NIST Tours @ NIST NIH Bio-Imaging Showcase, 10/06/09

NOTE: Tours are available to pre-registered NIST NIH Showcase attendees only. Space is limited to 10 participants per Tour, and are first come – first serve, so be sure to arrive for the Showcase early to sign-up for your preferred Tour! For more on the Showcase, visit www.marylandtedco.org.

Biomaterials and Bioimaging
Marc Cicerone, Ph.D., Polymers Division

Man-made tissues and organs have the potential to revolutionize the treatment of many injuries and diseases. However, researchers working in this field need new tools, materials, and methods and testing technologies before tissue engineering efforts can make the transition from a small, basic research endeavor to a sustainable industry. This laboratory includes novel material platforms and optical methods developed by NIST for the noninvasive characterization of cell-biomaterial and protein-biomaterial interactions that will accelerate the evaluation of synthetic materials for tissue engineering and the delivery of new therapeutic agents.

Lab on a Chip: Miniaturized Systems for Chemical and Biochemical Detection
Wyatt Vreeland, Ph.D., Biochemical Science Division

Miniaturized lab-on-a-chip technologies are predicted to revolutionize the biotechnology industry in the same way that electronic miniaturization has revolutionized the computer industry. Lab-on-a-chip devices are miniaturized handheld devices used for chemical and biochemical detection, and are developed for a wide range of applications that include forensic analysis, chemical and biological agent detection, environmental analysis, and clinical diagnostics (at home or at bedside). NIST plays a key role in development of these technologies by providing much-needed measurement expertise.

Nanocrystal Probes for Quantitative Bioimaging and Biodetection
Dr. Jeeseong Hwang, Ph.D., Optical Technology Division

Novel fluorescent nanocrystal probes are used for bioimaging applications to achieve quantitative imaging contrast. The current challenge is the ability to characterize and model the unique optical properties of these nanoscale materials. We are developing and using new measurement platforms and standards to characterize and model the optical properties of these nanoscale materials for their applications as quantitative biosensors and detectors. A variety of self-assembly techniques are also being developed to engineer nanocomplexes of biomolecules for their potential applications in cellular diagnostics, repair, and modification; cancer detection; in vivo imaging; biological warfare agent detection; and drug research and development.

Digital Tissue Phantom
Maritoni Litorja, Ph.D., Principle Investigator, Optical Technology Division; and Joseph Rice, Ph.D., Optical Technology Division

Tissue-mimetic material artifacts are used to calibrate and validate optical imaging systems for biomedical use. These are often soft gel-like materials where modifications to the compositions can be changed to suit the optical imaging application. These have high variability and short shelf life. A digital tissue phantom, which is mainly hyperspectral image data that can be reprojected to test an imager, is being explored. The scene can be that of a material tissue phantom or real tissues. Modifications to the scene can be performed by synthesizing variations in the spatial and relative spectral components. Visitors will see a working prototype of the digital tissue phantom on display in this laboratory.