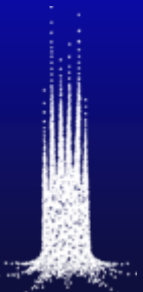


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Duke University

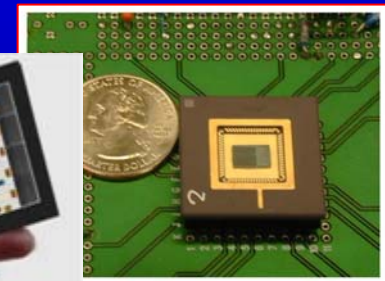
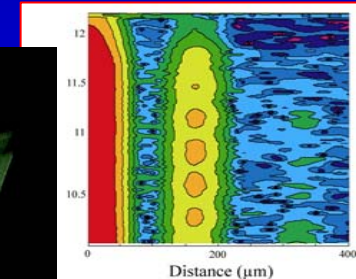
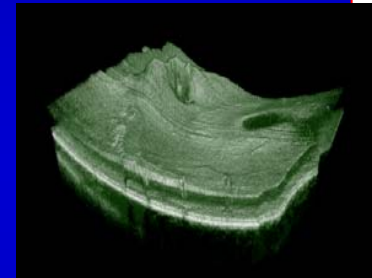
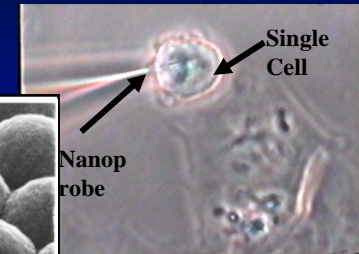
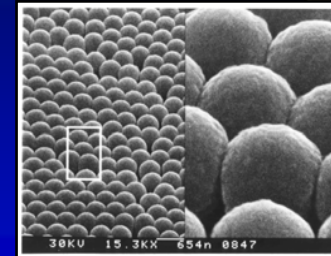
Tuan Vo-Dinh

Director



8 Main Research Programs

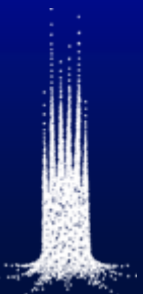
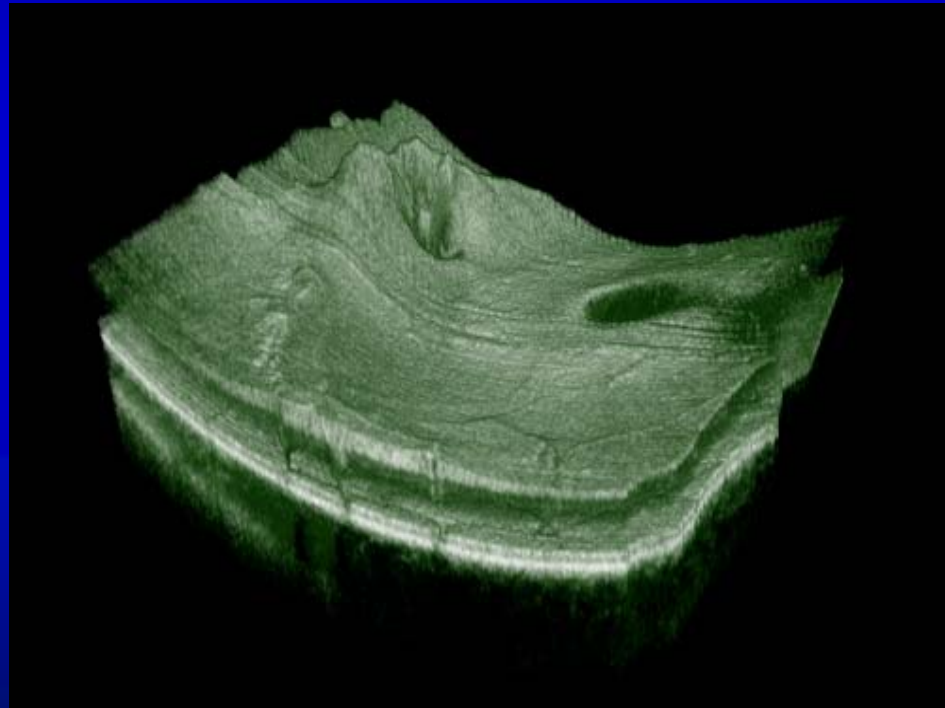
- Biophotonics
- Nano and Micro Systems
- Quantum Optics & Information Photonics
- Photonic Materials
- Advanced Photonic Systems
- Nanophotonics
- Systems Modeling & Theory and Data Treatment
- Novel Spectroscopies



Strategic focus on target applications based on competencies

Optical Coherence Tomography for In Vivo Medical Diagnostics

Joseph Izatt

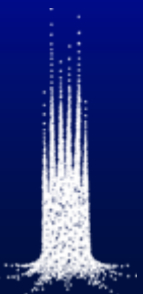
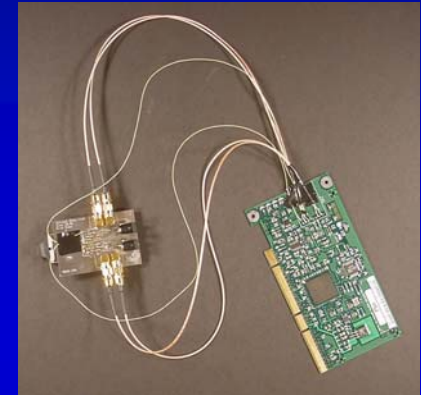


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Bridging the Gap: From the Nano World to Field Devices

Integrated Nano and Micro Systems

- Traditional Approach
 - High Cost, Low Volume, Niche
 - Separate Component Packaging
- Next Generation
 - Low Cost, High Volume, Pervasive
 - Integrated/Embedded OE Packaging
 - Take OE packaging from discrete to integrated
(emulating the IC revolution in the last 50 years)
 - Making tabletop systems into ladybug size

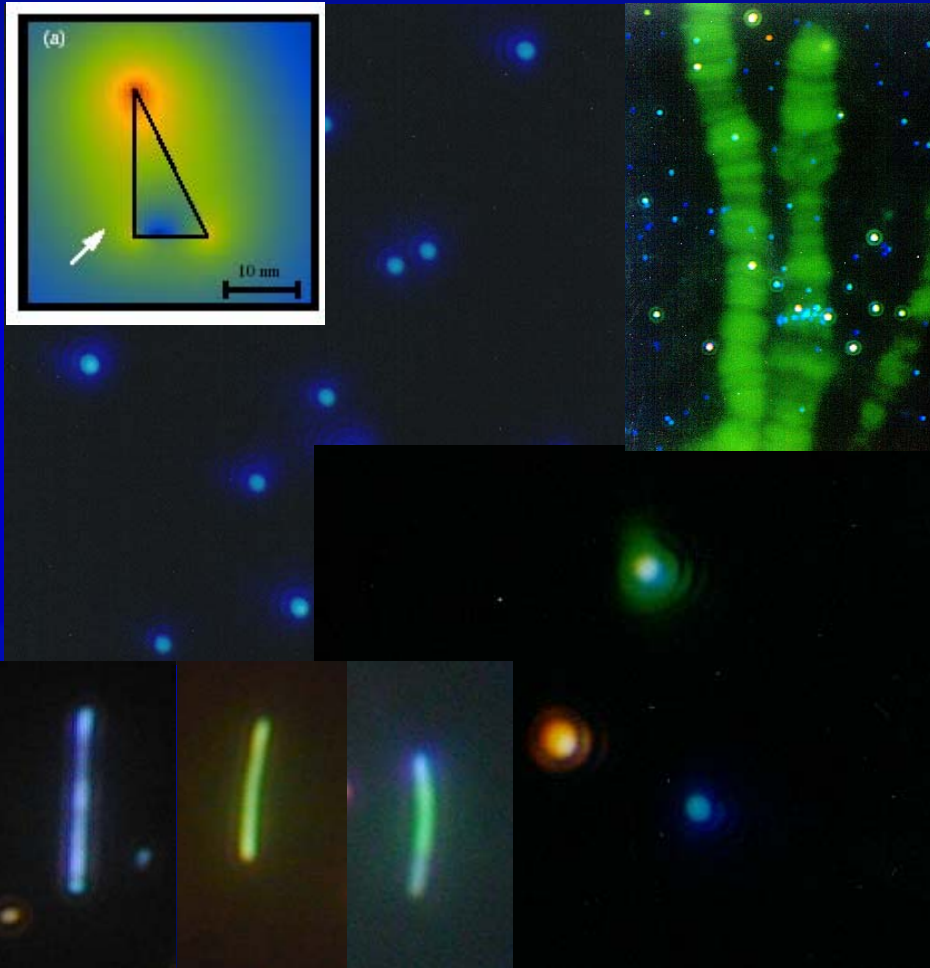


Nan Marie Jokerst, FIP



Negative ϵ at Optical Wavelengths

David Smith, Duke University

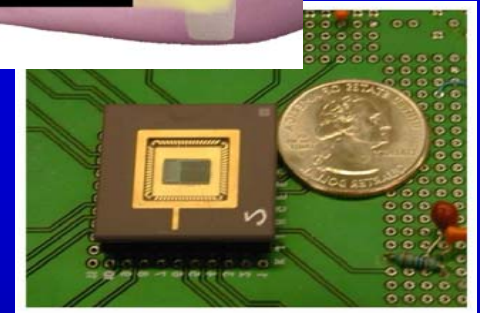
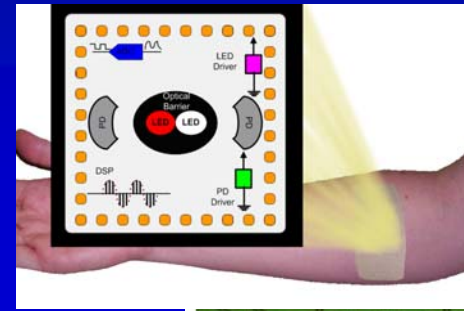


Properties of Plasmons:

- Surface modes
- Spatial variation of optical wavelengths on a scale $\ll \lambda$.
- Large local field enhancements
- Large local density of states
- Contributes to SERS and SERRs phenomena
- Fast (fs) time scales

Technologies for Integrated Nano- and Micro-Systems

- Miniaturized systems containing:
 - Nanoprobes and microsensors
 - Control and signal processing electronics
 - Micro and nanofluidics
 - Wireless alarm/data transmission
 - Microactuators
 - Integrate all of these components into a single mini-micropackage
 - Patch, Probe, Stamp-sized
 - Operates on a coin battery
 - Continuous monitoring with pre-set alarm conditions and sensing information
- OR
- One shot sensing (disposable probes)
 - Wireless data download



**Fitzpatrick Institute for Photonics
Pratt School of Engineering
Duke University**

Physical Facilities



Fitzpatrick Center for Interdisciplinary Engineering, Medicine, and Applied Science
“FCIEMAS”

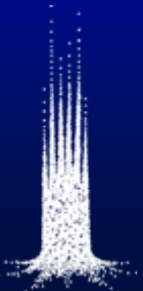
\$100M, 300,000-sqft Facilities

Dedication: November, 2004

Fitzpatrick Institute for Photonics (FIP)

120,000-sqft Facility

56 Faculty Members and their Research Groups



Fitzpatrick Institute for Photonics

Tuan Vo-Dinh, *Director*

Biophotonics

Izatt, Joseph, *Program Director*

Brady, David

Johnson, G. Allan

Provenzale, James

Ramanujam, Nimmi

Seewaldt, Victorai

Shang, Allan

Vo-Dinh, Tuan

Warren, Warren*

Wax, Adam

Nano/Micro Systems

Jokerst, Nan , *Program Director*

Brooke, Martin

Fair, Richard

LaBean, Thomas

Massoud, Hisham

Tian, Jingdong

Yoshie, Tomoyuki*

Quantum Optics and Information Photonics

Gauthier, Daniel, *Program Director*

Baranger, Harold

Kim, Jungsang

Thomas, John

Warren, Warren*

Photonic Materials

Smith, David, *Program Director*

Brown, April

Cummer, Steve

Glass, Jeff

Jokerst, Nan*

Massoud, Hisham*

Stiff-Roberts, Adrienne

Advanced Photonic Systems

Reichert, William, *Program Director*

Brady, Rachael

Chakrabarty, Krish

Johnson, Kristina

Edwards, Glenn

Guenther, Bob

Massoud, Hisham*

Ozev, Sule

Nanophotonics

Leong, Kam, *Program Director*

Chikolti, Asutosh

Ginsburg, Geoffrey

Lazarides, Anne

Liu, Jie

Smith, David*

Vo-Dinh, Tuan*

Wax, Adam*

Yuan, Fan

Yoshie, Tomoyuki

Systems Modeling, Theory & Data Treatment

Beratan, David, *Program Director*

Yang, Weitao, *Program co-Director*

Dwyer, Chris

Krolik, Jeffrey

Liu, Qing

Pitsianis, Nikos

Sun, Xiaobai

Venakides, Stephanos

Novel Spectroscopies

Warren, Warren, *Program Director*

Brady, David

Izatt, Joseph*

Palmer, Richard

Simon, John

Vo-Dinh, Tuan*

Wax, Adam*

