Supplementary material

Article

Microwave-Assisted Synthesis of Ge/GeO2-Reduced Graphene Oxide Nanocomposite with Enhanced Discharge Capacity for Lithium-Ion Batteries

Ji-Hye Koo and Seung-Min Paek *

Department of Chemistry, Kyungpook National University, Daegu 41566, Korea; guzza95@naver.com
* Correspondence: smpaek@knu.ac.kr; Tel.: +82-53-950-5335

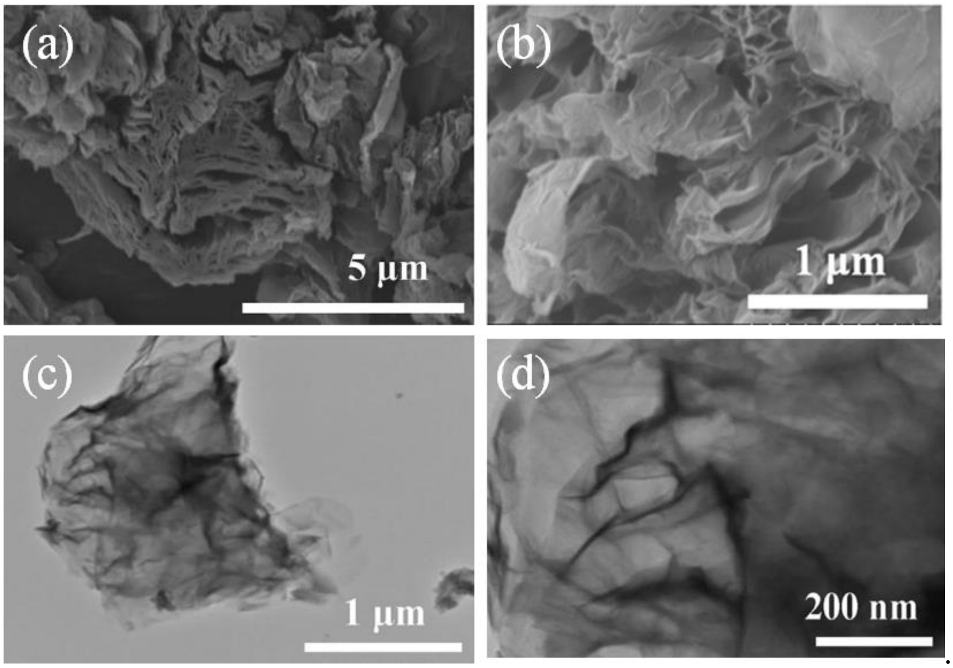

Figure S1. (a,b) SEM images (c,d) TEM images of RGO.

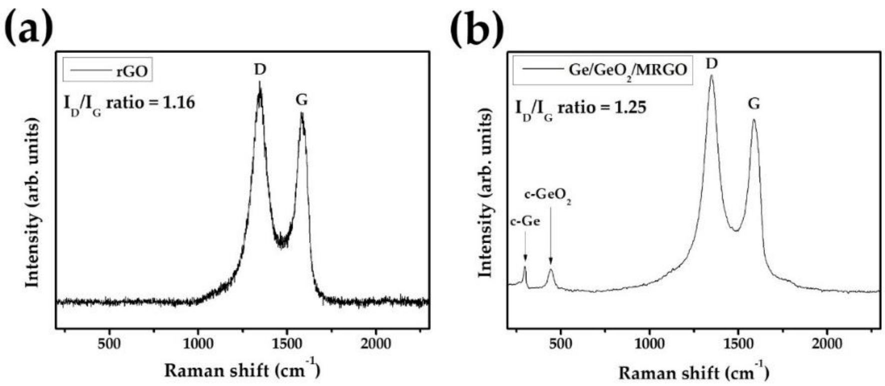

Figure S2. Raman spectra of (a) RGO and (b) Ge/GeO_2/MRGO.

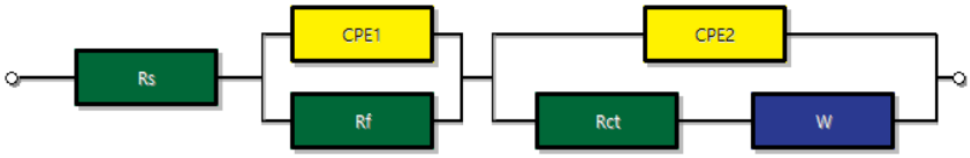

Figure S3. The equivalent circuit model for the EIS data fitting.

Table S1. Parameters derived by using equivalent circuit model for the EIS data of Ge/GeO_2 NPs and Ge/GeO_2/MRGO electrodes: R_s (bulk resistance), R_f (film resistance), and R_{ct} (charge-transfer resistance).

Anode materials	**R_s (Ω)**	**R_f (Ω)**	**R_{ct} (Ω)**
Ge/GeO_2 NPs	3.7	28.9	101.1
Ge/GeO_2/MRGO.	3.5	18.3	52.5

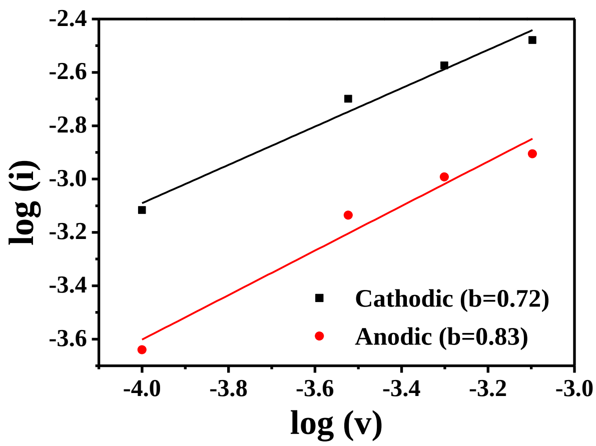

Figure S4. A power-law relationship of Ge/GeO_2 NPs and Ge/GeO_2/MRGO

Table S2. Summary of recent works for the various Ge and GeO_2 composites anode materials used in lithium ion batteries; [a]capacity (mA h/g); [b]current density (mA/g); [c]mass ratio (active material : conductive carbon : binder).

Anode materials	**Capacity (Capacity[a]/Current density[b]/Cycle number)**	**Voltage range (vs. Li/Li^+)**	**Mass ratio[c]**	**Ref.**
Ge NWs in graphite tubes	260/250/100	0.001–2.5 V	7 : 2 : 1	[1]
Porous Ge microtubes	1200/138/100	0.01–1.5 V	8 : 1 : 1	[2]
3D porous Ge NPs	1420/1600/200	0.01–1.5 V	8 : 1 : 1	[2]
Ge–graphene–carbon nanotube	864/100/100	0.01–3.0 V	8 : 1 : 1	[3]
Ge/RGO-1	815/200/100	0.01–1.5 V	8 : 1 : 1	[4]
Ge/RGO-2	960/200/100	0.01–1.5 V	8 : 1 : 1	[4]
Ge/RGO-3	720/200/100	0.01–1.5 V	8 : 1 : 1	[4]
GeO_2/graphene	650/100/80	0.0–3.0 V	8 : 1 : 1	[5]
Ge/GeO_2/MRGO	1080/100/150	0.01–3.0 V	7 : 2 : 1	This work

References

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