

## Supplemental Information

## Platinum-decorated Carbon Nanotubes for Hydrogen Oxidation and Proton Reduction in Solid Acid Electrochemical Cells

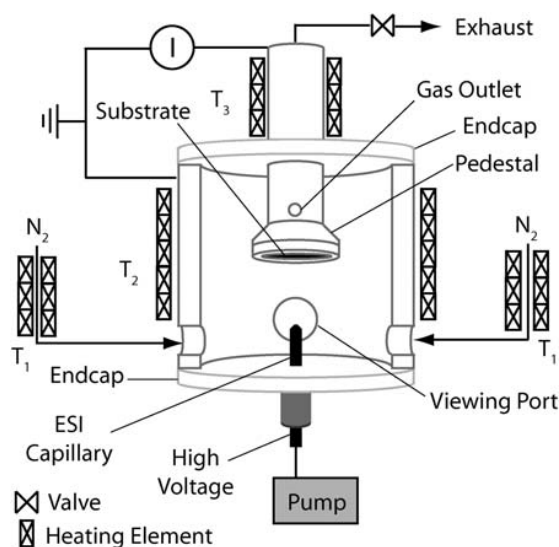
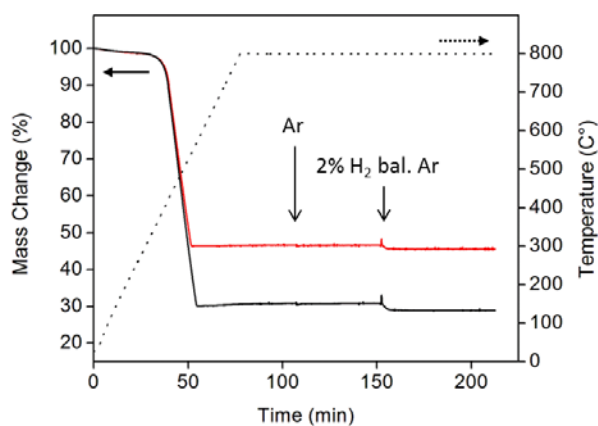
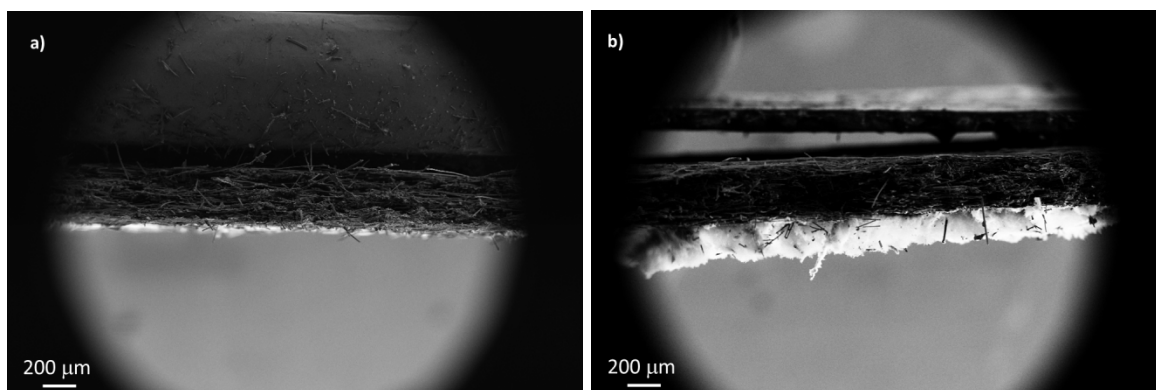
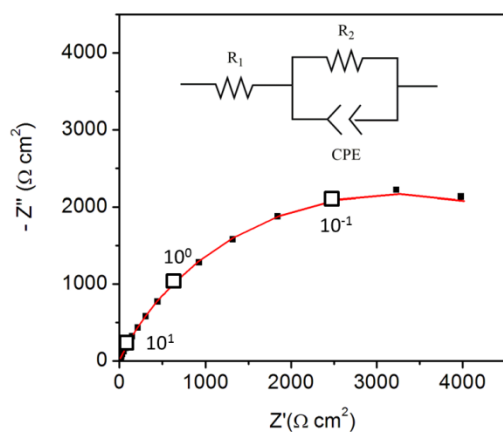
V. Sara Thoi<sup>a</sup>, Robert E. Usiskin<sup>a</sup>, and Sossina. M. Haile<sup>a</sup>Figure S1. Schematic of the electro spray apparatus.<sup>1</sup>

Figure S2. TGA profiles of 30 (red) and 46 wt% (black) Pt-CNTs under a flow of air, Ar, and 2.04% H<sub>2</sub> bal at 200 mL min<sup>-1</sup> and a heating rate of 10 °C min<sup>-1</sup>. The negligible mass change (< 1%) upon switched from oxidizing to reducing atmosphere indicates there is negligible formation of PtO<sub>x</sub>.



**Figure S3.** Cross-sectional SEM analysis of a) layered-composite and b) co-sprayed composite of 30 wt% Pt-CNT-C<sub>s</sub>H<sub>2</sub>PO<sub>4</sub> from Strategies 1 and 2, respectively, illustrated in Scheme 2 in the main text. The straw-like layer is the carbon paper electrode and the thin white layer is the C<sub>s</sub>H<sub>2</sub>PO<sub>4</sub>-based electrode.



**Figure S4.** Symmetric cell impedance measurements of electrospayed commercial CNTs (as received). Measurements are performed at 240 °C in a dynamic atmosphere of 0.4 atm H<sub>2</sub>O and balance H<sub>2</sub> supplied at a gas velocity of 6 cm min<sup>-1</sup> (inset: equivalent circuit used for fitting).

1. A. Varga, N. A. Brunelli, M. W. Louie, K. P. Giapis and S. M. Haile, *J. Mater. Chem.*, 2010, **20**, 6309.