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Electrostatic Force Microscopy of Fe_3O_4 nanoparticles A. MOTTAGHIZADEH, LPEM, ESPCI-ParisTech-UPMC-CNRS, Paris, France, P.L. LANG, LPEM, ESPCI-ParisTech-UPMC-CNRS, Paris, France; School of Science, BUPT, Beijing, China, L. CUI, LPEM, ESPCI-ParisTech-UPMC-CNRS, Paris, France; IOP and Beijing Nat. Lab. for Cond. Matt. Phys., CAS, Beijing, China, J. LESUEUR, A. ZIMMERS, H. AUBIN, LPEM, ESPCI-ParisTech-UPMC-CNRS, Paris, France, J. LI, D.N. ZHENG, IOP and Beijing Nat. Lab. for Cond. Matt. Phys., CAS, Beijing, China, V. REBUTTINI, Dept. of Chemistry, CICECO, University of Aveiro, Aveiro, Portugal, N. PINNA, Dept. of Chem., CICECO, Univ. of Aveiro, Portugal; WCU, C2E2, School of Chem. and Biological Engineering, College of Engineering, SNU, Seoul, Korea — The electronic compressibility is a fundamental property that characterizes the electronic properties of materials submitted to an external electric field. In metals (insulators), the electronic compressibility is large (small) and leads to a small (large) screening length. Variations of the screening length can be observed through measurements of the "quantum" capacitance between one material and a metallic counter-electrode. Using an Electrostatic Force Microscope (EFM), we measured maps of the local capacitance of 8 nm magnetite nanoparticles synthesized following the "benzyl alcohol route" deposited on a metallic substrate. Magnetite, an inverse spinel structure of composition Fe_3O_4, is a material with strongly correlated electronic properties and presents a metal-insulator transition at 120 K, the so-called Verwey transition. We present EFM measurements of these nanoparticles as a function of tip-sample distance and temperature.

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