

## Electronic Supplementary Information

### **Patterning of Electrodes for Mechanically Robust and Bendable**

#### **Lithium-Ion Batteries**

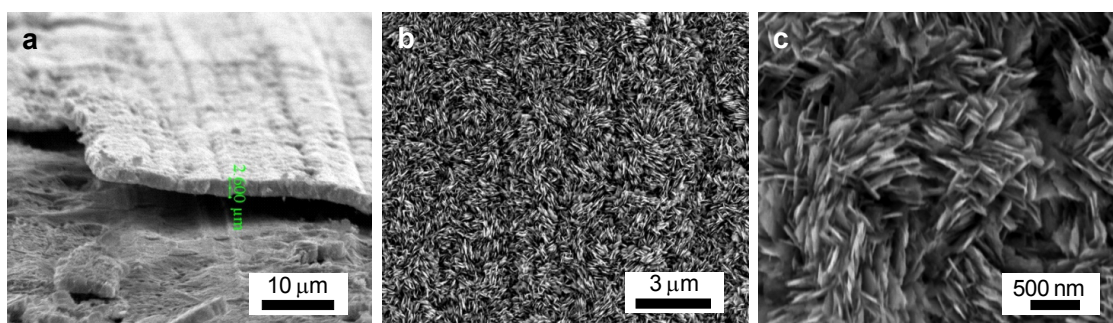
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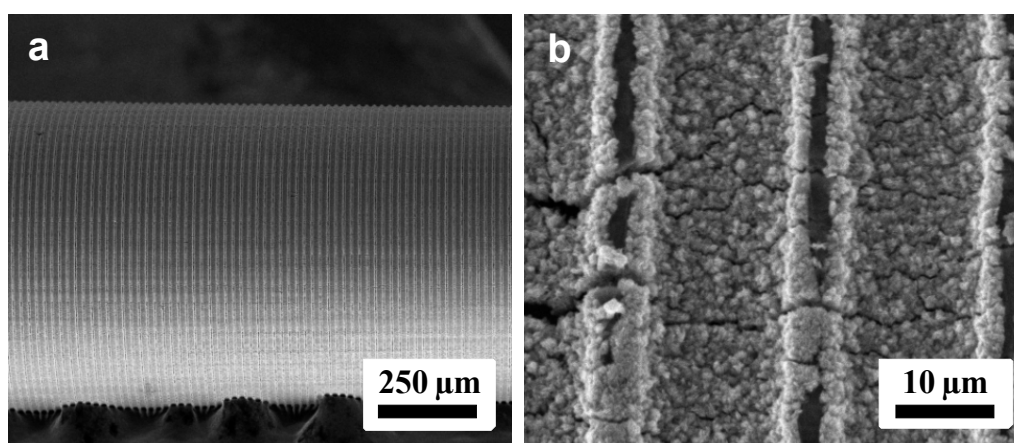
E-mail: spark@unist.ac.kr

#### **Experimental section**

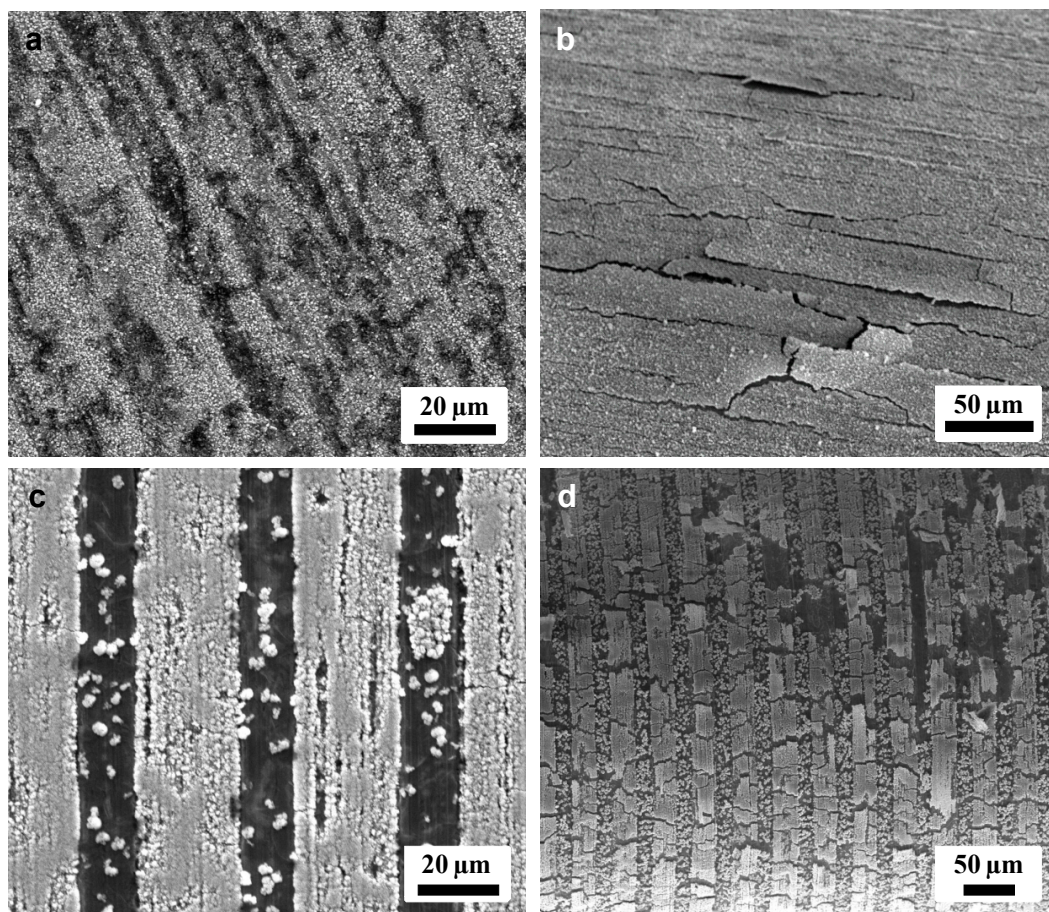
A layer of photoresist (Positive PR, AZ-5214E) was spin-coated at 2000 rpm for 60 sec onto a flat Cu substrate (50  $\mu\text{m}$  thick, 99.9%, Goodfellow) and developed after a UV(365nm)-mask illumination standard photolithography process (MA6, SUSS MicroTec) to make trench-type polymer patterns having dimension of 10  $\mu\text{m}$ . Subsequently, the PR patterned Cu foils were immersed in 20% copper chloride aqueous solution for 20 min to make trench-type Cu patterns having depth of 10  $\mu\text{m}$ . After growing copper oxide nanoflakes in a basic ammonia solution, the PR patterns were completely removed by immersing them in acetone.



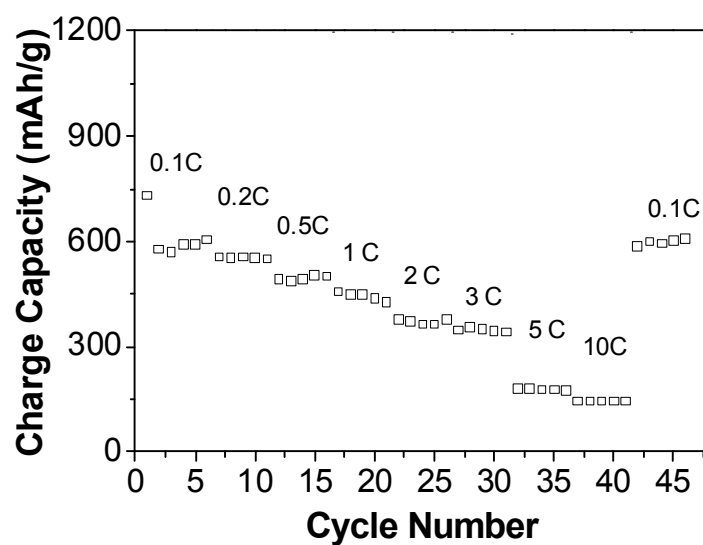
**Figure S1.** Three-dimensional hierarchical CuO nanoflakes grown on the flat Cu foil. a) SEM image showing thickness of CuO grown onto the Cu foil, b) SEM image showing CuO nanoflakes in a large area, and c) Magnified SEM image of hierarchical CuO flakes.



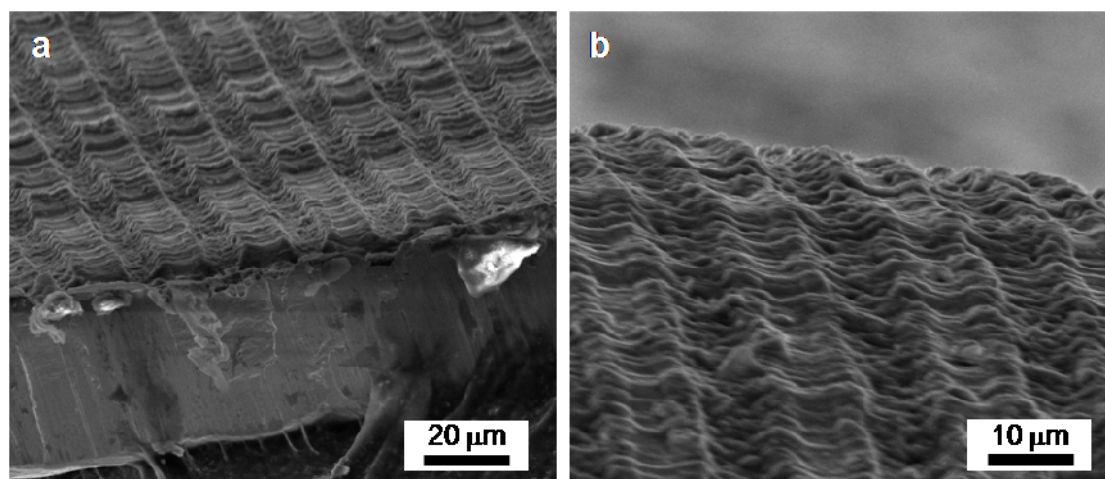
**Figure S2.** Morphologies of CuO nanoflakes after bending test. a) SEM image and b) magnified SEM image showing CuO flakes. When the etched trenches were vertical to the axis of the roll, many cracks of CuO flakes formed.



**Figure S3.** SEM images showing CuO active materials on Cu current collector after bending test. a) Etched but no patterned Cu surfaces, b) CuO materials detached from the etched Cu current collector after bending test, c) CuO flakes grown onto patterned but no etched Cu surfaces, and d) SEM image showing many cracks after bending of the sample seen in c).



**Figure S4.** Rate capabilities of CuO nanoflake anodes on a flat Cu current collector in the range of 0.1 – 10 C rates.



**Figure S5.** SEM images of CuO anodes on the patterned Cu current collectors after 100 cycles. a) Tilted view SEM image and b) the magnified SEM image. The CuO nanoflakes were aggregated and SEI layers on the surface of the CuO were formed.