

Supporting Information

Highly Loaded Gold (Au) Nanoseeds with uniform distribution on 3D Carbon Foam for Long-Cycle Lithium-Metal Batteries

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Supplementary Figures

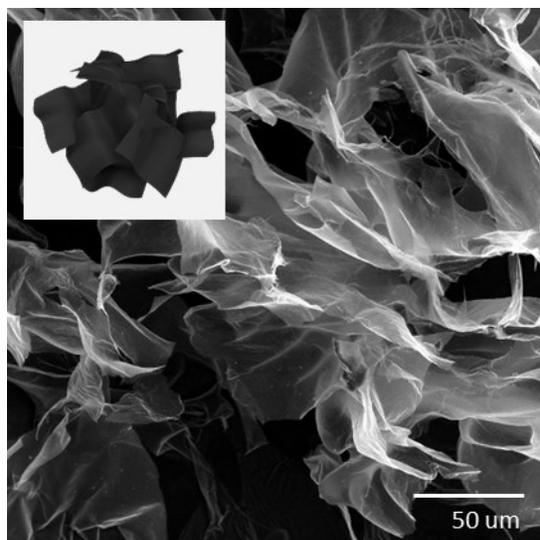


Fig. S1. SEM image of CC foam.

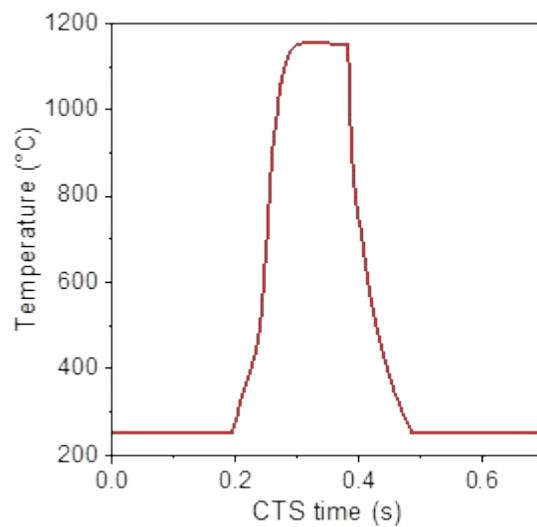


Fig. S2. Temperature profile during CTS process.

Temperature profile of Au/CCC foam was measured by infrared thermometer and it shows fast ramping time and cooling time during CTS.

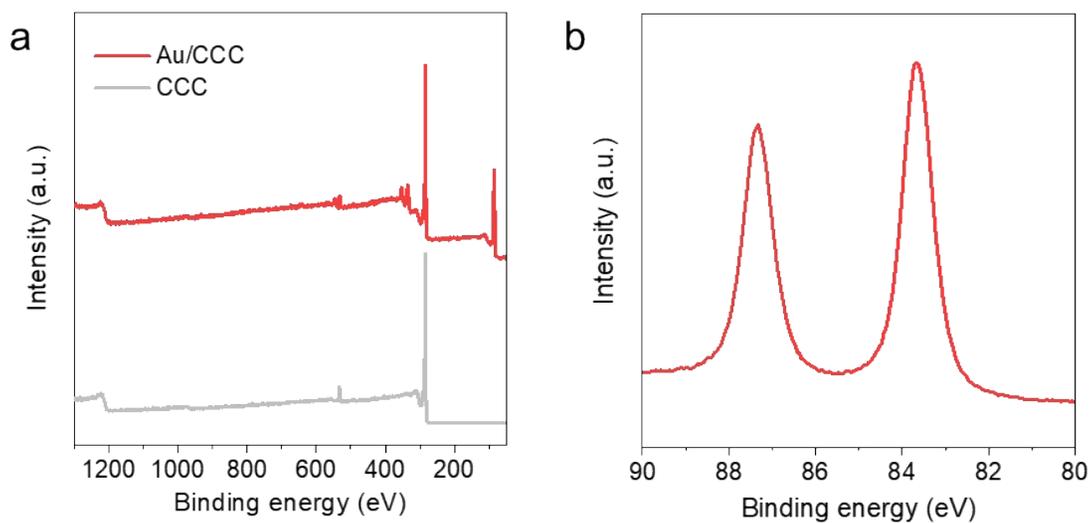


Fig. S3. a) XPS survey scan spectra of Au/CCC and CCC foams, and b) XPS Au 4f high-resolution corresponding Au of Au/CCC foam.

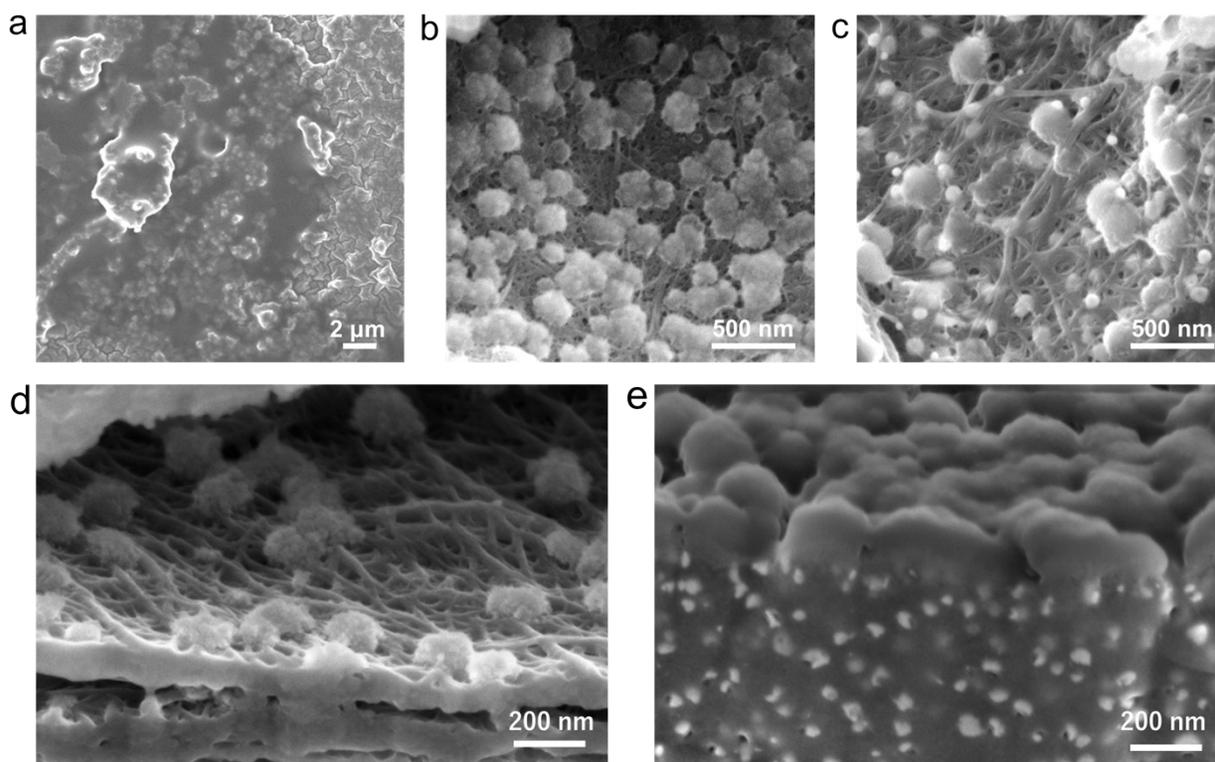


Fig. S4. SEM images of a) bare Cu foil, b) CCC and c) Au/CCC foams after initial lithium deposition of 0.1 mAh cm^{-2} . FIB-SEM images of d) CCC and e) Au/CCC after lithium of 1.0 mAh cm^{-2} .

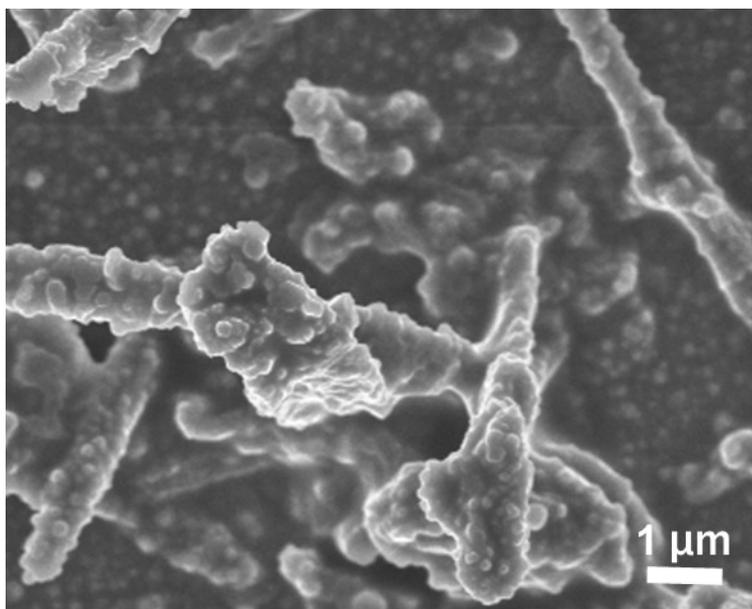


Fig. S5. SEM image of bare Cu foil after lithium deposition of 1.0 mAh cm⁻².

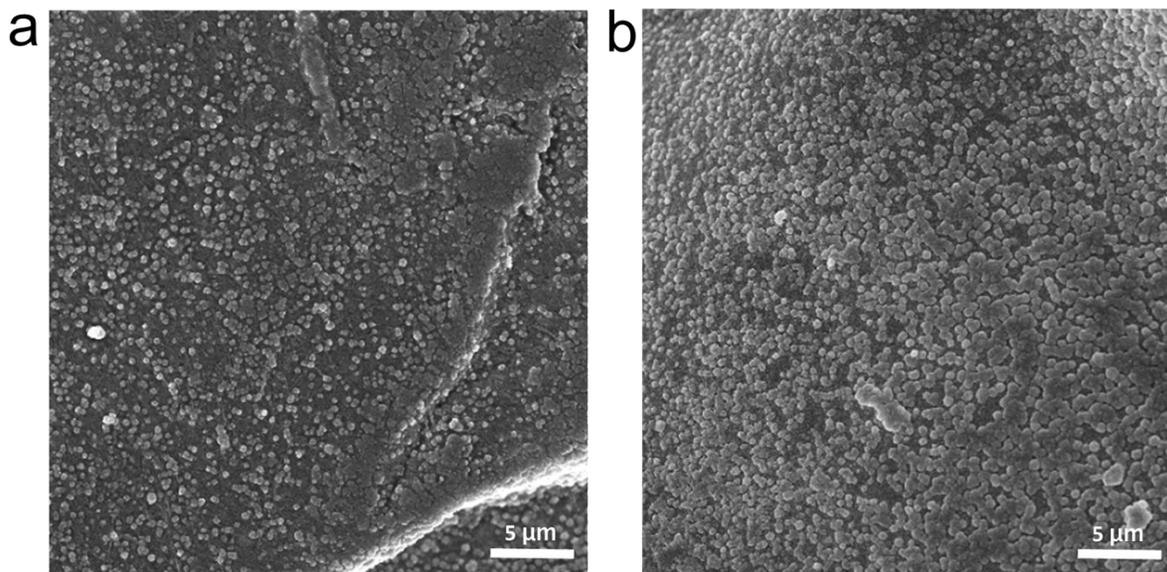


Fig. S6. Low magnification SEM images of a) CCC b) Au/CCC after initial lithium deposition of 0.1 mAh cm^{-2} .

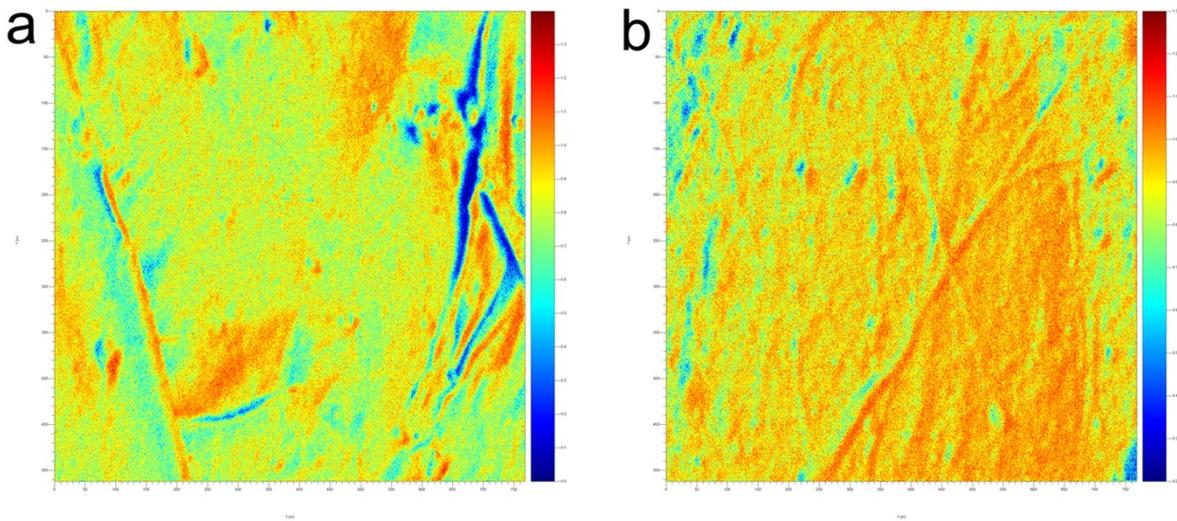


Fig. S7. SIMS images of lithium. a) CCC and b) Au/CCC.

Color intensity scale ranging from blue (low intensity) to red (high intensity).

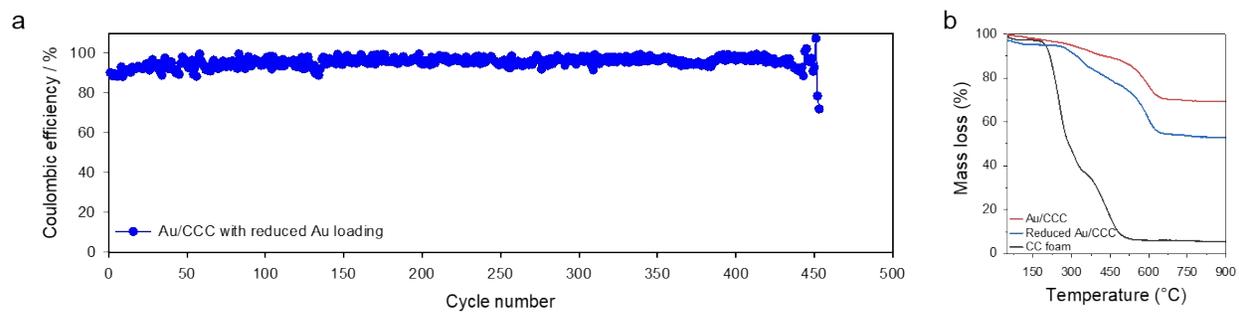


Fig. S8. Cyclic stability of Au/CCC with reduced Au loading. a) Cycle stability and b) TGA curves.

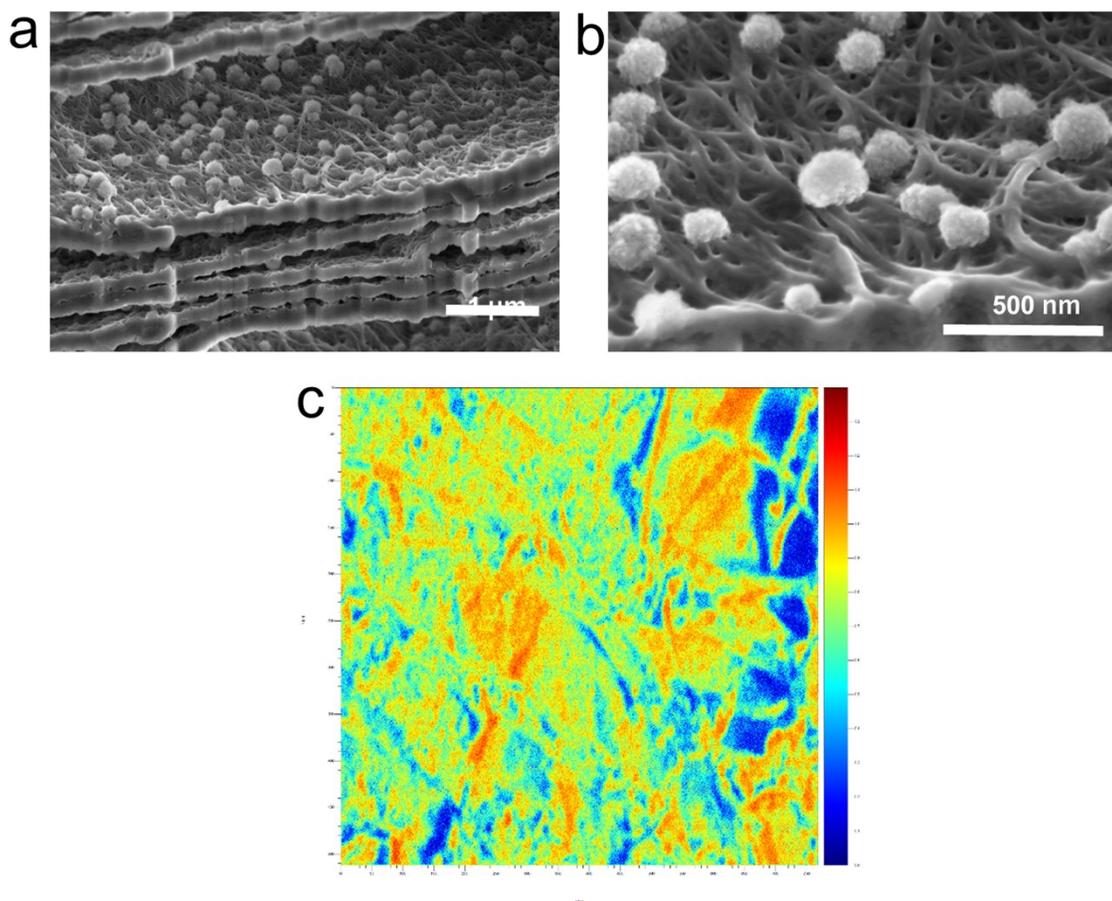


Fig. S9. Li deposition behavior of CCC physically mixed with Au nanoparticles a) low magnification SEM image, b) high magnification SEM image, and c) SIMS image after lithium deposition of 1.0 mAh cm^{-2} .

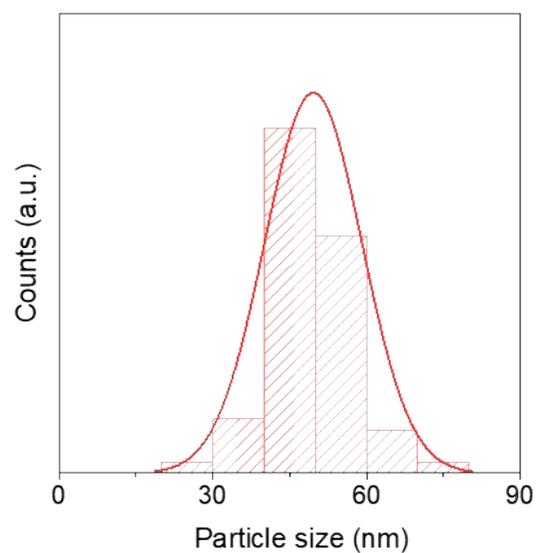


Fig. S10. Size distribution of Au/CCC after 650 cycles.

Particle sizes were collected from TEM image of Fig. 4d and showed similar particle size distribution which was compared to Au NPs before cycling.

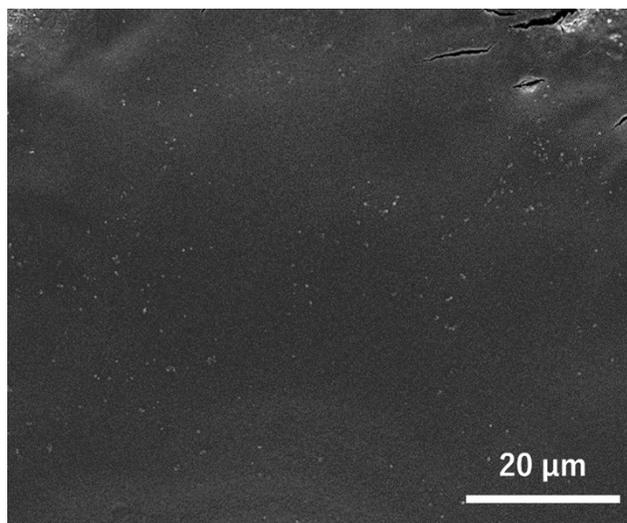


Fig. S11. *Ex situ* SEM image of Au/CCC after 600 cycles.

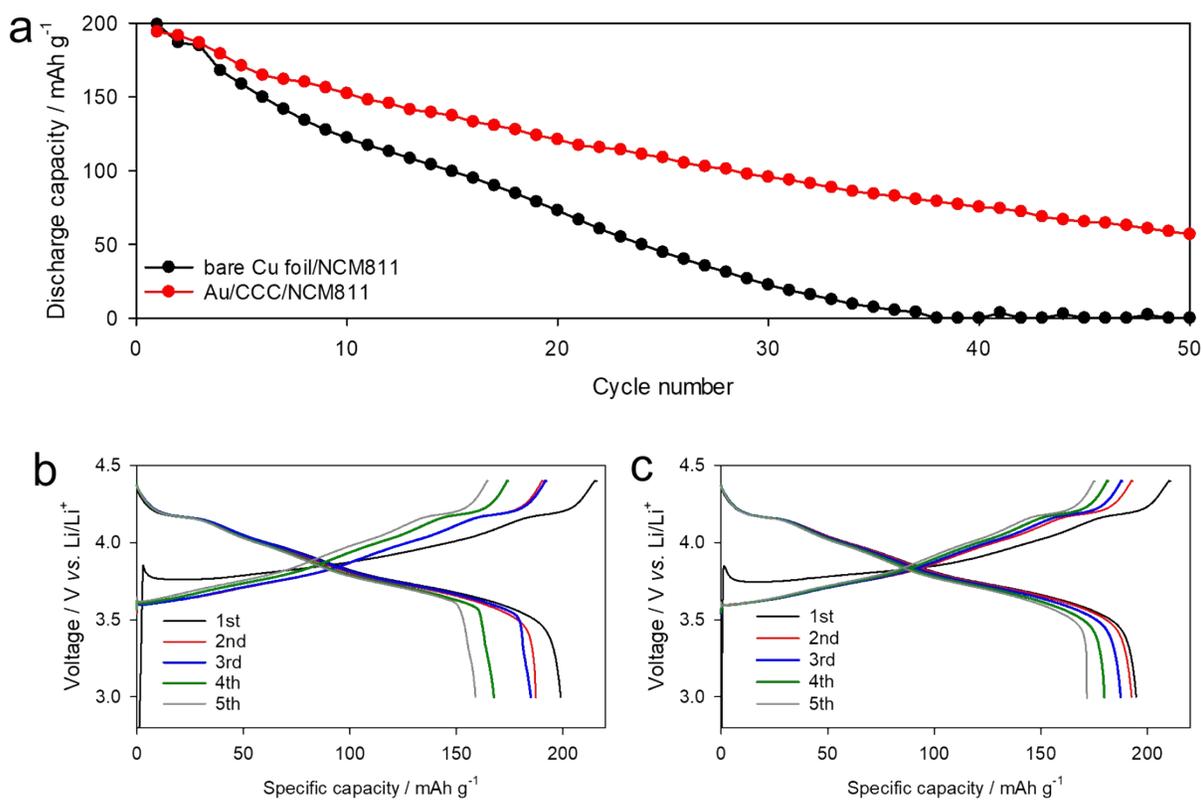


Fig. S12. $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ full cell assembled with the bare Cu foil and Au/CCC. a) Cyclic stability, b) voltage profiles of full cell with bare Cu, c) voltage profiles of full cell with Au/CCC.

The applied current density was 0.1C. The Au/CCC was pre-cycled in the voltage range of 0 to 1.2 V (vs. Li/Li^+) for 3 times before constructing full cell.