Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Attraction between charged silica spheres at a water-air interface[1]

PENGER TONG, WEI CHEN, Department of Physics, Hong Kong University of Science & Technology, SUSHENG TAN, WARREN T. FORD, Department of Chemistry, Oklahoma State University — Charged colloidal particles at aqueous interfaces are found to experience attractive interactions but the origin of such attraction is not well understood. Here we report an experimental study of attractive interactions between micron- sized charged silica spheres at a water-air interface. Atomic force microscopy is used to examine the charge distribution of the silica surface. Digital video microscopy is used to measure the equilibrium pair potential between the interfacial silica spheres over varying salt concentrations in the aqueous phase. It is found that the measured interaction potential U (r) has an energy barrier with height $\sim 0.15\ k_BT$ at large particle separation r. For smaller separations, U(r) has an attractive well of order $0.3k_BT$. At even smaller separations, the usual Coulomb repulsion dominates. The experimental observation can be explained in terms of a balance between the screened Coulomb repulsion and unscreened dipole interactions.

[1]Work supported in part by the Research Grants Council of Hong Kong SAR under Grant No.

Penger Tong
Department of Physics, Hong Kong University of Science & Technology

Date submitted: 05 Dec 2005 Electronic form version 1.4