Supplementary Information

Binder-free Rice husk-based Silicon-Graphene Composite Paper as Energy Efficient Li-ion Battery Anodes

Deniz P. Wong[a,b,c], Rangaraj Suriyaprabha[d], Rathinam Yuvakumar[d], Venkatachalam Rajendran[d], Yit-Tsong Chen[c,f], Bing-Joe Hwang[e], Li-Chyong Chen[a*] and Kuei-Hsien Chen[f*]

[a] *Center for Condensed Matter Sciences, and Center for Emerging Material and Advanced Devices, National Taiwan University, Taipei 10617, Taiwan*

[b] *Nanoscience and Technology Program, Taiwan International Graduate Program, Academia Sinica, Taipei 11529, Taiwan*

[c] *Department of Chemistry, National Taiwan University, Taipei 10617, Taiwan*

[d] *Center for Nanoscience and Technology, K. S. Rangasamy College of Technology, Tiruchengode – 637 215, Tamil Nadu, India*

[e] *Department of Chemical Engineering, National Taiwan University of Science and Technology, 43 Keelung Road, Section 4, Taipei 10617, Taiwan*

[f] *Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei 10617, Taiwan*

Fax: +886- 2-336652xx; Tel: +886-2-33665231; E-mail: chenlc@ntu.edu.tw (L.C. Chen) or chenkh@pub.iams.sinica.edu.tw (K.H. Chen).

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S1. Preparation of GO suspension[1]

GO was prepared using a modified Hummers and Offeman's method.[2] In a typical reaction, graphite (2.5 g, ITRI), sodium nitrate ($NaNO_3$, 2.5g, reagent grade, Aldrich) and sulfuric acid (H_2SO_4, 115 mL, Acros) were stirred together in an ice bath. Potassium permanganate ($KMnO_4$, 7.5g, Aldrich) was slowly added while stirring, and the rate of addition was controlled to prevent the mixture temperature from exceeding 20^0C.

The mixture was then transferred to a 35^0C water bath and stirred for about 0.5 hour, forming a thick paste. Subsequently, de-ionized water (115 mL) was added gradually, causing an increase in temperature to 98^0C. After 15 min., the mixture was further treated with de-ionized water (350 mL) and H_2O_2 solution (30%, 25 mL). The warm solution was then filtered and washed with de-ionized water until the pH was 7 and dried at 65^0C under vacuum.

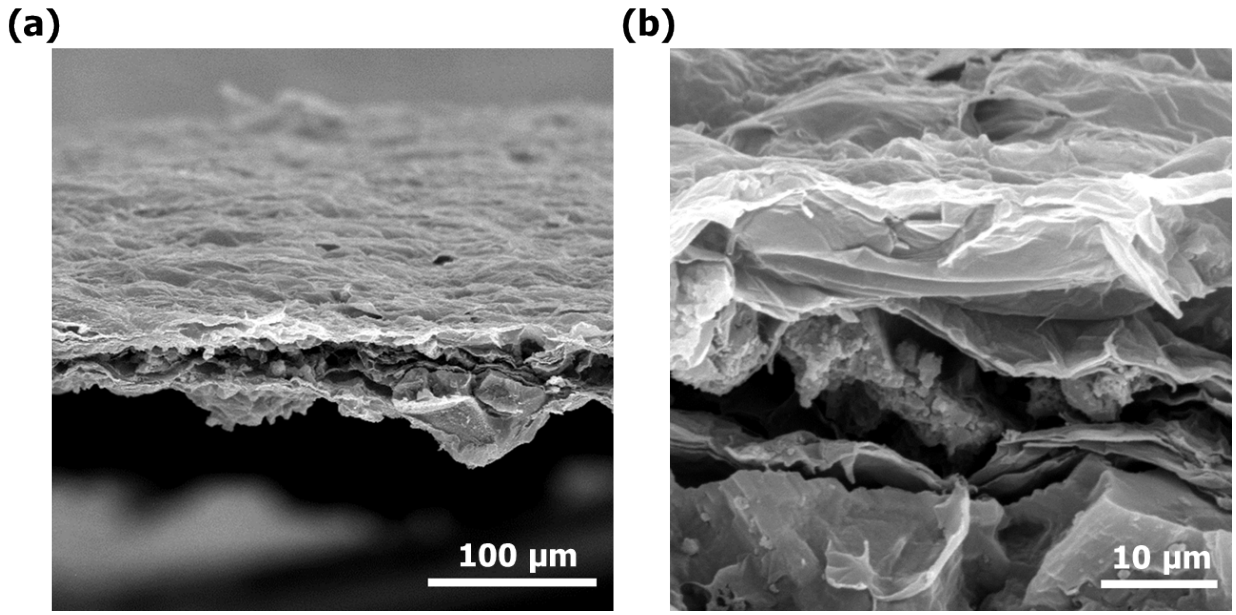

Fig. S2. Cross-sectional SEM image of the Si-graphene composite paper

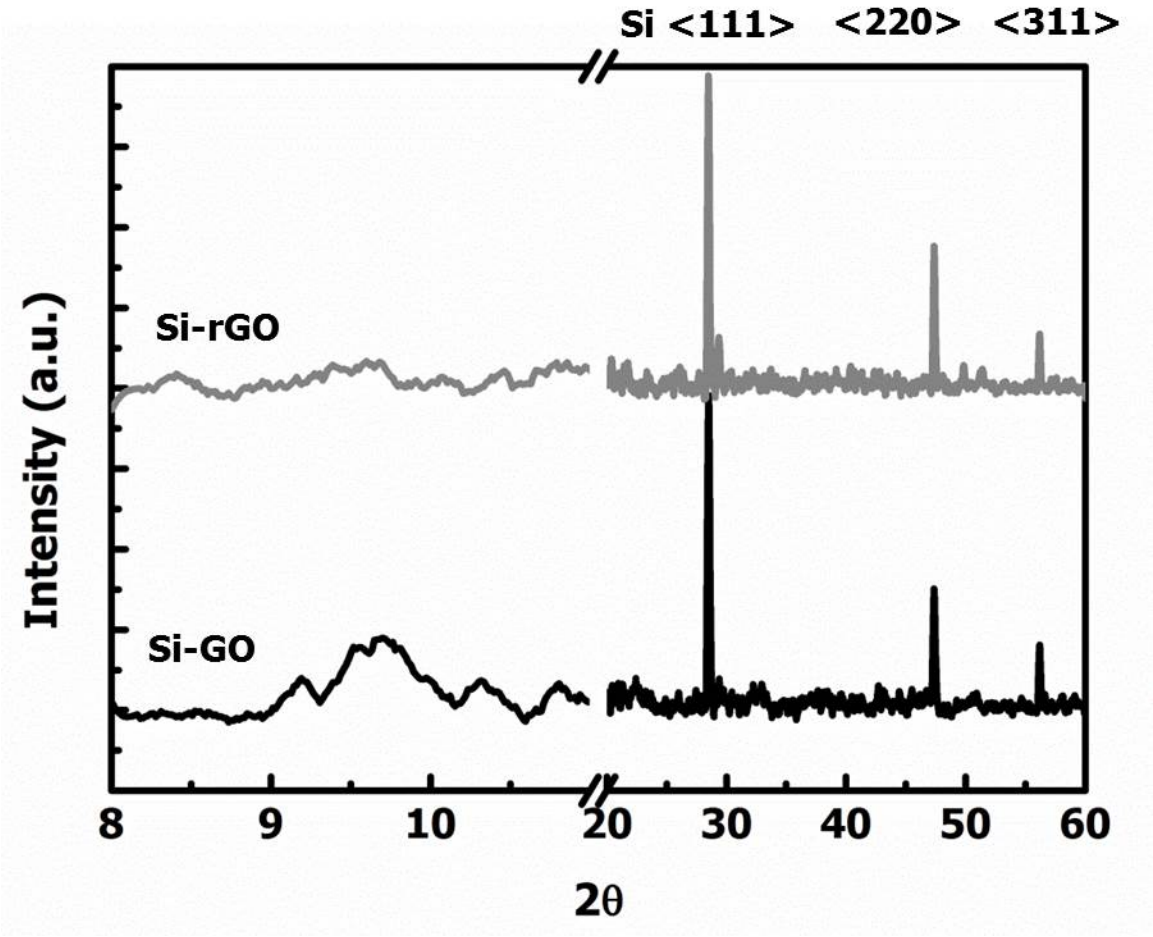

Fig. S3. XRD spectra of the rice husk-based Si NPs composite before (black) and after (gray) thermal reduction in Ar atmosphere

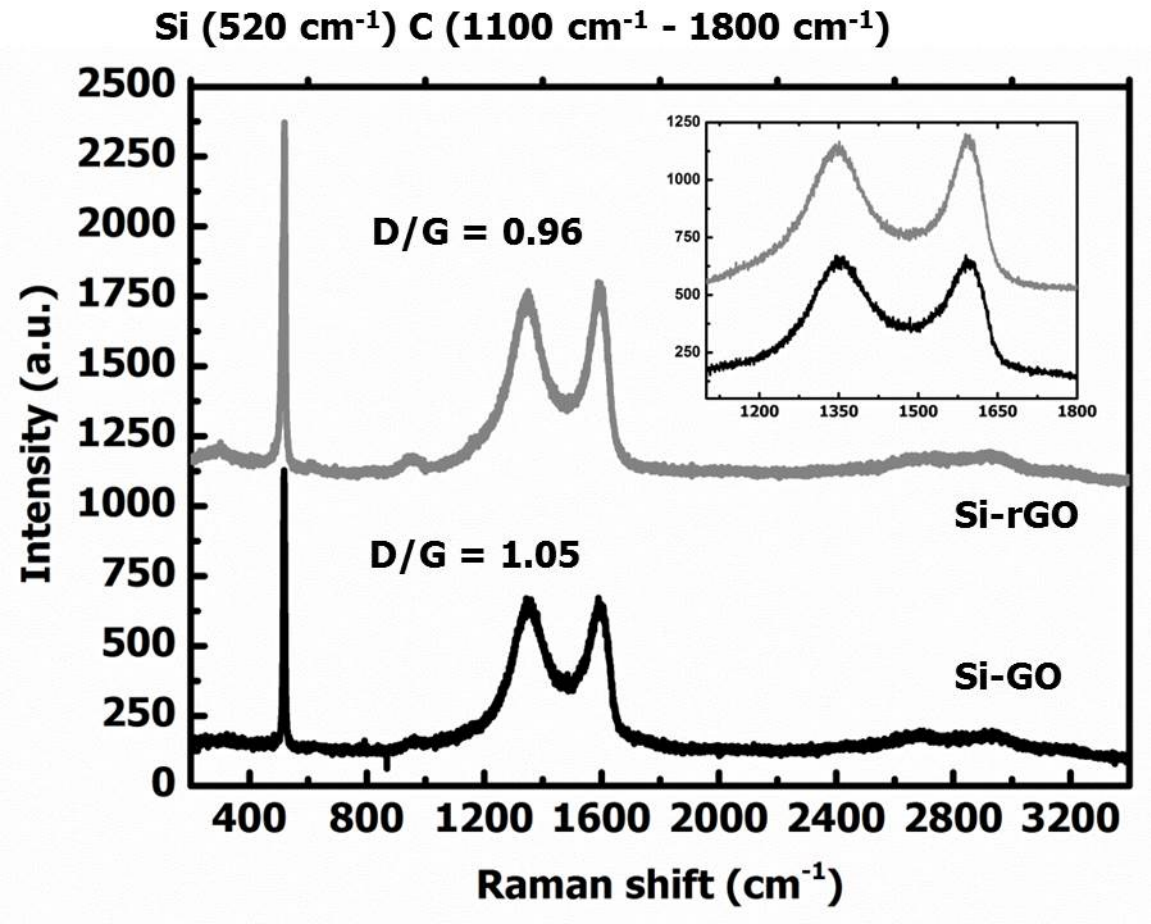

Fig. S4. Raman spectra of the rice husk-based Si NPs composite before (black) and after (gray) thermal reduction in Ar atmosphere.

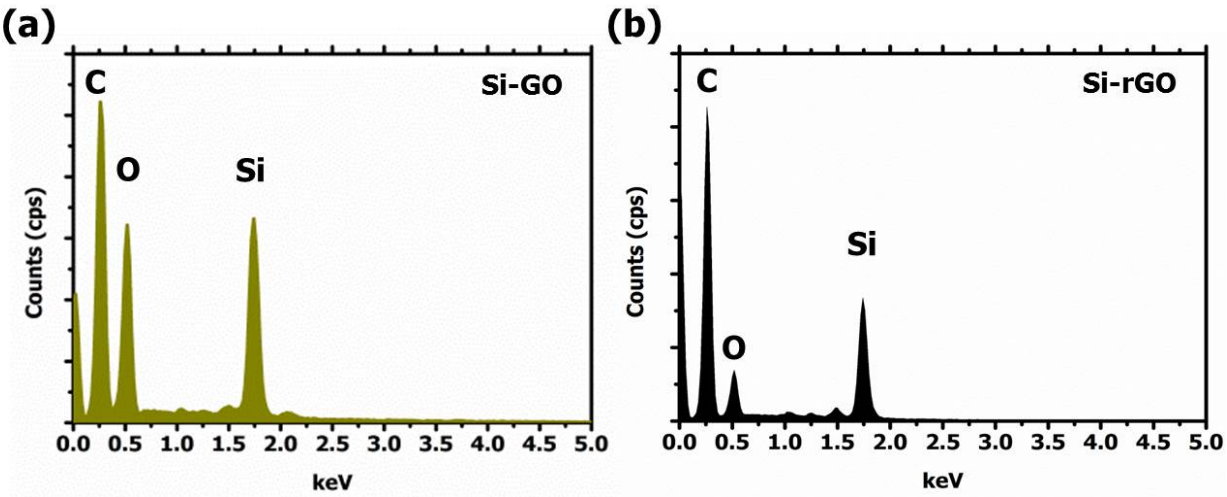

Fig. S5. SEM-EDS spectra of the rice husk-based Si NPs composite (a) before and (b) after thermal reduction in Ar atmosphere.

1. H.-C. Hsu, I. Shown, H.-Y. Wei, Y.-C. Chang, H.-Y. Du, Y.-G. Lin, C.-A. Tseng, C.-H. Wang, L.-C. Chen, Y.-C. Lin and K.-H. Chen, *Nanoscale*, 2013.
2. W. S. Hummers and R. E. Offeman, *J. Amer. Chem. Soc.*, 1958, **80**, 1339-1339.