

Supporting Information For

Solution-Based Carbohydrate Synthesis of Individual Solid, Hollow and Porous Carbon Nanospheres Using Spray Pyrolysis

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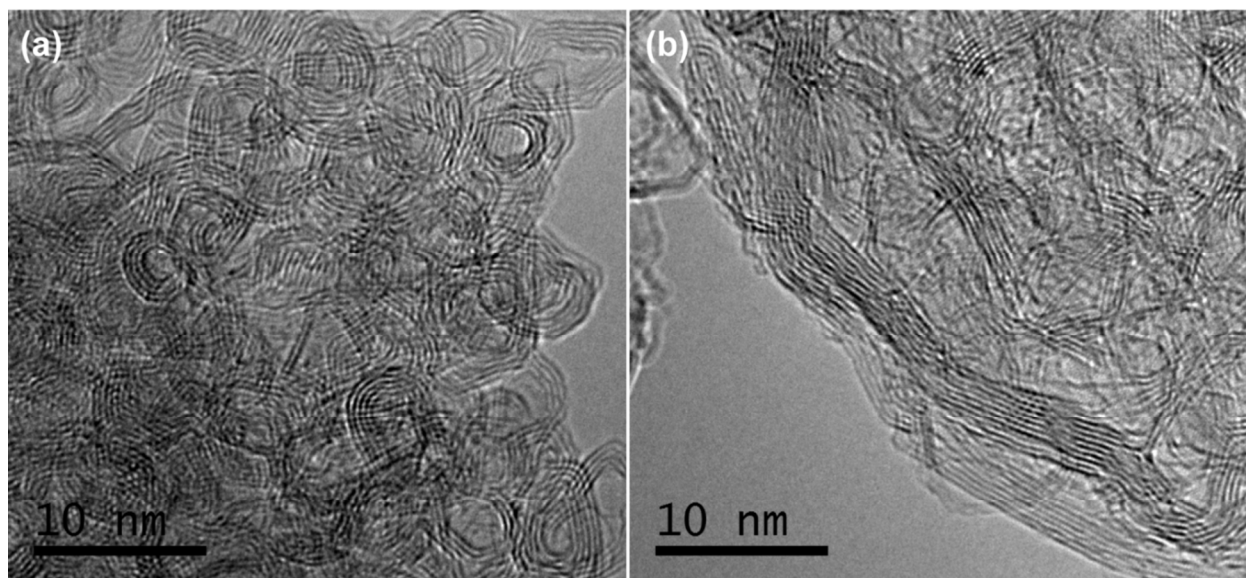


Figure S1. HRTEM of (a) nanodiamond-derived carbon onions and (b) carbon nanospheres annealed at same condition, 2300 °C, 1h.

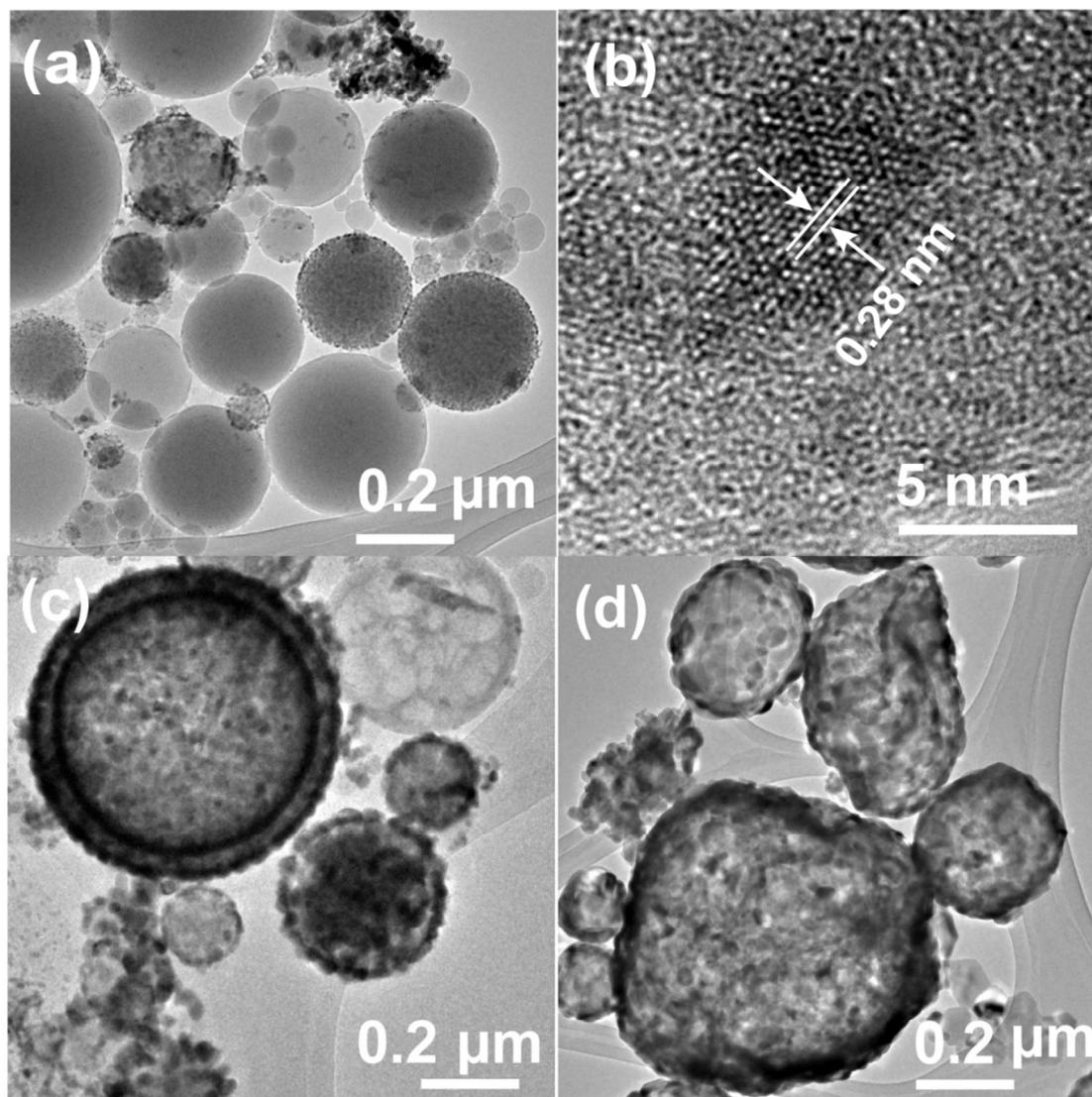


Figure S2. TEM images of as-prepared carbon nanospheres synthesized from $\text{Zn}(\text{NO}_3)_2$ to sugar ratios of (a),(b) 1g: 1g; (c) 3g: 1g; (d) 10g: 1g. (b) HRTEM image of ZnO nanoparticle inside the carbon nanospheres from 1g:1g sample with d-spacing of 0.28 nm matching ZnO (100).

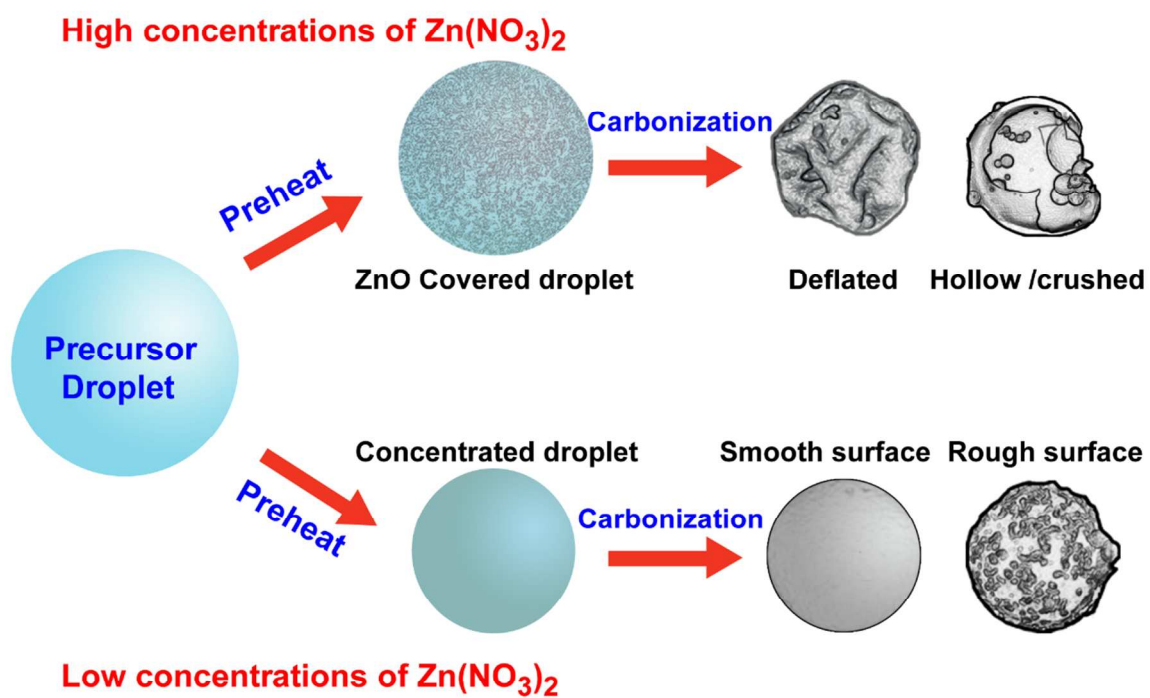


Figure S3. Illustration of the carbon nanospheres formation mechanism.

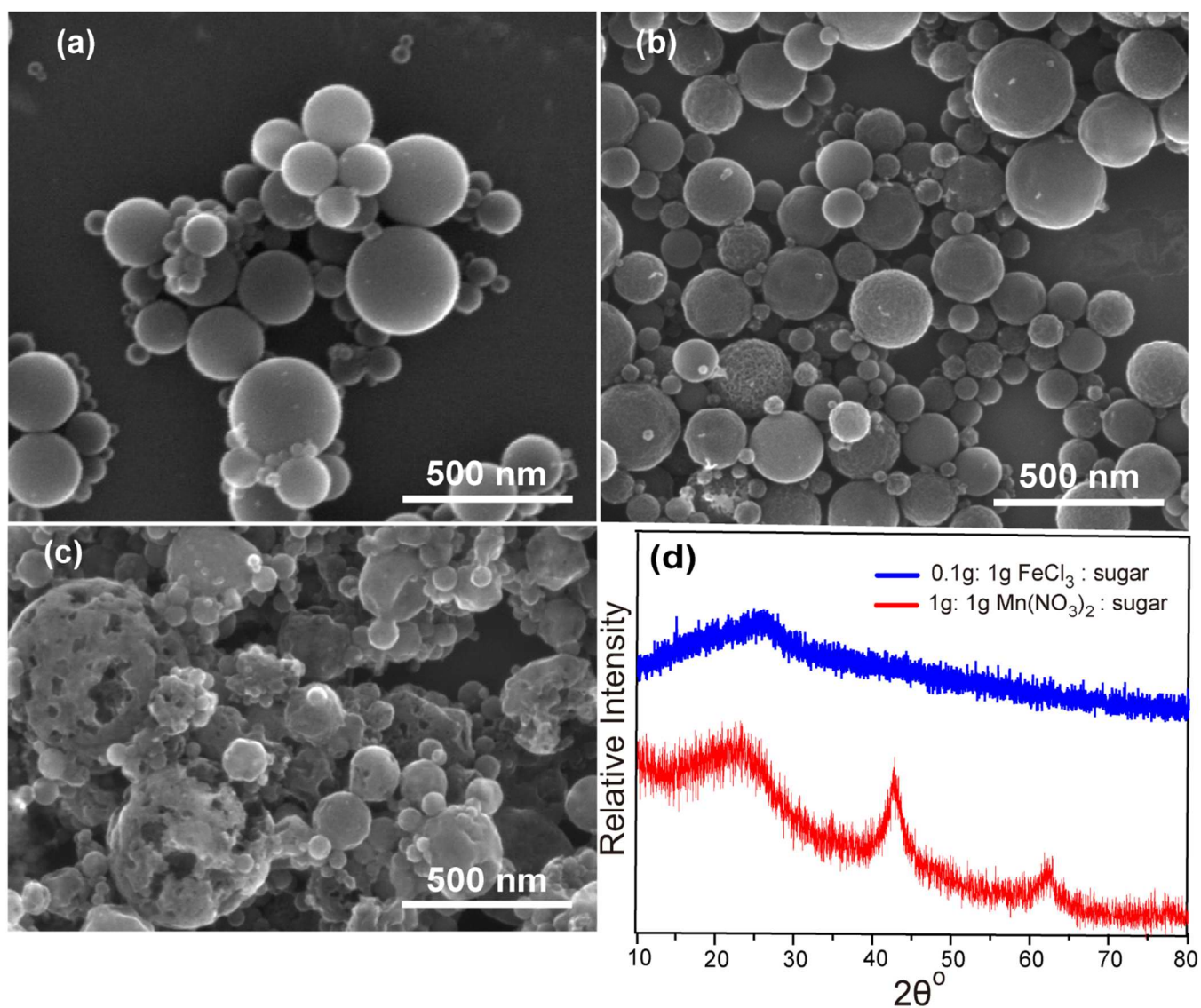


Figure S4. SEM images and XRD of carbon nanospheres synthesized from different carbon and metal salt precursors after HCl treatment. (a) $\text{Zn}(\text{NO}_3)_2$ and 3,4-dihydroxybenzaldehyde (1g:1g); (b) $\text{Mn}(\text{NO}_3)_2$ and sugar (1g:1g); (c) FeCl_3 and sugar (0.1g:1g); (d) XRD of as-prepared samples from 0.1g: 1g FeCl_3 : sugar (blue) and 1g: 1g $\text{Mn}(\text{NO}_3)_2$: sugar (red).

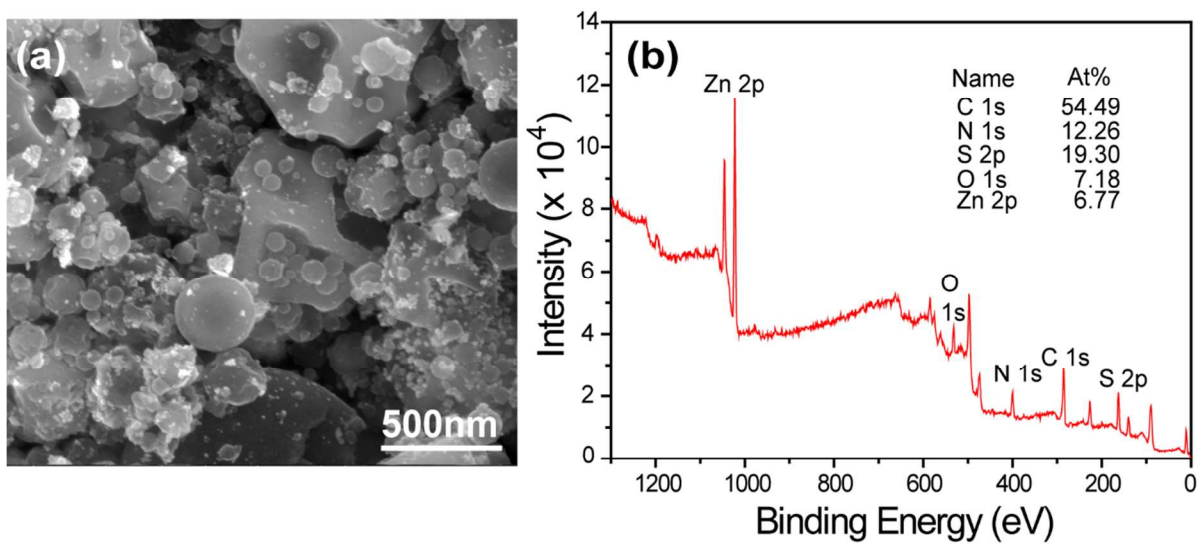


Figure S5. (a) SEM image of as-prepared carbon nanospheres synthesized from 1g:1g $\text{Zn}(\text{NO}_3)_2$ and PEI; (b) XPS wide scan and elemental analysis for carbon nanospheres prepared from 2 g $\text{Zn}(\text{NO}_3)_2$, 1g PEI and 1g thiourea.

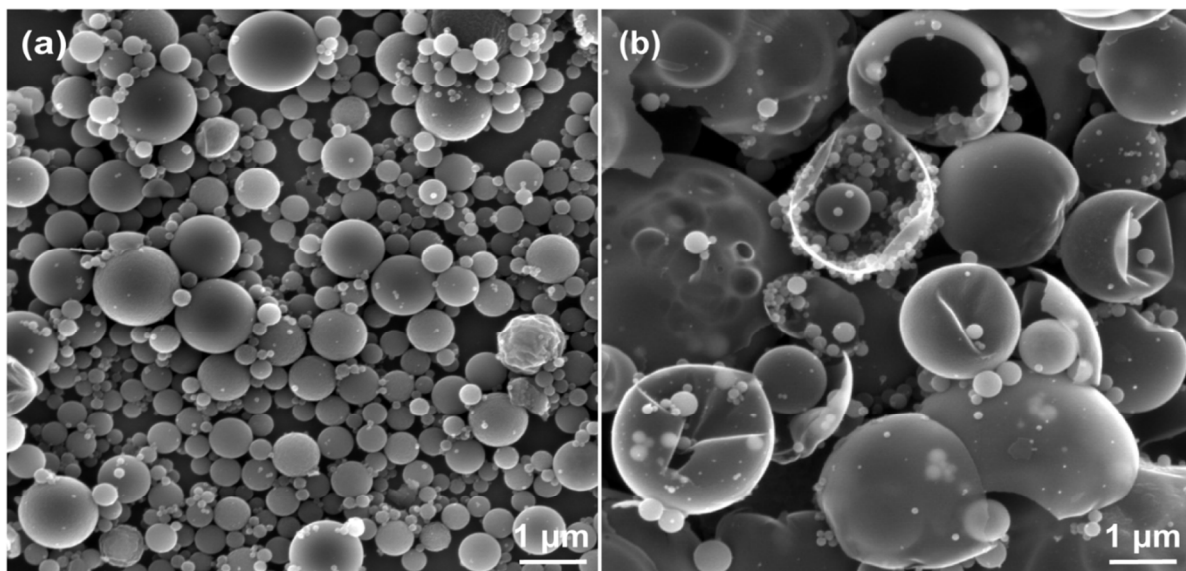


Figure S6. SEM images of carbon nanospheres prepared from precursors with $\text{Zn}(\text{NO}_3)_2$ to sugar ratios of (a) 3g:3g; (b) 6g:3g.

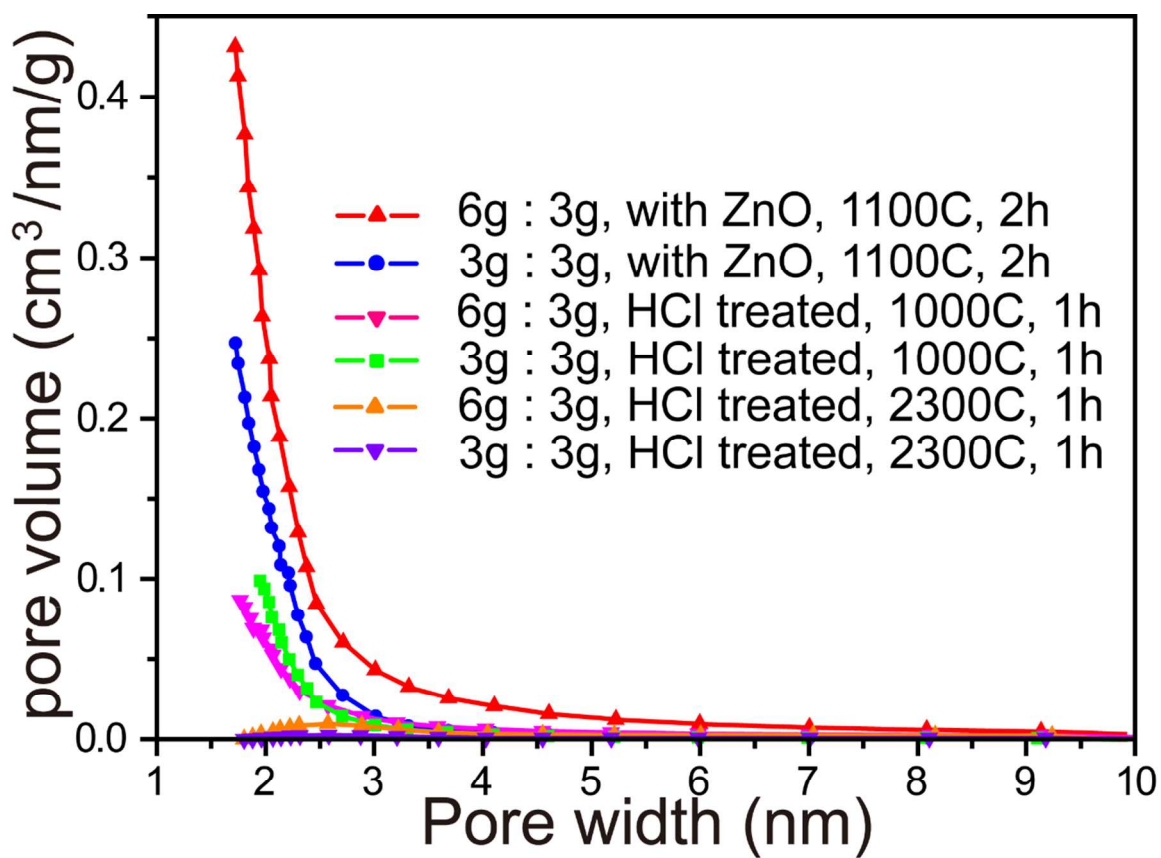


Figure S7. Pore size distribution curves of different carbon nanospheres.

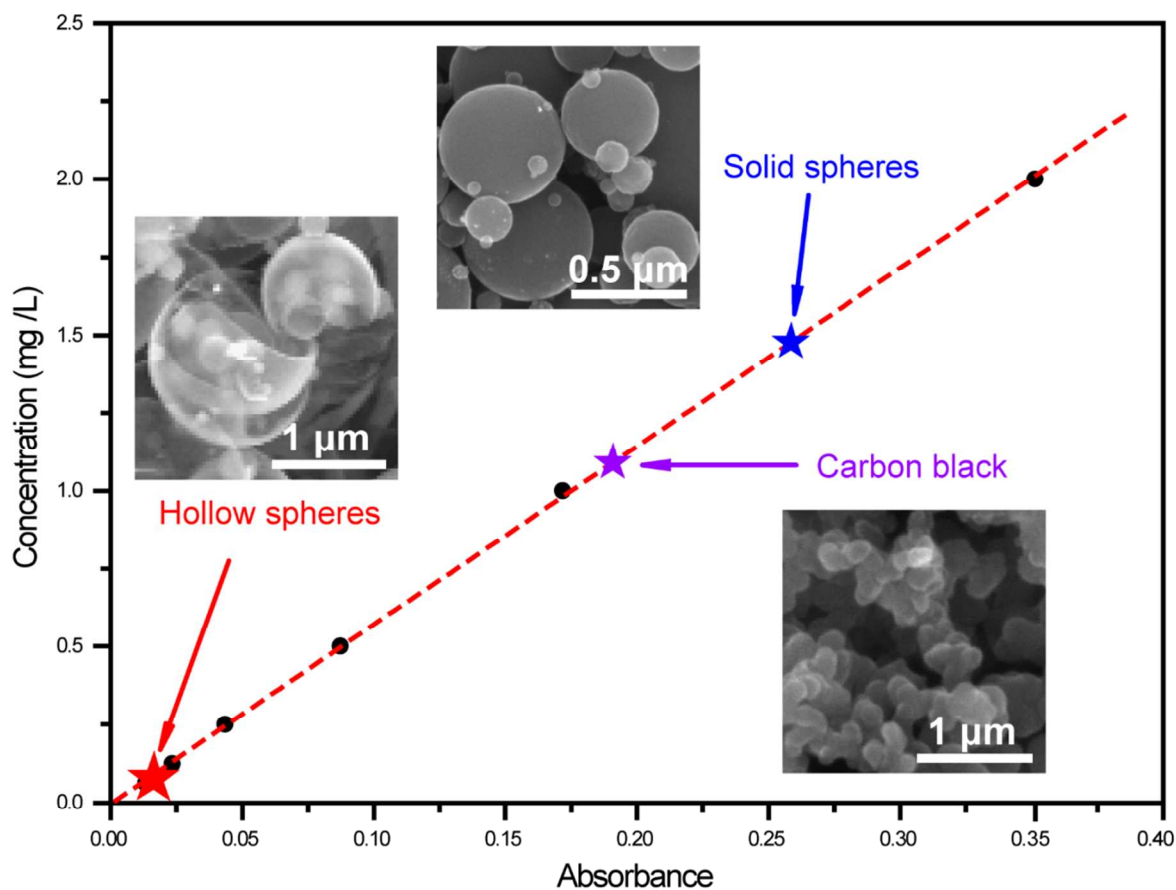


Figure S8. Calibration curve for used to determine concentration of RB using UV-vis spectroscopy. Black points correspond to the calibration points. Stars correspond to the concentrations of remaining RB after sorption onto different carbon samples: hollow carbon nanospheres (300 mg dye per g carbon), solid carbon nanospheres (12 mg/g), and carbon black (20 mg/g). Insets show the corresponding SEM images.

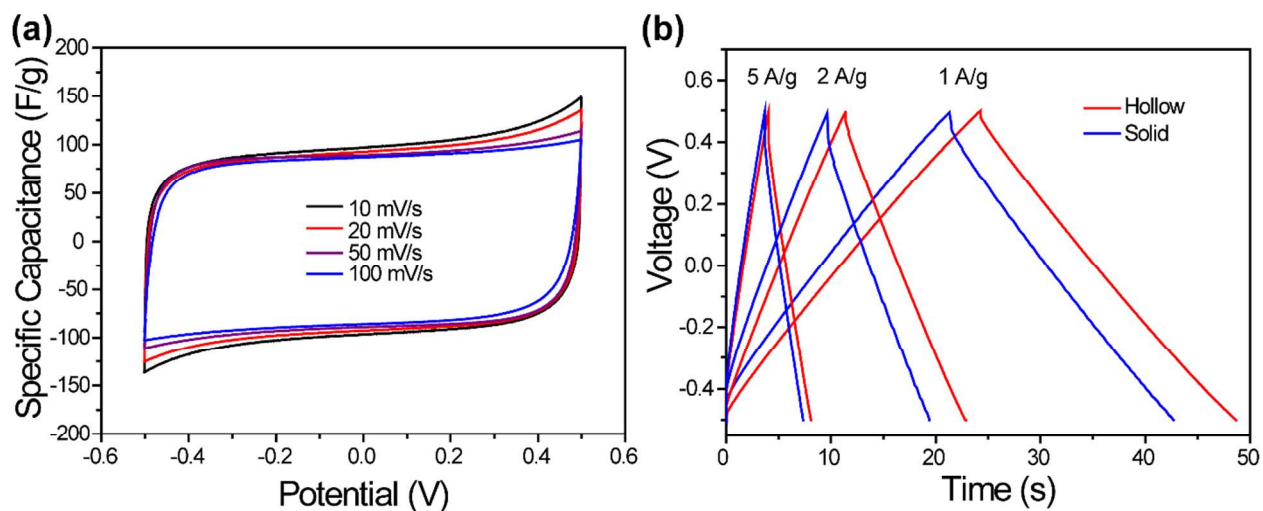


Figure S9. (a) Cyclic voltammograms (CVs) curves at different scan rates for supercapacitor made of solid carbon nanospheres in 6 M KOH aqueous electrolyte. (b) Galvanostatic charge/discharge curves of supercapacitors made from hollow or solid carbon nanospheres at different current densities.