Supporting Information

3D Hierarchical CuO Mesocrystals from Ionic Liquid Precursor: Towards Better Electrochemical Performance for Li-ion Batteries

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Results and Discussion

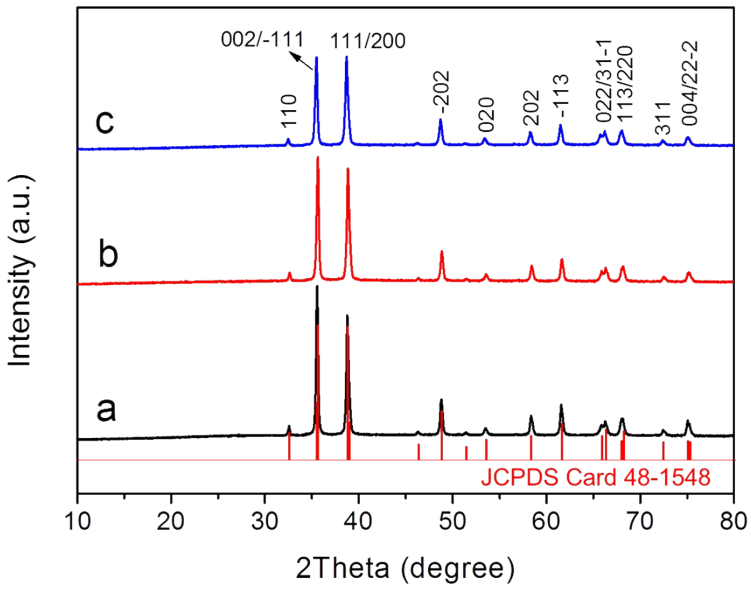

Figure S1. XRD patterns of as-prepared CuO samples at different concentrations of [Bmim]Cl: (a) 0 mmol, butterfly-like nanosheets; (b) 1 mmol, hierarchical mesocrystals composed of nanosheets; (c) 5 mmol, nanorods. All the diffraction peaks can be perfectly indexed to the monoclinic CuO (JCPDS Card 48-1548).

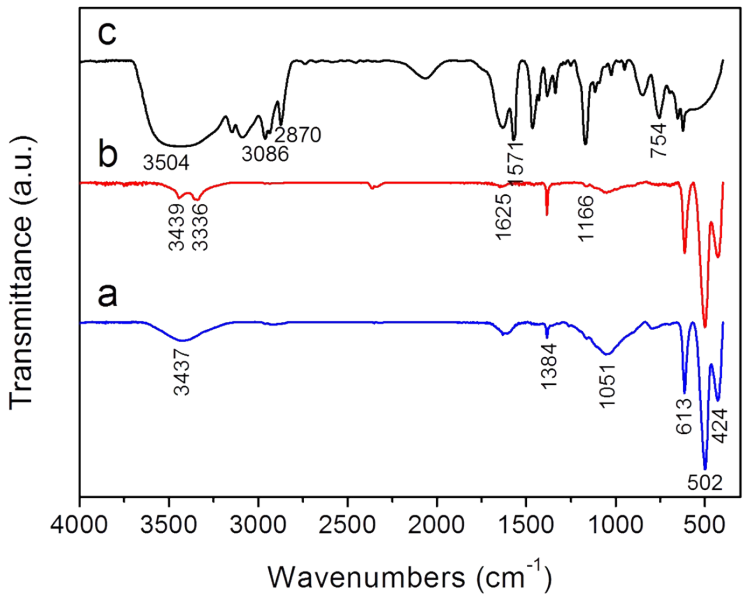

Figure S2. FT-IR spectra of (a) CuO, (b) [Bmim]Cl/CuO, and (c) [Bmim]Cl.

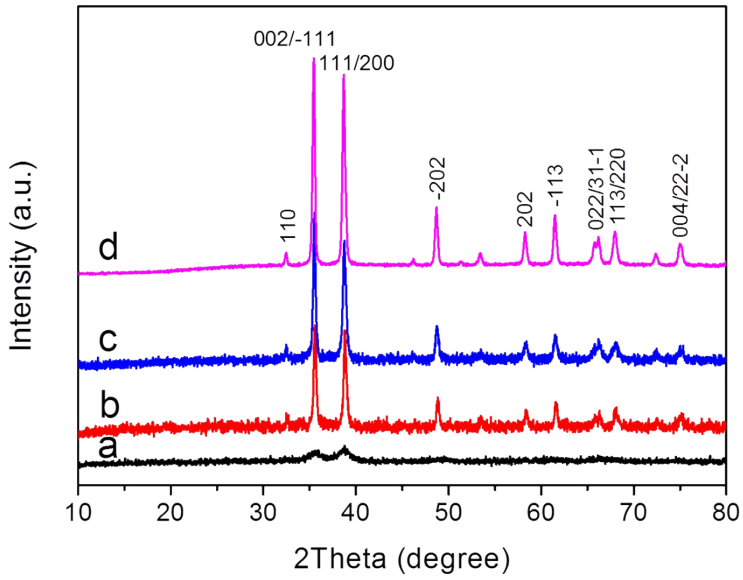

Figure S3. XRD patterns of as-prepared CuO samples at different reaction times: (a) 0.5 h; (b) 2 h; (c) 4 h; (d) 12 h. The diffraction peaks in b-d can be perfectly indexed to the monoclinic CuO (JCPDS Card 48-1548).

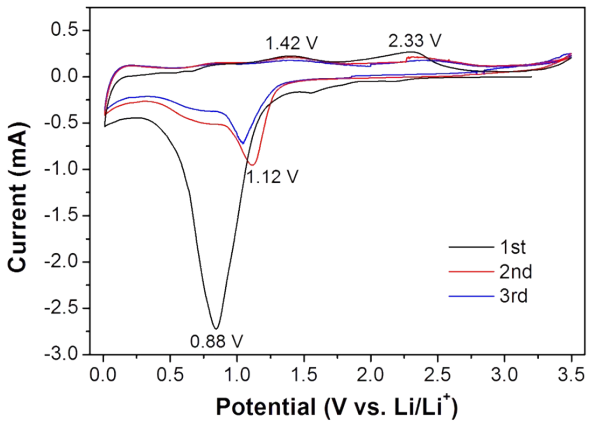

Figure S4. CV curves of CuO nanosheets obtained at a scanning rate of 0.1 mV s^{-1}. During the first discharging process, it is found that there are two reduction peaks located at 1.61 and 0.88 V, corresponding to electrochemical reactions that involve the intermediate copper oxide phase ($Cu_{1-x}^{II}Cu_x^{I}O_{1-x/2}$), the formation of Cu and Li_2O, respectively. Subsequently, during the charging process, two oxidation peaks located at about 1.42 and 2.33V can be assigned to the formation of Cu_2O and the oxidation of Cu_2O to CuO, respectively. In the subsequent cycles, the CV curves are very similar in shape expect the reduction peaks shift to higher potentials, while the oxidation peaks stay almost at the same locations.

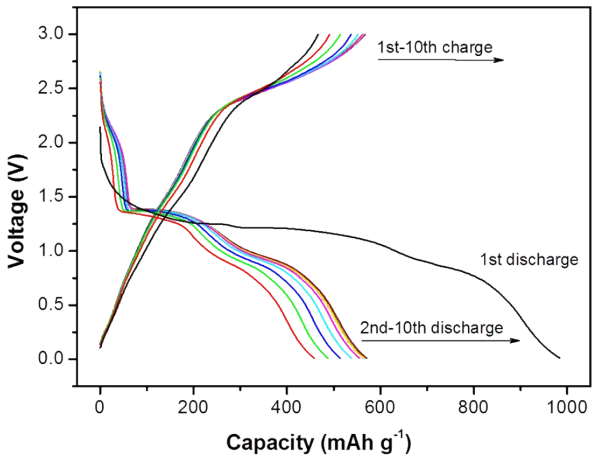

Figure S5. Galvanostatic charge-discharge curves of hierarchical CuO mesocrystalline electrode for the first ten cycles between 0.01 and 3 V at a current density of 67 mA g^{-1}.

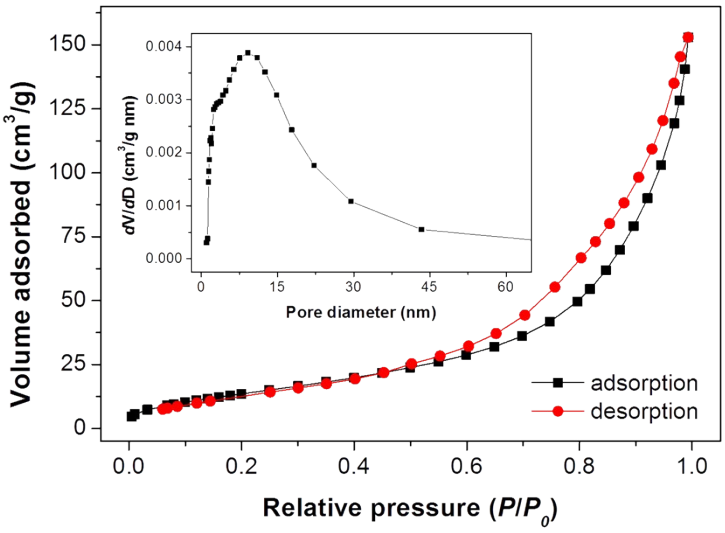

Figure S6. Nitrogen adsorption/desorption isotherms and the corresponding pore size distribution for the 3D hierarchical CuO mesocrystals. The BET surface area is about 45.2 m^2/g.

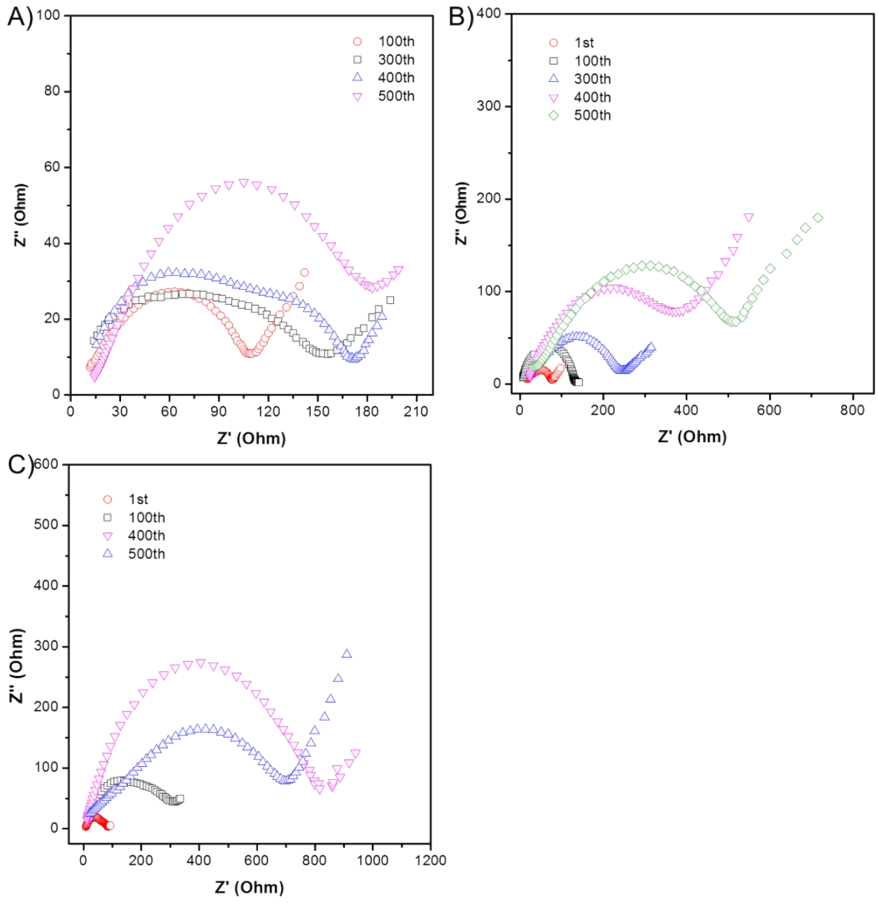

Figure S7. Nyquist polts of CuO electrodes at different cycle performance: (A) hierarchical CuO mesocrystals; (B) CuO nanosheets, and (C) CuO nanorods.

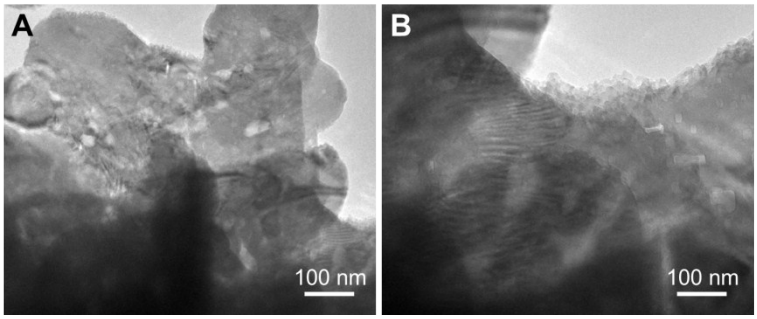

Figure S8. TEM images of the CuO mesocrystalline electrodes after 500 cycles.