Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

On the Surface Tension of Nanobubbles[1] HAIM BAU, JOSEPH GROGAN, MICHAEL NORTON, University of Pennsylvania, FRANCES ROSS, IBM T.J. Watson Research Center — Using our custom-made liquid cell, the nanoaquarium [1], we imaged with a transmission electron microscope the formation, growth, and detachment of single nanobubbles, nucleating in a supersaturated aqueous solution [2]. The supersaturation results from electron-induced radiolysis of water. The bubbles are first observed when their radii are about 20nm and detach when their radii are about 200nm. Based on our experimental data, we determined the bubbles' growth rates as functions of time, and found the growth rates to be highly reproducible and nearly independent of time (and bubbles' radii). Comparison of the theoretical predictions for bubble growth rate with our experimental observations suggests that the surface tension of the bubble-liquid interface must depend on the bubble's radius.

[1] Grogan J., and Bau, H., H., 2010, IEEE/ASME Journal of Microelectromechanical Systems 19 (4) 885-894.
[2] http://arxiv.org/abs/1210.3380

[1]The work was supported, in part, by NSF grants 1066573 and 1129722.

Haim Bau
University of Pennsylvania

Date submitted: 02 Aug 2013 Electronic form version 1.4