

Supporting information

Rendering redox reactions of cathodes in Li-ion capacitors enabled by lanthanides

Kaiqiang Zhang^{†,‡}, Tae Hyung Lee[†], Mohammad A. Khalilzadeh[§], Rajender S. Varma^{*,||}, Ji-Won Choi^{*,‡}, Ho Won Jang^{*,†}, Mohammadreza Shokouhimehr^{*,†}

[†]Department of Materials Science and Engineering, Research Institute of Advanced Materials, Seoul National University, Seoul 08826, Republic of Korea

[‡]Electronic Materials Center, Korea Institute of Science and Technology (KIST), Seoul 136-791, Republic of Korea

[§]Department of Forest Biomaterials, College of Natural Resources, North Carolina State University, Raleigh, North Carolina 27607, United States

^{||}Regional Center of Advanced Technologies and Materials, Department of Physical Chemistry, Faculty of Science, Palacky University, Šlechtitelů 27, 783 71 Olomouc, Czech Republic

*Corresponding authors: varma.rajender@epa.gov (R.S.V.), jwchoi@kist.re.kr (J.-W. Choi), hwjang@snu.ac.kr (H. W. Jang), mrsh2@snu.ac.kr (M. Shokouhimehr)

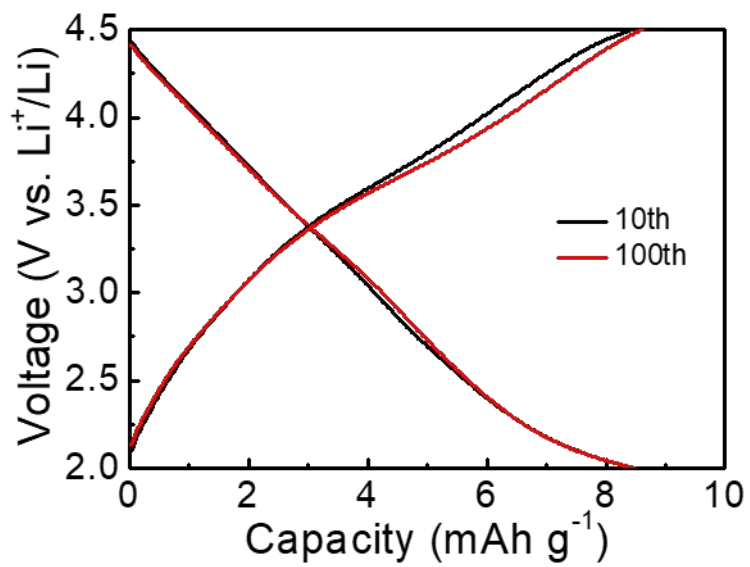


Figure S1. Voltage profiles during the repeated cycling measurement of bare MC demonstrating the capacitive Li-ion-storage process.

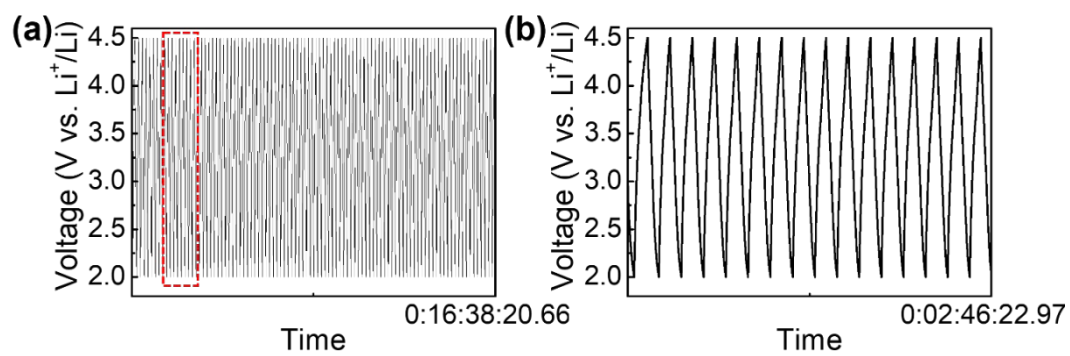


Figure S2. (a) Voltage profiles and (b) magnified part of the bare MC during the consecutive cycling measurement. It depicts a stable charge–discharge behavior.

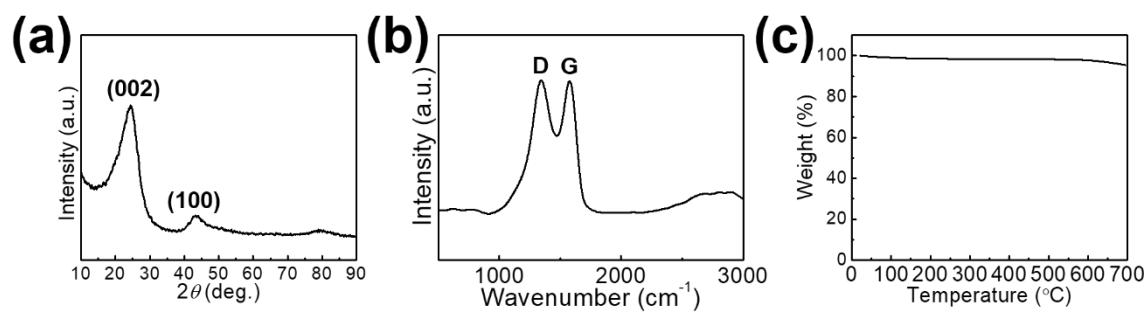


Figure S3. (a) XRD pattern, (b) Raman spectra, and (c) TGA curve of MC.

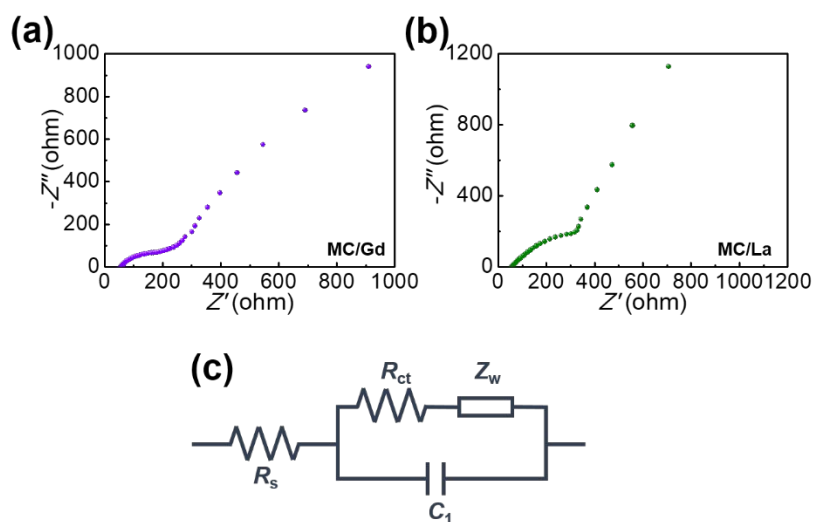


Figure S4. EIS curves of the (a) MC/Gd and (b) MC/La samples. (c) Equivalent circuit of the EIS curves with diverse components in the electrochemical system.

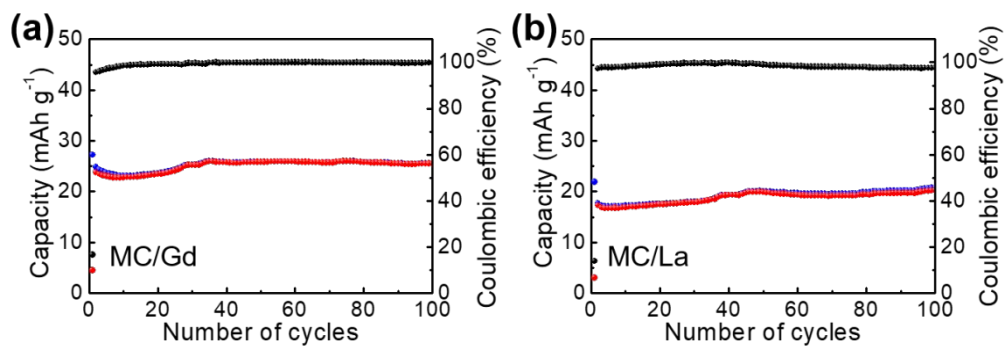


Figure S5. Repeated charge–discharge operations for (a) MC/Gd and (b) MC/La at a current density of 100 mA g⁻¹.

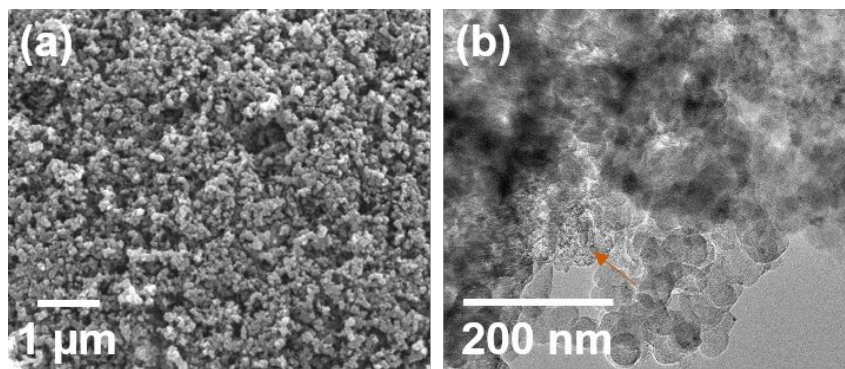


Figure S6. (a) SEM and (b) TEM images of the MC/Gd sample after long-term repeated charge–discharge measurements.

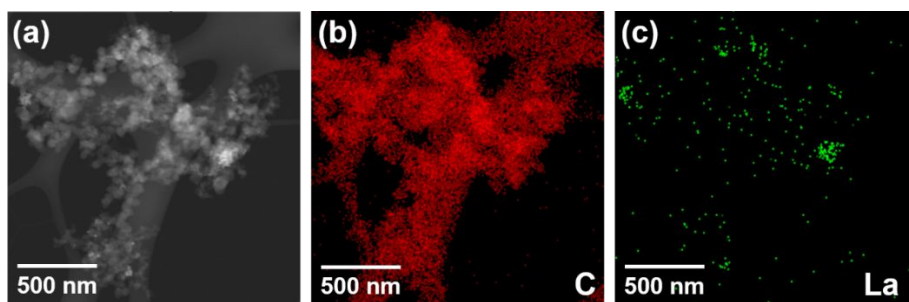


Figure S7. (a) STEM and (b,c) EDX mapping images of the MC/La sample after long-term repeated charge–discharge measurements.