Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Micro-nano structured Ni-MOFs as high-performance cathode catalyst of rechargeable Li–O_2 batteries

Xiaofei Hu, Zhiqiang Zhu, Fangyi Cheng, Zhanliang Tao and Jun Chen*

Contents

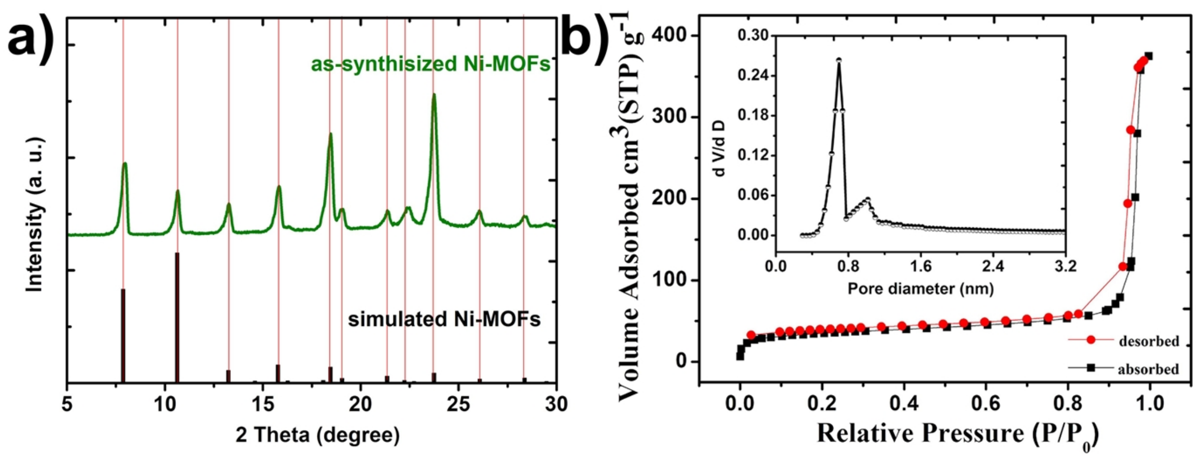

Fig. S1 (a) XRD patterns of the simulation and the as-synthesized sample of Ni-MOFs. **(b)** N_2 adsorption-desorption isotherms of Ni-MOFs. The inset is the pore-size distribution of Ni-MOFs.

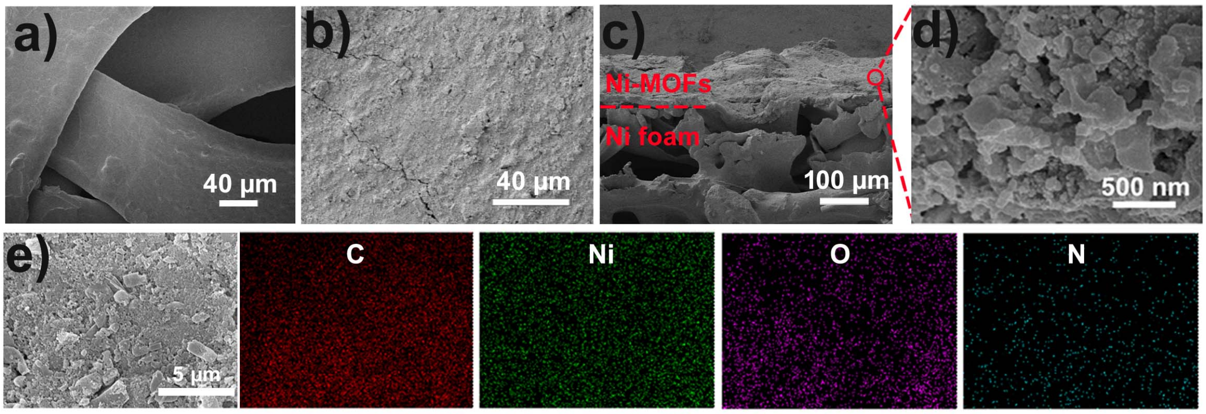

Fig. S2 (a) SEM image of the outside of Ni-MOFs-based cathode. We paste our Ni-MOFs-based catalyst only on the inner side of Ni foam, so the outside of the cathode actually is the pristine state of Ni foam. **(b)** SEM image of Ni-MOFs based cathode on the inner side (adjoin to separator of Li–O_2 cells). **(c)** SEM image of the cross section of Ni-MOFs based cathode with a Ni-MOFs layer (~100 μm in thickness) coating on a piece of Ni foam. **(d)** The enlargement image of the cross section of Ni-MOFs layer. **(e)** SEM image of inner side of Ni-MOFs based cathode and its distribution of C, N, O, and Ni elements.

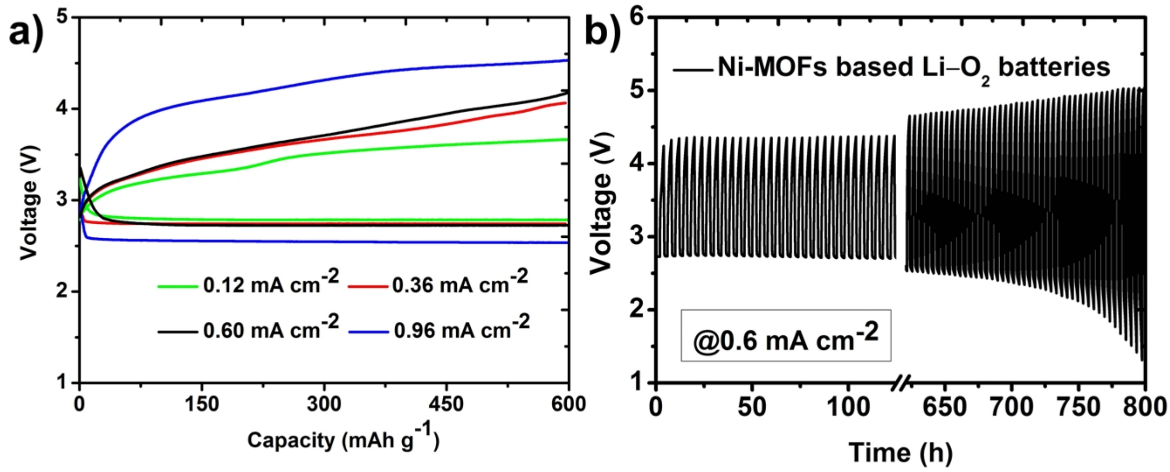

Fig. S3 (a) Rate capability of Ni-MOFs based Li–O_2 batteries in pure O_2 with fixed capacity of 600 mAh g^{-1}. **(b)** Cycling performance and voltage-time curves of Ni-MOFs based Li–O_2 batteries at 0.6 mA cm^{-2}. The capacity is based on the total mass loading on cathode including Ni-MOFs, VC-72, and binder. The current densities are based on current collector area.

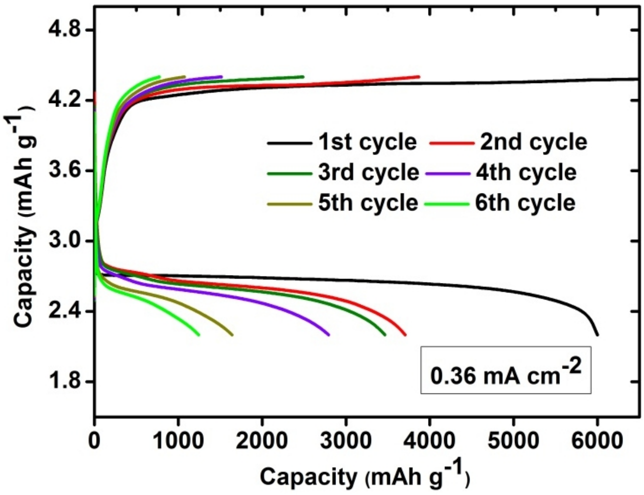

Fig. S4 Galvanostatic discharge–charge curves of Ni-MOFs based Li–O_2 batteries without controlling capacity.

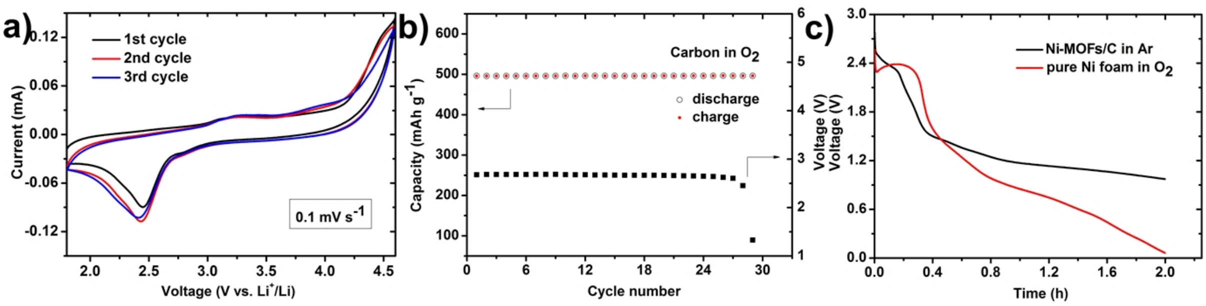

Fig. S5 (a) Cyclic voltammetry curves of Ni-MOFs based batteries in pure O_2. **(b)** Variation of voltage on the discharge terminal of C based Li–O_2 batteries. The current density is 0.12 mA cm^{-2} based on the current collector area. The capacity is based on the carbon mass on cathode. **(c)** Discharge curves of Ni-MOFs based batteries in Ar and pure Ni foam based batteries in O_2.

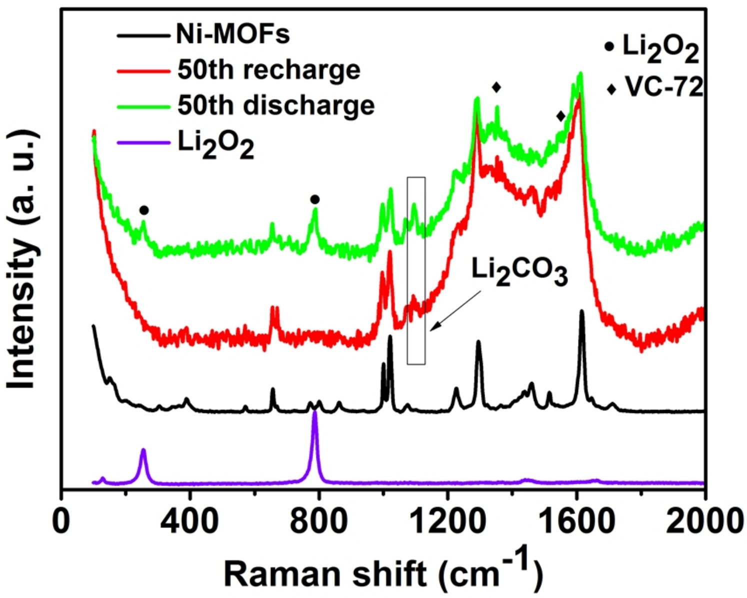

Fig. S6 Raman spectrum of Ni-MOFs-based cathode at different discharge/charge state.