Supplementary Information

Enhancement of hydrogen storage capacity of zeolite-templated carbons by chemical activation

Marta Sevilla[a,b], Nurul Alam[a] and Robert Mokaya[a,*]

[a] *School of Chemistry, University of Nottingham, University Park, Nottingham NG7 2RD, U. K.*

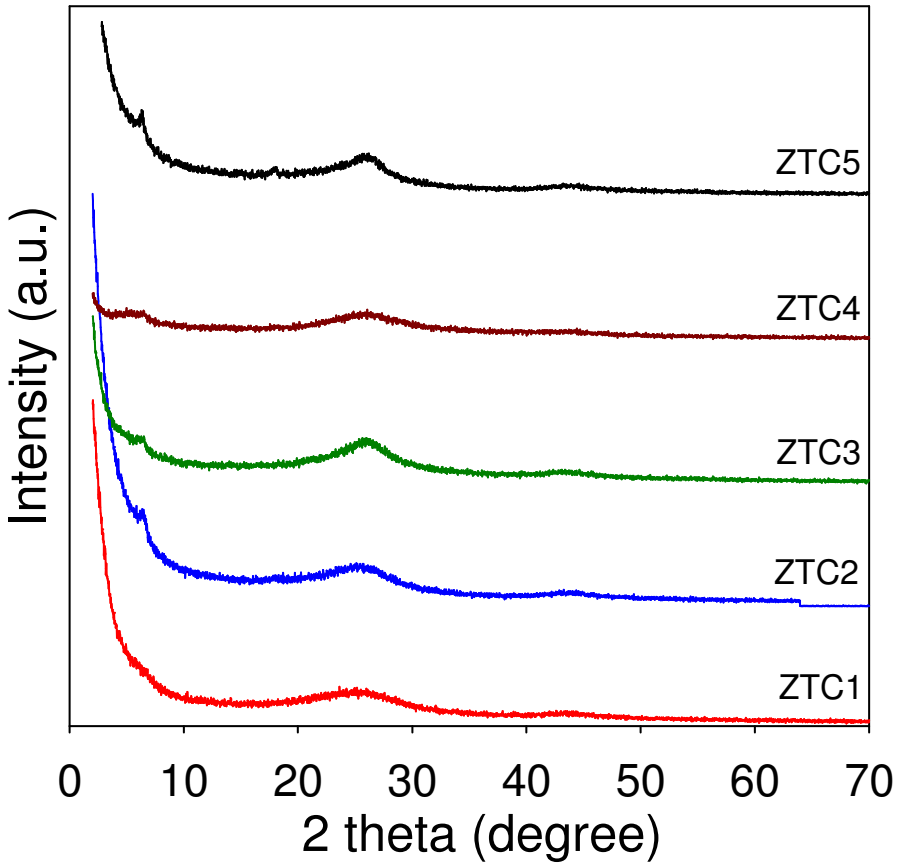
[b] *Instituto Nacional del Carbón (CSIC), P.O. Box 73, 33080 Oviedo, Spain*

**r.mokaya@nottingham.ac.uk*

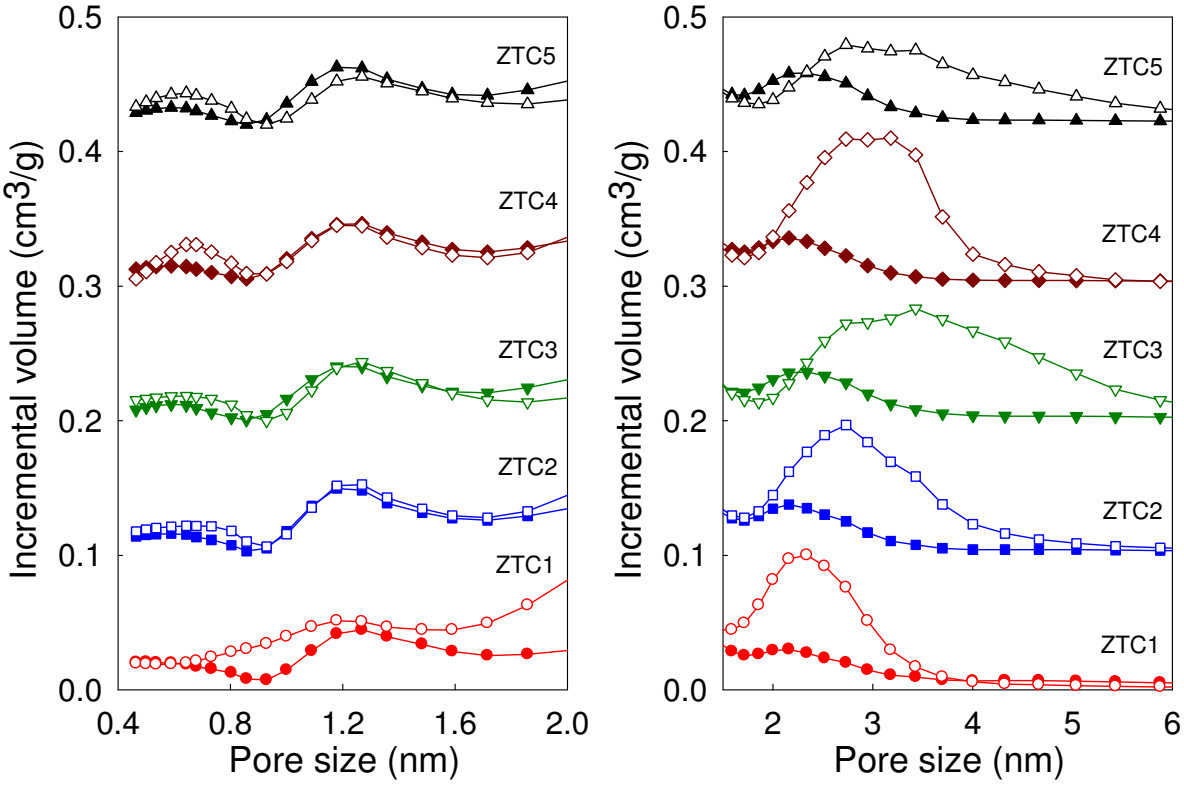
Table S1. Textural properties and hydrogen uptake capacity of zeolite templated carbons (ZTC) and their activated derivatives (Ac-ZTC).

Sample	Surface area (m^2/g)[a]	Increase in surface area (%)[b,c]	Pore volume (cm^3/g)[d]	Pore size maxima (nm)[e]
ZTC6	1084 (792)		0.66 (0.37)	1.2/2.5
ZTC7	916 (667)		0.57 (0.31)	1.3/2.5
ZTC8	720 (551)		0.41 (0.26)	1.2/2.5
Ac-ZTC6	867 (138)	-20(-82)	0.75 (0.06)	1.3/3.4
Ac-ZTC7	980 (156)	7 (-77)	0.85 (0.07)	1.3/3.5
Ac-ZTC8	1112 (146)	40 (54)	0.91 (0.06)	1.3/3.4

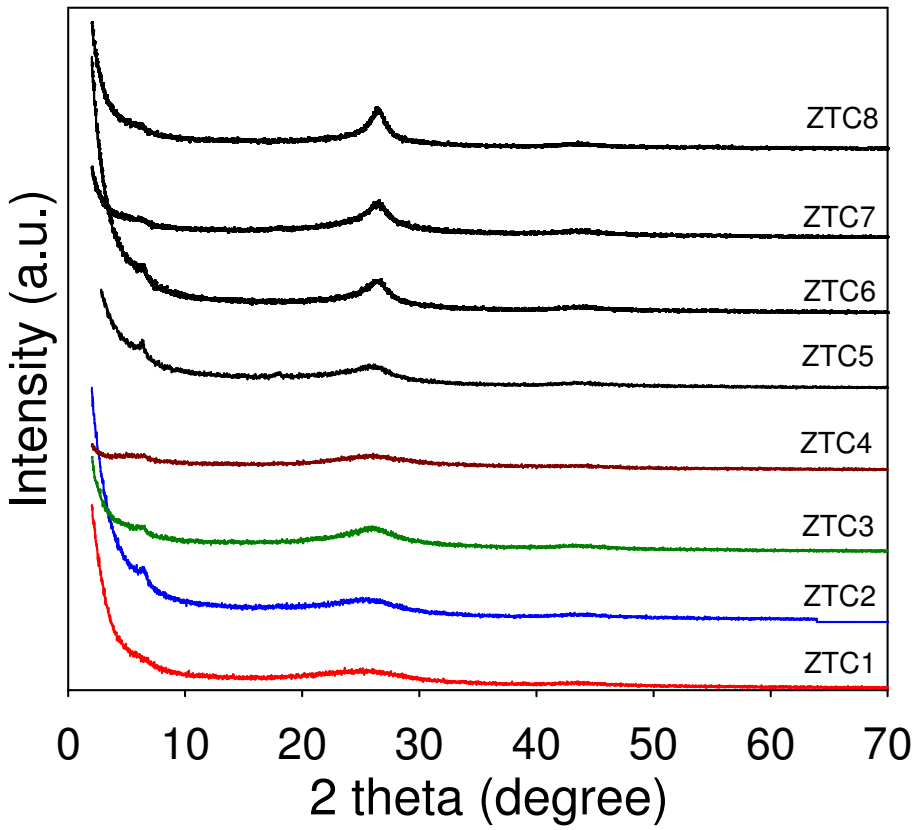
[a]Values in parenthesis are micropore surface area. [b]Percentage increase in surface area after chemical activation. [c]Values in parenthesis are percentage change in micropore surface area after chemical activation. [d]Values in parenthesis are micropore volume. [e]Maxima of the DFT pore size distribution.



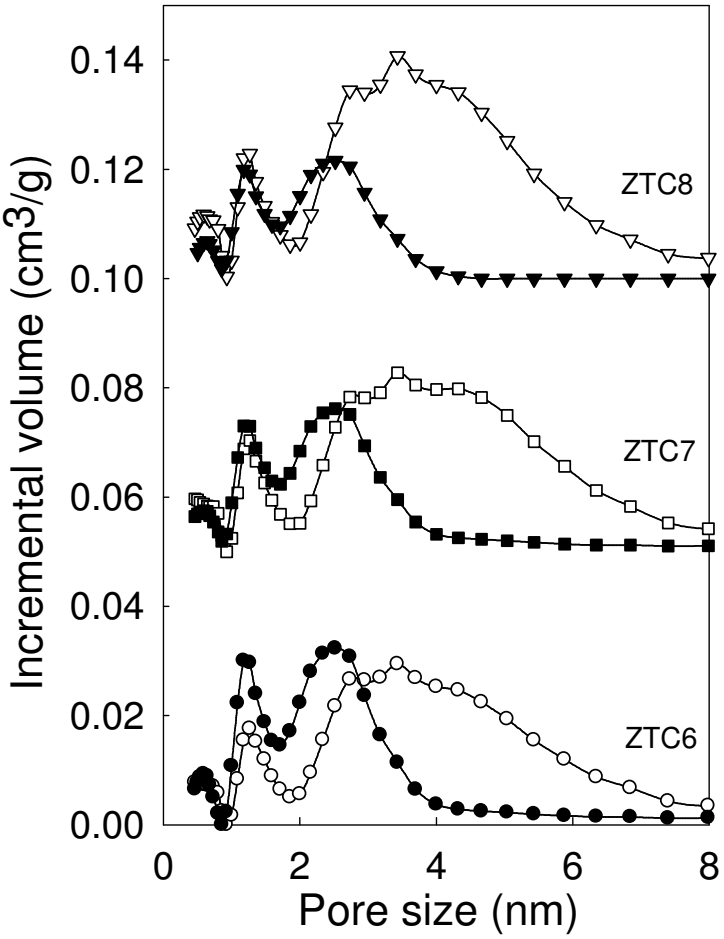
Supporting Figure S1. Powder XRD patterns of zeolite-templated carbon.



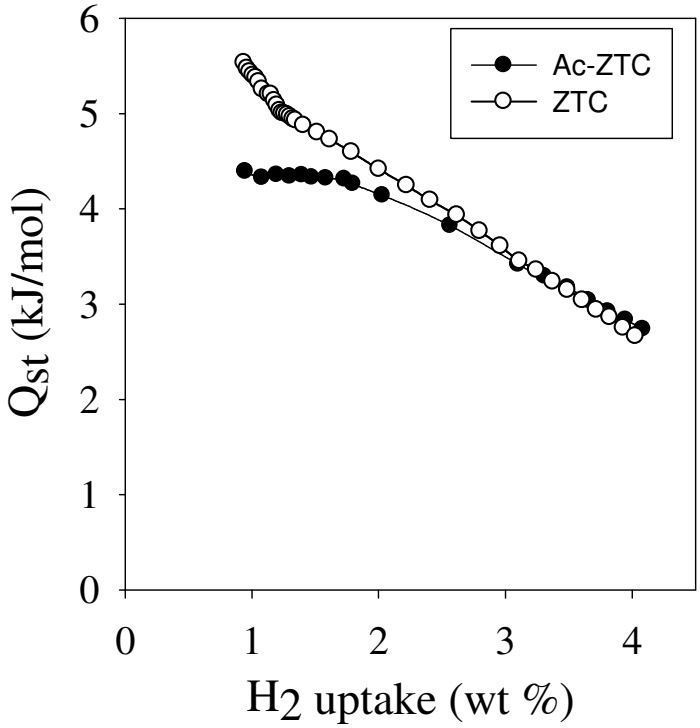
Supporting Figure S2. Pore size distribution curves of zeolite-templated carbons before (filled symbols) and after (open symbols) chemical activation with KOH.



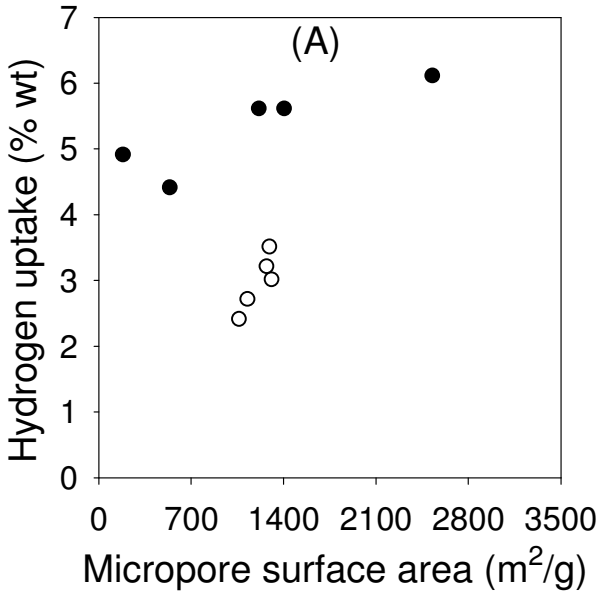
Supporting Figure S3. Powder XRD patterns of zeolite-templated carbon showing that samples ZTC6, ZTC7 and ZTC8 (prepared at CVD temperature of 950 and 1000 ^{o}C) are relatively more graphitic (according to the peak at $2\theta = 26°$, which is ascribed to the (002) diffraction from turbostratic/graphitic carbon)

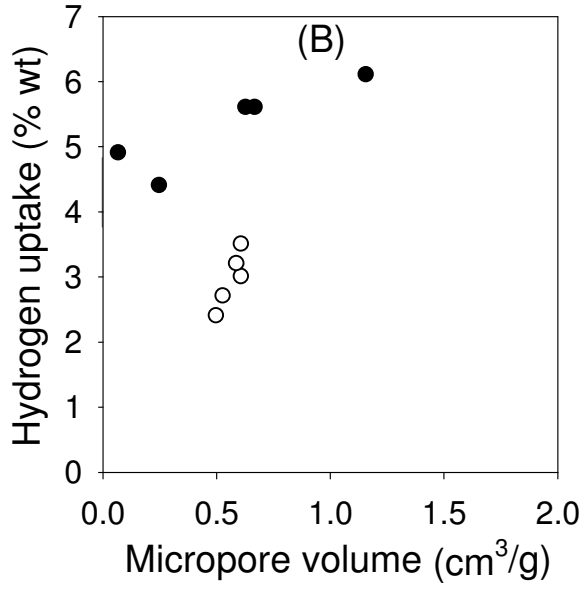


Supporting Figure S4. Pore size distribution curves of zeolite-templated carbons with higher levels of graphitisation, before (filled symbols) and after (open symbols) chemical activation with KOH.



Supporting Figure S5. Evolution of the isosteric heat of hydrogen adsorption (Q_{st}) as a function of hydrogen uptake of zeolite-templated carbon before (O) and after (●) chemical activation with KOH.





Supporting Figure S6. Plot of hydrogen storage capacity as a function of (A) micropore surface area or (B) micropore volume of zeolite-templated carbons before (O) and after (●) chemical activation with KOH.