

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Transient Capacitance of Light-Emitting Electrochemical Cells¹

NANCY HAEGEL, YEVTTE DAVIS, PETER CROOKER, Naval Postgraduate School, J. DEVIN MACKENZIE, YUKA YOSHIOKA, Add-Vision, Inc. — Although the steady-state behavior of light-emitting electrochemical cells (LECs) has been addressed theoretically, the transient properties of LECs have yet to be studied in detail. We present time- and frequency-dependent measurements of the capacitance, current, and optical emission of LECs as a constant voltage bias is applied and removed. We find that the capacitance increases more rapidly than the light or current and, unlike the light and current behavior, can be oscillatory and even negative at lower frequencies. Variable temperature experiments were performed to enable observation of a range of transient phenomena that cannot be fully explored at room temperature. The transient behavior suggests that the capacitance is determined by a combination of ion distribution, free carrier screening, and junction width. We interpret our data by qualitatively extending the ideas of existing steady-state theory.

¹Supported by NSF Grant 0804527 and DOD Rapid Reaction Office

Peter Crooker
Naval Postgraduate School

Date submitted: 10 Nov 2011

Electronic form version 1.4