

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Ion Sensors based on Polyelectrolyte Hydrogels DAVID HOAGLAND, DOUGLAS W. HOWIE, JR.¹, Univ. of Massachusetts Amherst — Attaching a thin polyelectrolyte hydrogel layer to a quartz crystal microbalance (QCM) potentially enables a new class of online ion-sensing devices. The device's operating principal would be conceptually straightforward: ions of a liquid under examination, upon ion exchange with counterions of the hydrogel layer, alter the layer's mass and thus the QCM's resonant frequency. To examine device feasibility, we have grafted thin, chemically crosslinked poly(allylamine) chloride hydrogels to the gold electrodes of a thickness-shear-mode QCM. In otherwise pure water, the resulting devices are easily able to detect nitrate ions at the hundreds of ppm level, displaying sensitivity suitable for drinking water evaluation. The physics of these devices, however, are not well understood. Questions regarding ion selectivity as well as optimal layer thickness and stiffness must be addressed before routine use is considered. Polyelectrolyte and viscoelastic aspects of these questions will be addressed in this presentation.

¹now at General Electric

David Hoagland
University of Massachusetts Amherst

Date submitted: 01 Dec 2004

Electronic form version 1.4