Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Sensing of NO_2 with Zirconium Hydroxide via Electrical Impedance Spectroscopy[1] COLEMAN HARRIS, The University of Alabama, JENNIFER SOLIZ, US Army Edgewood Chemical Biological Center, ANDREW KLEVITCH, The University of Alabama, JOSEPH ROSSIN, Guild Associates, Inc., AUGUSTUS FOUNTAIN III, GREGORY PETERSON, US Army Edgewood Chemical Biological Center, ADAM HAUSER, The University of Alabama — Nitrogen Dioxide (NO_2) is a brown gas mainly produced as a byproduct of burning fossil fuels, such as automobiles and power plants. Nitrogen oxides can form acid rain and smog by reacting with air, can form toxic organic nitrates by reacting with soil, and can react with oxygen in water, destroying marine life due to a lack of breathable oxygen. Any concentration beyond 53 ppb (air quality standard) can cause irritation to the lungs and respiratory infections, and higher dosages can be fatal. As such, research in NO_2 detection is incredibly important to human welfare. Zirconium hydroxide ($Zr(OH)_4$) has been investigated as a candidate NO_2 dielectric sensor using impedance spectroscopy analysis. Impedance changes of several orders of magnitude are seen down to our dosage minimum of 50 ppm•hr. Changes in impedance correlate with nitrogen and oxygen atomic ratio increases observed via X-ray photoelectron spectroscopy (XPS). The results indicate that $Zr(OH)_4$ may be a strong candidate for use in impedance-based NO2 detection devices.

[1]A.J.H., J.R.S., A.W.F. and G.W. P. acknowledge funding under Army Research Office STIR award W911F-15-1-0104. J.R.S. acknowledges funding under a NRC fellowship and is advised by Dr. Christopher Karwacki, ECBC.

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Date submitted: 06 Nov 2015 Electronic form version 1.4