Supporting Information

Direct synthesis of 3D hollow porous graphene balls from coal tar pitch for high performance supercapacitors

Xiaojun He a,*, Hebao Zhang a, Hao Zhang a, Xiaojing Li a, Nan Xiao b, and Jieshan Qiu b,*

a School of Chemistry and Chemical Engineering, Anhui Key Lab of Coal Clean Conversion and Utilization, Anhui University of Technology, No. 59 Hudong Road, Maanshan 243002, China

b Carbon Research Lab, Liaoning Key Lab for Energy Materials and Chemical Engineering, State Key Lab of Fine Chemicals, Dalian University of Technology, Dalian 116024, China

*Corresponding authors. Tel: +86-555-2312355. Fax: +86-555-2311822. E-mail:

agdxjhe@126.com (X.J. He); Tel: +86-411-84986024. Fax: +86-411-84986015. E-mail: jqiudlut.edu.cn (J. S. Qiu).
Fig. S1. A graphene-like stone ball under the foot of a monster in front of the Lama Temple in Beijing of China, which was designed and built as an art decoration in 1694 in Qing dynasty. The stone ball seems to be made of a blown graphene sheet with only carbon six-member rings.
Fig. S2. (a) TEM image of HPGB$_{NP-6}$; (b) TEM image of HPGB$_{NP-4}$; (c) FESEM image of PC$_{1Ar}$; (d) TEM image of HPGB$_{2Ar}$; (e) TEM image of HPGB$_{Ar}$.

Fig. S2a and b show the TEM images of HPGBs (HPGB$_{NP-6}$ and HPGB$_{NP-4}$) that were synthesized directly from coal tar pitch by a simple nano-MgO template strategy coupled with KOH activation at pressure of −0.05 to −0.10 MPa. Fig. S2c shows that only conventional porous carbon (PC$_{1Ar}$) was synthesized in the absence of nano-MgO template. Fig. S2d shows the TEM image of HPGB (HPGB$_{2Ar}$) with some wrinkles that was made from coal tar pitch by only using nano-MgO as template. Fig. S2e shows the TEM image of HPGB$_{Ar}$. 
Fig. S3. XPS spectra of HPGBs, showing that no observable N-species (≈396 eV, N1s) are present in HPGB$_{\text{Ar}}$, HPGB$_{\text{N}_2}$, HPGB$_{\text{NP}-6}$ and HPGB$_{\text{NP}-4}$. This means that the working gas atmosphere is not involved in the chemical reactions related to HPGBs under the experimental conditions.