Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Examination of Humidity Effects on Measured Thickness and Interfacial Phenomena of Exfoliated Graphene on $SiO_2$ via AC-AFM** KATHERINE JINKINS, JORGE CAMACHO, LEE FARINA, YAN WU, Univ of Wisconsin, Platteville — Tapping (AC) mode Atomic Force Microscopy (AFM) is commonly used to determine the thickness of graphene samples. However, AFM measurements have been shown to be sensitive to environmental conditions such as adsorbed water, in turn dependent on relative humidity (RH). In the present study, AC-AFM is used to measure the thickness and loss tangent of exfoliated graphene on silicon dioxide ($SiO_2$) as RH is increased from 10% to 80%. We show that the measured thickness of graphene is dependent on RH. Loss tangent is an AFM imaging technique that interprets the phase information as a relationship between the stored and dissipated energy in the tip-sample interaction. This study demonstrates the loss tangent of the graphene and oxide regions are both affected by humidity, with generally higher loss tangent for graphene than $SiO_2$. As RH increases, we observe the loss tangent of both materials approaches the same value. We hypothesize that there is a layer of water trapped between the graphene and $SiO_2$ substrate to explain this observation. Using this interpretation, the loss tangent images also indicate movement and change in this trapped water layer as RH increases, which impacts the measured thickness of graphene using AC-AFM.

Katherine Jinkins
Univ of Wisconsin, Platteville

Date submitted: 16 Dec 2014 Electronic form version 1.4