Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Modeling large screening length effects in Electrostatic Force Microscopy P.L. LANG, LPEM, ESPCI-ParisTech-UPMC-CNRS, Paris, France; School of Science, BUPT, Beijing, China, A. MOTTAGHIZADEH, LPEM, ESPCI-ParisTech-UPMC-CNRS, Paris, France, L. CUI, LPEM, ESPCI-ParisTech-UPMC-CNRS, Paris, France; IOP and Beijing National Laboratory for Condensed Matter Physics, CAS, Beijing, China, A. ZIMMERS, H. AUBIN, LPEM, ESPCI-ParisTech-UPMC-CNRS, Paris, France, J. LI, D.N. ZHENG, IOP and Beijing National Laboratory for Condensed Matter Physics, CAS, Beijing, China — Electrostatic Force Microscopy (EFM) and its variants such as Kelvin Probe Microscopy (KPM) are ordinarily used to image charged states or electrochemical surface potentials. However, EFM can also be used to measure the local capacitance between the tip and the substrate. For perfectly metallic substrates, this capacitance is purely geometrical, i.e. it is set by the tip shape and substrate geometry. In semi-metals with long screening length, the measured capacitance contains a "quantum" component, which is set by the electronic compressibility. Using finite element calculations, we demonstrate that this quantum capacitance component can be measured by EFM. We apply these calculations to the analysis of EFM data on magnetite nanoparticles presented by A. Mottaghizadeh during this meeting.

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Date submitted: 27 Nov 2011 Electronic form version 1.4