

**Supporting Material for**

**Integration of microplasma with transmission electron microscope: Real-time  
observation of gold sputtering and island formation**

K. Tai,<sup>1</sup> T. J. Houlahan Jr.,<sup>2</sup> J. G. Eden,<sup>2</sup> and S. J. Dillon<sup>1</sup>

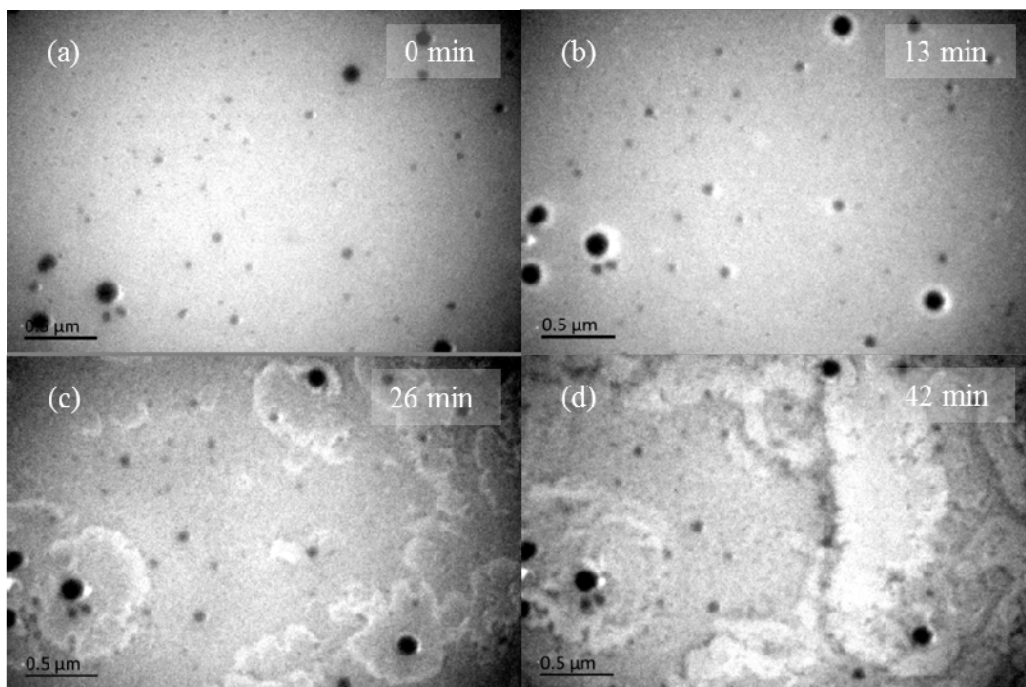
<sup>1</sup>*Department of Materials Science and Engineering, University of Illinois, Urbana,*

*IL 61801 USA*

<sup>2</sup>*Department of Electrical and Computer Engineering, University of Illinois,*

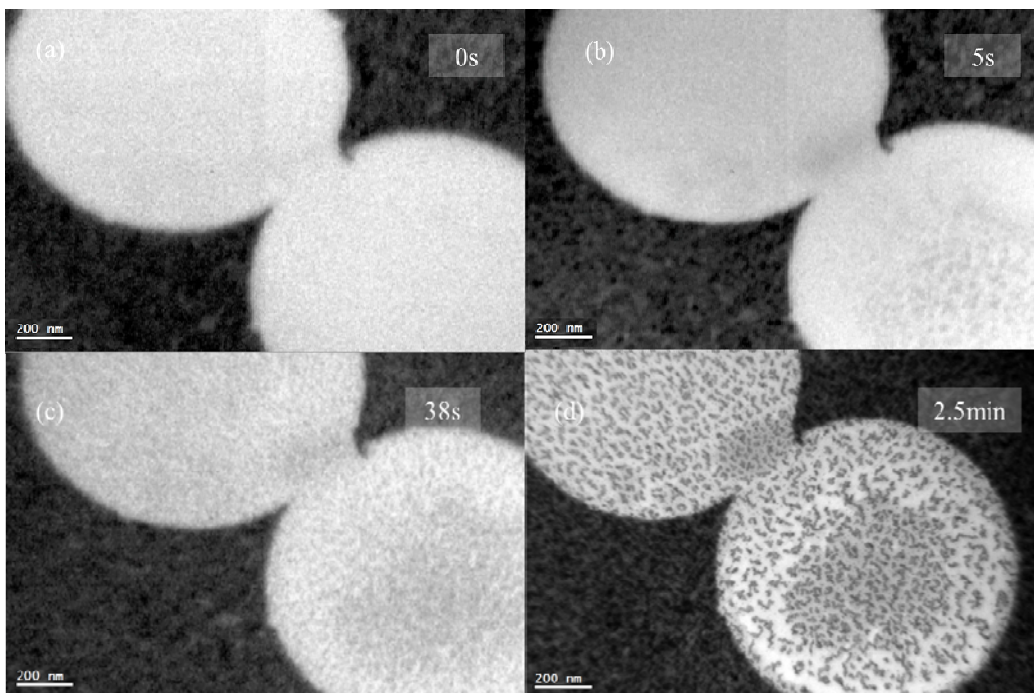
*Urbana, IL 61801 USA*

**S1.** In-situ TEM video of the plasma-sputtering of a gold cathode film. The video is played in 50× speed.

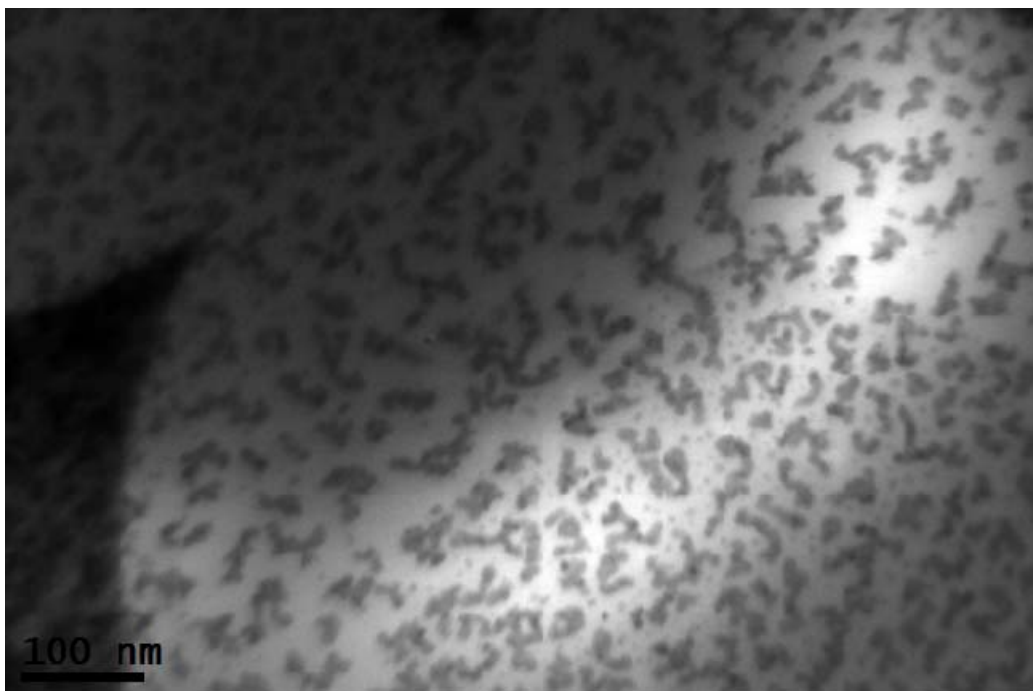


**S2.** Time-lapse bright field TEM images of the sputtering of Au film at the cathode side of the cell. (Note: the black spots are contamination particles).

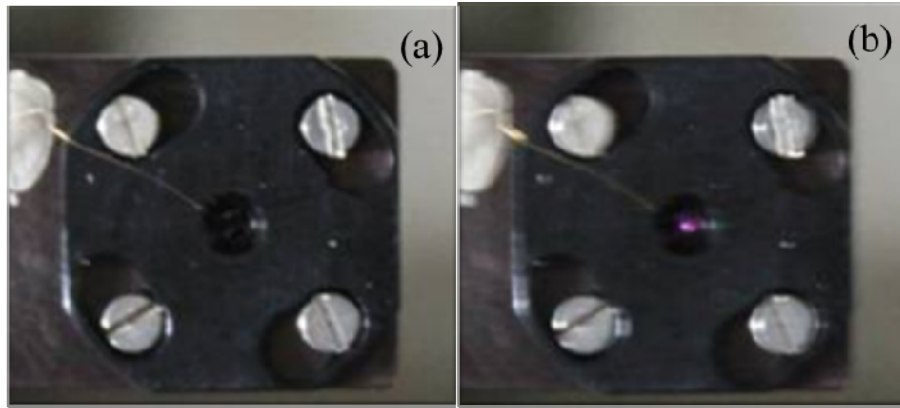
**S3.** In-situ TEM video of the plasma-deposition of gold on a region of the anode surface. The video is played in 16× speed.



**S4.** Time-lapse bright field TEM images of deposition of Au at the anode side of the cell.



**S5.** *Ex-situ* bright field TEM image of the Au deposition at the anode side of the cell, in which the nanosized Au islands with twins structures can be seen.



**S6.** In-situ optical images of plasma-microcell (a) before DC voltage applied, (b) generation of purple colored  $\text{Ar}^+$  plasma after DC voltage applied.