Supplementary Information

High Surface Area Mesoporous Titanium Zirconium Oxide Nanofibrous Web: A Heavy Metal Ion Adsorbent

Jonghyun Choi,[a] Andreas Ide,[b,c] Yen B. Truong,[a] Ilias L. Kyratzis[a] and Rachel A. Caruso[*a,b]

[a] Materials Science and Engineering, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Bayview Avenue, Clayton, VIC 3168 Australia

[b] School of Chemistry, The University of Melbourne, Melbourne, VIC 3010 Australia

[c] MR & CT Contrast Media Research, Bayer Pharma AG, Berlin 13342 Germany

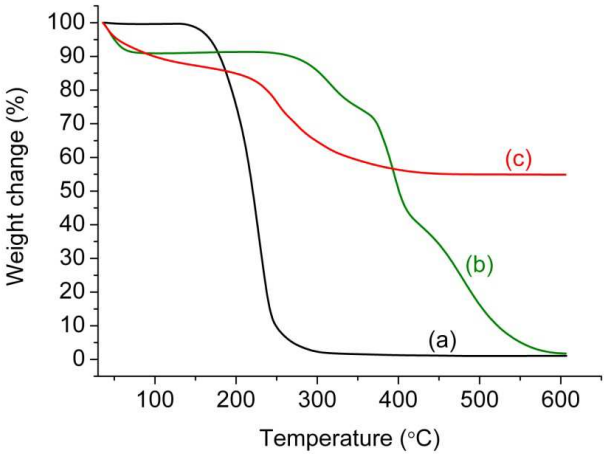

Figure S1 Thermogravimetric analysis of (a) Pluronic P123, (b) polyvinylpyrollidone (1.3M MW), and (c) electrospun nanofiber web (PVP/P123 = 22/78 w/w). Temperature: 30 – 600 °C, ramp rate: 1 °C min^{-1}, under air atmosphere.

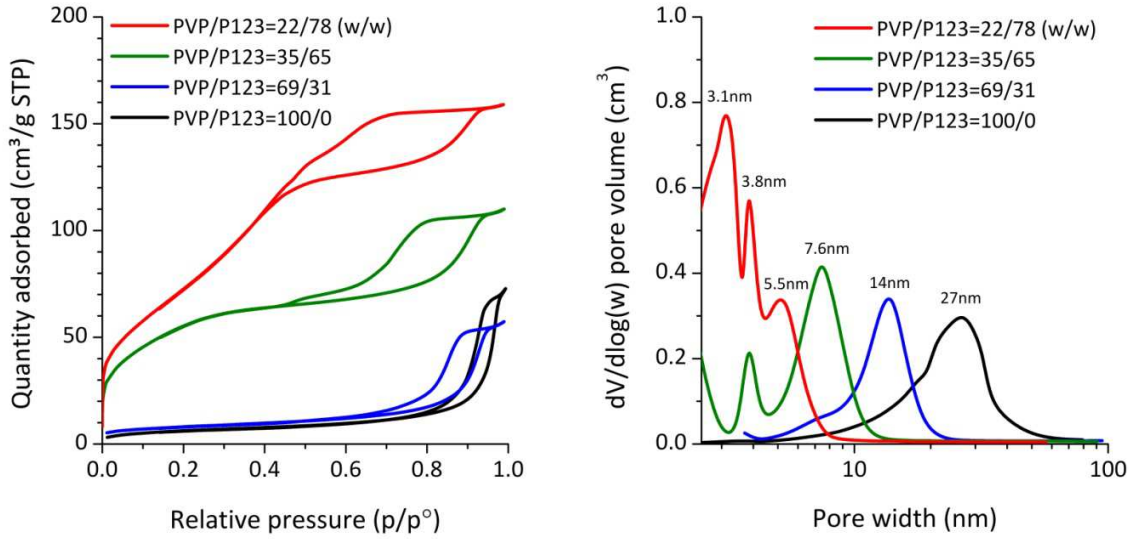

Figure S2 Nitrogen sorption isotherms (left) and pore size distributions (right) of TiO_2/ZrO_2 nanofibrous webs prepared from solutions varying in PVP/P123 ratio.

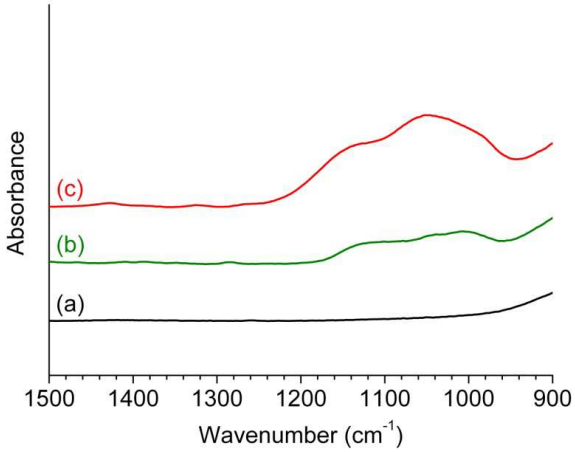

Figure S3 IR spectra of (a) non-modified TiO_2/ZrO_2 nanofibrous web, (b) amine-functionalised TiO_2/ZrO_2 nanofibrous web and (c) phosphonate-functionalised TiO_2/ZrO_2 nanofibrous web.

It clearly indicates the bonding between the nanofibre surface and phosphonate coupling molecules. While there are no bands in the range for the non-modified TiO_2/ZrO_2 nanofibrous web, there are broad P-O stretching bands between 950 and 1200 cm^{-1} for the functionalised samples. These are the characteristic bands for M (metal)-O-P and agree well with the literature (see below).

References:

1) 900 – 1200 cm^{-1} (G. Guerrero et al., *Chem. Mater.* **2001**, *13*, 4367)
2) 900 – 1300 cm^{-1} (G. Guerrero et al., *Chem. Mater.* **2000**, *12*, 1268)
3) 990 – 1250 cm^{-1} (M.A. White et al., *J.Am.Chem.Soc.* **2006**, *128*, 11356)