

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

**Stresses due to Squeeze Flow between Particles Surrounded by
an Electrolyte Solution with Application to Lithium-Ion Batteries¹** A.T.

CONLISK, CONG ZHANG, The Ohio State University — Large stresses are induced during lithium-ion battery charging and discharging, termed intercalation and deintercalation stresses. Current models of the stresses in lithium-ion batteries in the literature seldom consider the influence of the interaction between the particles within the electrodes on the stress distribution. The particles within lithium-ion battery electrodes can undergo relative motion with relative velocities of different magnitudes and directions. One important mode of motion manifests itself as two particles approaching each other. The interaction is mediated by the electrolyte between the particles. The relative motion of the particles induces significant pressures and the primary objective of this work is to propose a source of mechanical stresses as a consequence of the dynamic squeezing motion as opposed to a static environment considered in the battery literature. Other applications in the biomedical field are also discussed.

¹Supported by DOE Graduate Automotive Technology Education (GATE), OSU Center for Automotive Research and OSU NSEC Center for the Affordable Nano-engineering of Polymeric Biomedical Devices.

A. T. Conlisk
The Ohio State University

Date submitted: 02 Aug 2013

Electronic form version 1.4