz sources have low power and rely on optical means of the terahertz radiation. THz quantum cascade lasers using over thousand alternating layers of gallium arsenide and aluminum gallium arsenide have achieved high THz powers generated by optical means. Improved designs and using quantum dot medium for THz laser cavities are expected to result in improved THz laser performance. Large THz powers are generated using free electron lasers or THz vacuum tubes.

Two-terminal semiconductor devices are capable of operating at the low bound of the THz range, 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.

Speaker:

Dr. Michael Shur is Patricia W. and C. Sheldon Roberts Professor and Director of the NSF I/UCRC “Connection One” at RPI. He is Life Fellow of IEEE, APS, and SPIE, Fellow of OSA, IET, ECS, WIF, MRS, AAAS, life member of IEEE

Photo

MTT, Sigma Xi, and Humboldt Society, and member of Eta Kappa Nu, Tau Beta Pi, and ASEE. He is also Editor-in-Chief of IJHSES, Vice- President of IEEE Sensor Council for Conferences, Member of Board of Governors and Distinguished Lecturer of IEEE EDS. He is co- founder and Vice-President of Sensor Electronics Technology, Inc. His awards include Tibbetts Award for Technology Commercialization, St. Petersburg Technical University Honorary Doctorate, IEEE Kirchmayer Award, Gold Medal of Russian Education Ministry, and Best Paper Awards. Dr. Shur is a Foreign Member of the Lithuanian Academy of Sciences.

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