

## POZVÁNKA

Ústav elektrotechniky, Oddelenie vysokofrekvenčnej techniky a optoelektroniky a Oddelenie teoretickej elektrotechniky si Vás dovoľujú pozvať na

**p r e d n á ť k u**

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s názvom

### **Multi-functional Nanoscale Probing with Near Field Scanning Microwave Microscopy**

#### **Kvantitatívna charakterizácia nanomateriálov, zariadení a nano-častíc pomocou mikrovlnovej mikroskopie blízkeho poľa**

##### **Abstract:**

Since scanning tunneling microscopes (STMs) and atomic force microscopes (AFMs) were invented in the 1980's, there has been an ongoing effort to combine the atomic-scale spatial resolution of these techniques with additional excitation sources and additional sensing mechanisms. Near Field Scanning Microwave Microscopy (NSMM) integrates radio-frequency (RF)/microwave compatibility with scanning probe microscopy instrumentation. The particular appeal of combining RF with nano-scale metrology arises from its unique physics (e.g. the skin-depth effect) as well as from the fact that many contemporary electronics and communications devices operate in this frequency regime. Here at NIST, we have focused on applications of NSMM to calibrated micro-capacitance measurements, dopant profiling of semiconductors, and characterization of photovoltaic systems. For the latter application, it is necessary to integrate the capability to illuminate the sample into the NSMM. Ongoing work focuses on integrating both the optical source and the RF/microwave signal path into a single probe, whose potential applications will extend beyond photovoltaics to a wide range of fields, including high-tech materials research and nanoparticles for biomedical applications. The single probe is based on GaN nanowires. For the high frequency applications the proper design of the RF path along the GaN probe is vital and several different approaches have been tested. To date, we have demonstrated that probes with GaN nanowire tips enable increased sensitivity for RF/microwave measurements and significantly improve the mechanical robustness of the probe, while minimizing the effects of stray capacitance. Ultimate goals of the work include wafer-scale fabrication of multifunction GaN nanowire probes as well as realization of true atomic-scale measurements with NSMM.

**Miesto konania: Ústav elektrotechniky, blok E-201, zasadačka**

**Dňa: 20. 3. 2014, o 13.30 hod. (trvanie cca 60 min)**

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