

## **Pre-meeting NIST Introduction and Tours**

The 2013 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics (formerly titled Characterization and Metrology for ULSI Technology) will be held March 25-28, 2013 at the National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, USA. This conference, the ninth in the series, will focus on the frontiers and innovation in characterization and metrology of nanoelectronics.

- On Monday March 25, NIST will host laboratory tours.
  - Conference Attendees will need to check in at the NIST gate to obtain a visitor pass.
- Tour begins with a basic introduction to NIST
  - Conference Attendees can visit the NIST cafeteria if they arrive early.

### **2:00 - Meet in Administration Building Lecture Room D**

**2:00 – 2:15 - Introduction to NIST** – Michael T. Postek, Senior Scientist Semiconductor and Dimensional Metrology Division, Physical Measurement Laboratory

### **2:15 – 2:20 – Walk to Building 225**

### **2:20 – 2:45 - Reliability and Electrical Characterization for Advanced CMOS**

As the CMOS technology advances, it is becoming extremely difficult to maintain the required reliability due to variability, decreasing development cycle time, new nanoscale specific failure mechanisms, and exploding technology options. This tour will demonstrate the new innovations in measurements being developed to characterize reliability problems in nano-scale CMOS such as NBTI, random telegraph noise, and atomic level defects.

**Hosts: Charles Cheung and John Suehle, Room: B367, Building 225**

### **2:45 – 2:50 Walk to Building 224**

### **2:50 – 3:15 - Critical-Dimension Small Angle X-ray Scattering (CD-SAXS) for Dimensional Metrology of 3D Nanoscale Patterns**

As next generation CMOS nanostructures decrease in size and increase in complexity, current dimensional metrology tools become more and more challenged. The ITRS roadmap highlights CD-SAXS as a potential next generation dimensional metrology solution. Our lab advances the capability of CD-SAXS and is actively working to transition CD-SAXS from the synchrotron to the laboratory. This tour will include the NIST prototype CD-SAXS system and discuss recent CD-SAXS measurements on sub 32 nm pitch structures.

**Hosts: R. Joseph Kline and Daniel F. Sunday, Room B321, Building 224**

### **3:15 – 3:25 - Walk to Center for Nanoscale Science and Technology (CNST)**

### **3:25 – 4:00 - Center for Nanoscale Science and Technology**

The Center for Nanoscale Science and Technology (CNST) is the Department of Commerce's nanotechnology user facility. The CNST enables innovation by providing rapid access to the tools needed to make and measure nanostructures, with these tools provided to anyone who needs them, both inside and outside NIST, with a particular emphasis on helping industry. Access is provided in two ways. In the NanoFab, researchers can access a commercial state-of-the-art tool set at economical hourly rates, along with help from a dedicated, full-time technical support staff. In the NanoLab, researchers can access the next generation of tools and processes through collaboration with the CNST's multidisciplinary research staff, who are developing new measurement and fabrication methods in response to national nanotechnology needs.

**Hosts: J. Alexander Liddle and Jabez McClelland, Main Lobby, Building 215**

### **4:00 – 4:05 – Walk to Atom Probe**

### **4:05 – 4:30 – Atom Probe Tomography for 3-D Chemical Metrology**

An atom probe allows atom by atom mass spectral analysis and imaging data to be collected and reconstructed into full 3D tomographic images. The reconstructions yield atom locations to a few tenths of a nanometer and sensitivities down to about 100 parts per million for the whole periodic table of elements. This makes the atom probe potentially very useful to the semiconductor community for analysis of elemental spatial distributions in complex devices. NIST is investigating the reliability and accuracy of both the imaging (dimensional) and chemical analysis aspects of the technique.

**Hosts: Eric Steel and Fred Meisenkothen; Building 217, Room D108**

### **4:30 – 4:35 - Walk to Particle Beam Dimensional 3-D Metrology**

### **4:35 – 5:00 - Particle Beam Dimensional 3-D Metrology**

Scanning electron microscopes are typically used in many areas of scientific research and manufacturing metrology. SEMs are used extensively in semiconductor manufacturing for quality assurance and critical dimension control. This laboratory has been devoted to developing standards and performance testing methods for the SEM. More recently NIST received the first production helium ion microscope (HIM) and NIST has been doing fundamental research and investigating the HIM's application to semiconductor manufacturing through its collaborations with the instrument's manufacturer and SEMATECH.

**Hosts: Andras Vladar and Michael T. Postek, Room 217, Building E111**

### **5:00 – Depart NIST**