

## Supporting information

### **Preparation and evaluation of mesoporous carbon derived from waste materials for hybrid-type Li-air batteries.**

Kyoung-ho Kim <sup>[a]</sup>\*, Minsoo P. Kim <sup>[b]</sup>, and Wang-Geun Lee <sup>[c]</sup>

<sup>[a]</sup> Department of Chemical Industry, Dong-Eui Institute of Technology (DIT), 54, Yangji-ro, Busanjin-gu, Busan, 47230, Republic of Korea.

<sup>[b]</sup> School of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology (UNIST), 50, UNIST-gil, Banyeon-ri, Eonyang-eup, Ulju-gun, Ulsan, 44949, Republic of Korea.

<sup>[c]</sup> Center for Superfunctional Materials, Ulsan National Institute of Science and Technology (UNIST), 50, UNIST-gil, Banyeon-ri, Eonyang-eup, Ulju-gun, Ulsan, 44949, Republic of Korea.

\*Correspondence should be addressed to Kyoung-ho Kim; kkim@dit.ac.kr;

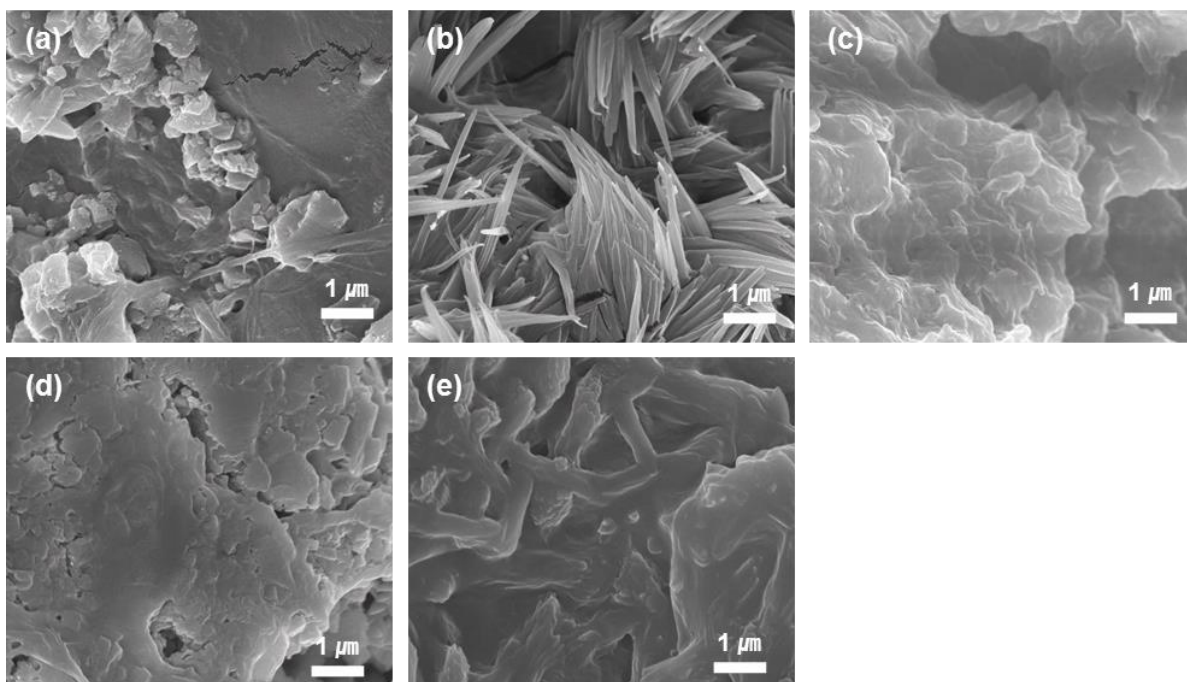


Figure S1. Surface SEM images of (a) waste paper, and (b) inside and (c) outside orange peel before hydrothermal treatment for MPC. Cross-sectional SEM images of (d) waste paper and (e) orange peel.

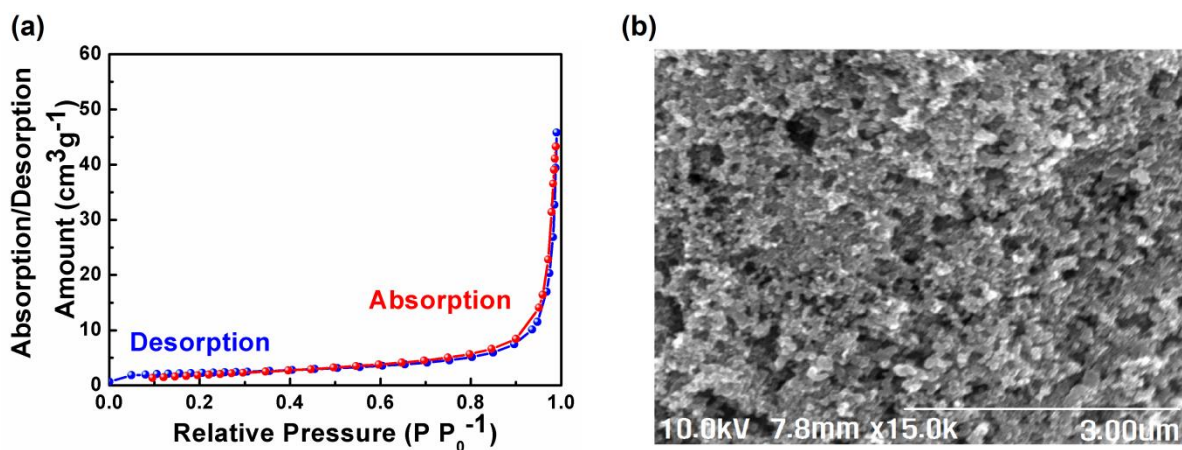


Figure S2. Surface area, surface morphology analysis of the Vulcan carbon black (Vulcan XC 72R); (a)  $N_2$  absorption-desorption measurements plot by use of BET calculation method, (b) SEM image.

**Table S1.** N<sub>2</sub> adsorption-desorption measurement data by use of BET calculation method of the synthesized MPC and Vulcan carbon black.

	MPC	Vulcan carbon black
Surface Area (m <sup>2</sup> g <sup>-1</sup> )	538.42	250.12
Total pore volume (P/P <sub>0</sub> =0.990, cm <sup>3</sup> g <sup>-1</sup> )	0.278	2.307
Average pore diameter (nm)	6.599	37.009

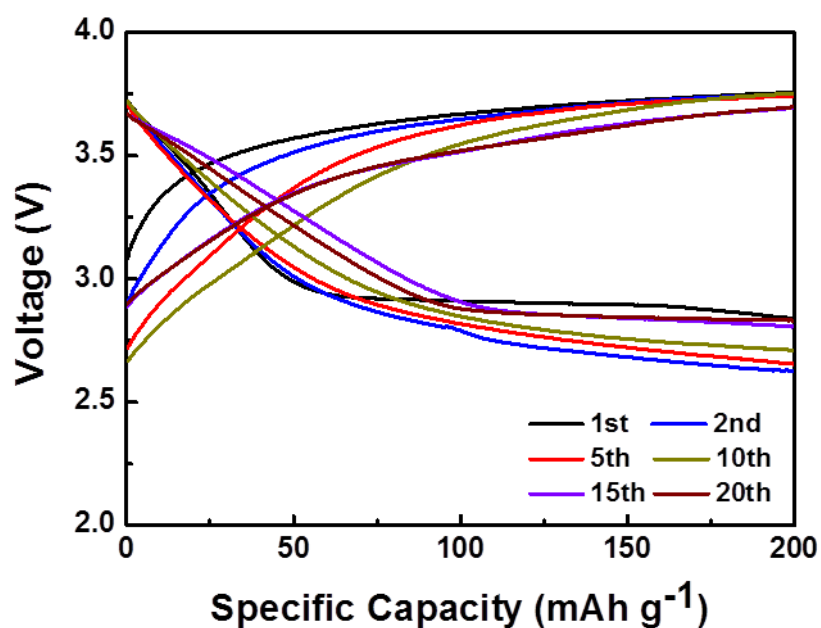


Figure S3. Cyclic galvanostatic charge-discharge curves of the hybrid-type Li-air battery with MPC during 20 cycles.

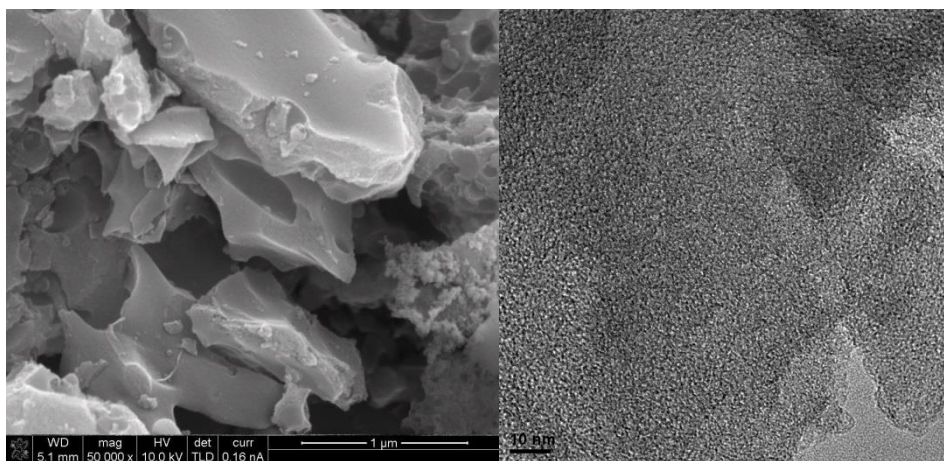


Figure S4. SEM & TEM images after electrochemical test.