CENTER FOR NANOHYBRID FUNCTIONAL MATERIALS

MONDAY
APRIL 23, 2012
3:00 PM
237 SEC
SCOTT ENGINEERING CENTER

Dr. Andrei Kolmakov

Associate Professor, Department of Physics,
Southern Illinois University

Quasi 1D and 2D metal oxide nanostructures in chemical sensors and analytical systems

The progress in the development of the chemical sensors and micro analytical systems based on metal oxide quasi 1D (q1DMOX) and 2D (q2DMOX) materials will be reviewed. The design evolution of the sensing elements from random nanowire network and single 2D sheets to ultimately small single nanowire devices will be described. The performance, advantages, challenges and perspectives of such sensing systems will be analyzed.

The development of simple, inexpensive, power efficient, robust and yet sensitive nanodevices for real-time analysis of the ambient gas is currently an imperative for environmental monitoring, bio-medical applications, food industry, homeland security and *etc.* Selectivity of these sensors remains to be a challenging task. One of the approaches to resolve this issue was based on mimicking the mammalian olfactory system, which nowadays is often referred to as the "electronic nose" (E-nose). The recent nanotechnology advancements allow the fabrication of the E-noses in the size domain where miniaturization of the "classical" thin film micro analytical systems encounters principal limitations. The evolution of the q1D and q2D MOX based sensors and electronic noses include: (i) single nanowire sensors, (ii) analytical systems-based distributed nanowire sensors and integrated sensors based on nanowire networks and, finally, (iii) the simplest and yet fully functioning E-nose made of an *individual* single-crystal metal oxide quasi-1D nanostructure. The designs, fabrication protocols and performance of these three generations of NW e-noses will be comparatively described. Novel emerging 2D materials and their potential for gas sensorics will be discussed.

Seminar hosted by Dr. Alex Sinitskii, UNL Department of Chemistry

University of Nebraska Lincoln