

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**How accurate is the Poisson-Boltzmann theory for monovalent ions near highly charged interfaces?**<sup>1</sup> WEI BU, ALEX TRAVESSET, DAVID VAKNIN, Ames Laboratory, Iowa State University — Monovalent ion distributions next to highly charged interfaces were determined by synchrotron surface X-ray sensitive techniques. A lipid phosphate (dihexadecyl hydrogen-phosphate) was spread as a monolayer at the air-water interface, containing CsI at various concentrations. Using anomalous reflectivity off and at the  $L_3$  Cs<sup>+</sup> resonance, we provide, for the first time, spatial counterion distributions (Cs<sup>+</sup>) next to the negatively charged interface over a wide range of ionic concentrations. We argue that at low salt concentrations and for pure water the enhanced concentration of hydroniums H<sub>3</sub>O<sup>+</sup> at the interface leads to proton-transfer back to the phosphate group by a high contact-potential, whereas high salt concentrations lower the contact-potential resulting in proton-release and increased surface charge-density. The experimental ionic distributions are in excellent agreement with a renormalized-surface-charge Poisson-Boltzmann theory without fitting parameters or additional assumptions.

<sup>1</sup>The MUCAT sector at the APS and the use of the APS are supported by the U.S. DOE, Basic Energy Sciences through Ames Laboratory under Contracts No. W-7405-Eng-82, and No. W-31-109-Eng-38, respectively.

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Date submitted: 15 Jan 2006

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