Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Imaging TiO_2 nanoparticles on GaN nanowires with electrostatic force microscopy[1] TING XIE, ECE, University of Maryland, College Park, BAOMEI WEN, N5 sensors, Inc, GUANNAN LIU, ECE, University of Maryland, College Park, SHIQI GUO, ECE, The George Washington University, ABHISHEK MOTAYED, N5 sensors, Inc, THOMAS MURPHY, IREAP, University of Maryland, College Park, R.D. GOMEZ, ECE, University of Maryland, College Park — Gallium nitride (GaN) nanowires that are functionalized with metal-oxides nanoparticles have been explored extensively for gas sensing applications in the past few years. These sensors have several advantages over conventional schemes, including miniature size, low-power consumption and fast response and recovery times. The morphology of the oxide functionalization layer is critical to achieve faster response and recovery times, with the optimal size distribution of nanoparticles being in the range of 10 to 30 nm. However, it is challenging to characterize these nanoparticles on GaN nanowires using common techniques such as scanning electron microscopy, transmission electron microscopy, and x-ray diffraction. Here, we demonstrate electrostatic force microscopy in combination with atomic force microscopy as a non-destructive technique for morphological characterization of the dispersed TiO_2 nanoparticles on GaN nanowires. We also discuss the applicability of this method to other material systems with a proposed tip-surface capacitor model.

[1]This project was sponsored through N5 Sensors and the Maryland Industrial Partnerships (MIPS, 5418).

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Date submitted: 05 Nov 2015 Electronic form version 1.4