Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Gas phase interactions with bare and gold nanoparticle decorated gallium nitride nanowires by ultraviolet photoelectron spectroscopy[1] ISHWAR NIRAULA, BLAISE-ALEXIS KENGNE, DAVID MCILROY, University of Idaho — Ultraviolet photoelectron spectroscopy (UPS) has been used to characterize the interaction of CO and H_2O with the surface of bare and gold nanoparticle (Au NP) decorated gallium nitride nanowires at 298 K, 77 K and 20 K. The average diameter of the Au NPs is 4.5 ± 0.5 nm and the average nanowire diameter is 105 ± 75 nm. CO and H_2O do not bond to the surface of the bare GaN nanowires at 298K, 77K, or 20K. Temperature dependent UPS analysis reveals that CO and H_2O weakly physisorbed to the Au NP decorated GaN nanowires with heats of adsorption of 4.37 ± 0.03 meV and 1.25 ± 0.04 meV , respectively. The adsorption at 298K of 50 Langmuir of CO followed by 50 Langmuir of H_2O showed that CO adsorption promotes H_2O adsorption, while 50 Langmuir of H_2O followed by 50 Langmuir of CO showed that H_2O inhibits CO adsorption. The findings of this study that the adsorption of H_2O inhibits CO adsorption onto the Au NP-GaN nanowires explains previous studies of the gas sensing properties of mats of Au NP- GaN nanowires.

[1]The University of Idaho BANTech (Biological Applications of Nanotechnology) Initiative and the Office of Naval Research (Grant # N00014-10-1-0282).

Ishwar Niraula
University of Idaho

Date submitted: 28 Oct 2011 Electronic form version 1.4