

Supporting Information

Experimental

Synthesis of activated carbon aerogel (ACA)

The ACA substrates were prepared through the sol-gel polymerization of resorcinol and formaldehyde using acetic acid as the reaction catalyst, as previously reported.¹ Briefly, resorcinol (12.3 g, 0.112 mol) and 37% formaldehyde solution (17.9 g, 0.224 mol) were dissolved in water (15 ml), followed by the addition of glacial acetic acid (0.44 g, 0.007 mol). The reaction mixture was then transferred to glass molds and cured at 80 °C for 72 h. The resultant organic hydrogels were washed with acetone to remove the water and then dried with supercritical CO₂. The organic aerogels were subsequently carbonized at 1050 °C for 3 h under an N₂ atmosphere, yielding CA monoliths with densities ~0.55 g cm⁻³. The activation of these materials was carried out under flowing CO₂ (10 sccm) at 950 °C.

Synthesis of ZnO-ACA

The sol-gel solution of ZnO was prepared following a literature procedure.² Briefly, 2.1 g of Zn(NO₃)₂•6H₂O (0.53M) was dissolved in methanol. To this solution, 4.025 g of propylene oxide (5.3M) was added and briefly stirred vigorously. For 60 wt % ZnO loaded sample, 100 mg of ACA in small pieces were added to the sol-gel solution and allowed to soak up the solution for 30 min. The mixture was then dried using a rotary evaporator. Thermal annealing at 250 °C and 450 °C were performed in a furnace at the rate of 40 °C/min. For 25 wt % ZnO loaded sample, the concentration of Zn(NO₃)₂•6H₂O and propylene oxide was reduced proportionally.

References

1. Baumann, T. F.; Worsley, M. A.; Han, T. Y. J.; Satcher, J. H., *J. Non-Cryst. Solids* **2008**, 354, (29), 3513-3515.
2. Gao, Y. P.; Sisk, C. N.; Hope-Weeks, L. J., *Chem. Mat.* **2007**, 19, (24), 6007-6011.