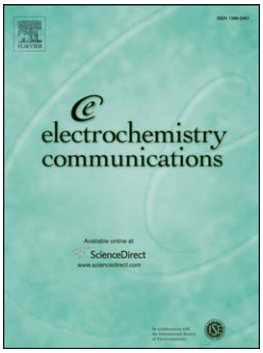

Generation and stability of freestanding aqueous microbubbles

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PII: S1388-2481(17)30021-8
DOI: doi:10.1016/j.elecom.2017.01.012
Reference: ELECOM 5861

To appear in: *Electrochemistry Communications*

Received date: 13 January 2017
Revised date: 13 January 2017
Accepted date: 17 January 2017

Please cite this article as: J.M.D. Coey, Matthias Möbius, Alice Gillen, Siddhartha Sen, Generation and stability of freestanding aqueous microbubbles, *Electrochemistry Communications* (2017), doi:10.1016/j.elecom.2017.01.012

Generation and stability of freestanding aqueous microbubbles

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Abstract. A new type of aqueous bubble, composed of a spherical liquid film with inner and outer gas/liquid interfaces, is generated during electrolysis of acidified water at a transparent platinum cathode. These quasi-stable freestanding hydrogen-filled microbubbles are studied by high-speed photography in an inverted microscope. Their radii are in the range 2–8 μm and the film thickness is about 5% of the radius. Extrapolated lifetimes at the cathode are 3–10 s, although the microbubbles collapse prematurely into sessile droplets. Their stability is attributed to interfacial diffusion barriers related to coherent scattering of hydrogen gas by a surface layer of correlated water molecules.

Keywords: microbubbles; microcapsules; electrolysis; hydrogen diffusion; homogeneous nucleation; quantum fluctuations