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## SEMINÁR ÚI SAV,

ktorý sa bude konať v utorok 18.6. 2019 o 14.00 hod.  
v zasadačke č.102, ÚI SAV

### Program:

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## "Fabrication and Field Emission Characteristics of Carbon-Based Nano Composite Materials"

### Abstract:

Sol-gel which contains iron atoms as the catalyst to grow carbon nanotube (CNT) by microwave plasma chemical vapor deposition system is studied. Comparing to the evaporation vapor deposition or sputter deposition, this method is more convenient and inexpensive to coat catalyst onto substrates. In addition, coating the sol-gel solution onto the microcrystalline diamond (MCD) film with the three-dimensional structure, such as the pyramid cave structure, shows the capability to grow the carbon nanotubes onto the three-dimensional structure uniformly. A field emission device of the MCD/CNT double-layered pyramid array has been fabricated. The double-layered material and pyramid array structure successfully decrease the turn-on field and the screening effect, respectively. The turn-on field of MCD/CNT double-layered pyramid array is 2.84 V/ $\mu\text{m}$  and the lifetime is more than 100 hours.

In addition, a novel three-dimensional nanostructured carbon material, named carbon nano-flake ball (CNFB), is grown by microwave plasma chemical vapor deposition system. The coverage of the CNFBs can be controlled by the different pretreatment methods and improves the field emission characteristics. The pretreatment methods include coating sol-gel, scratching, and ultrasonication. The lowest turn-on field is 2.13 V/ $\mu\text{m}$ , and the current density can reach 1 mA/cm<sup>2</sup> at 2.98 V/ $\mu\text{m}$ . The maximum current density is 6.61 mA/cm<sup>2</sup>. The lifetime is more than 70 hours. The growth mechanism of CNFB is also proposed.

The carbon nano-flake ball and carbon nanotube hybrid material shows excellent field emission properties. The maximum current density reaches 57 mA/cm<sup>2</sup> and it can operate at 1 and 0.1 mA/cm<sup>2</sup> for more than 300 hours. As far as we know, this could be the longest lifetime using carbon material as field emission cathode.

Tešíme sa na stretnutie s Vami pri šálke kávy alebo čaju.

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