



ECSE-6210 Advanced Concepts in Electronic and Optoelectronic Devices Spring of 2021

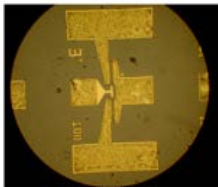


- Performance limits for emerging electronic devices and integrated circuits
- FinFET, Wrap-Around 3nm FET (toward 1 trillion transistors on chip – >54 billion achieved by a company founded by an RPI graduate)
- Carbon Nanotube (“infinite” responsivity), Ballistic, Hot Electron, Variable Threshold, Split Gate, Resonant Tunneling, Single Electron, Heterostructure and Tunneling Transistors, Beyond CMOS and CMOS, graphene and Black Phosphorus – Van der Waals materials
- Terahertz Electronics for Beyond 5G WI-FI and driverless cars
- Giant Area ICs on flexible substrates (“Sensitive Skin”) for advanced robotics
- Sensors for IoT
- Crystalline, amorphous, and organic solar cells, photoconductors
- Visible and UV LEDs and lasers. Future smart displays. Future communication systems for bandwidth hungry humans. Biomedical and agricultural applications (a must for preventing wars, reducing waste, and feeding the expanding earth population)
- Optoelectronic Integrated Circuits and Silicon Photonics
- RPI facilities for advanced materials and device fabrication and characterization
- How to create Intellectual Property in Advanced Devices

Prerequisites include basic knowledge of semiconductor devices (at the undergraduate course level).

Instructor Prof. M. Shur

<https://www.ecse.rpi.edu/~shur/>



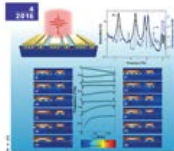
GaN HFET



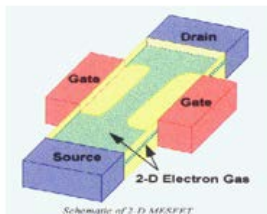
Sensitive Skin



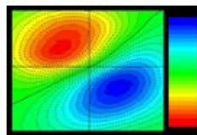
Color rendition engine



Plasmonic crystal



Schematic of 2-D MESFET



THz detector

Companies interested and hiring

