Electronic Supplementary Information

Hierarchically Ordered Arrays with Platinum Coated PANI Nanowires for Highly Efficient Fuel Cell Electrode

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Experimental section

We could obtain the growth density of PANI nanowires by the following method. In detail, we chose five regions in the SEM figures with low magnification. The area of five regions was 1×1 μm^2. Then, the growth density could be obtained through figuring the amount of PANI nanowires in five regions and averaging.

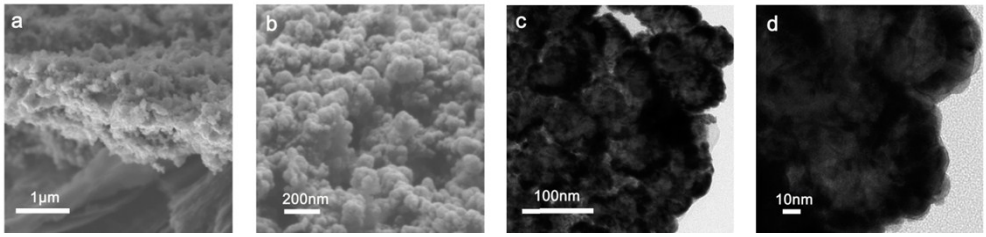

Fig.S1 SEM and TEM images of the disordered clusters structure of Pt-GDL electrode. (a, b) SEM images of side view of Pt-GDL electrode. (c, d) TEM images of Pt clusters on carbon powder.

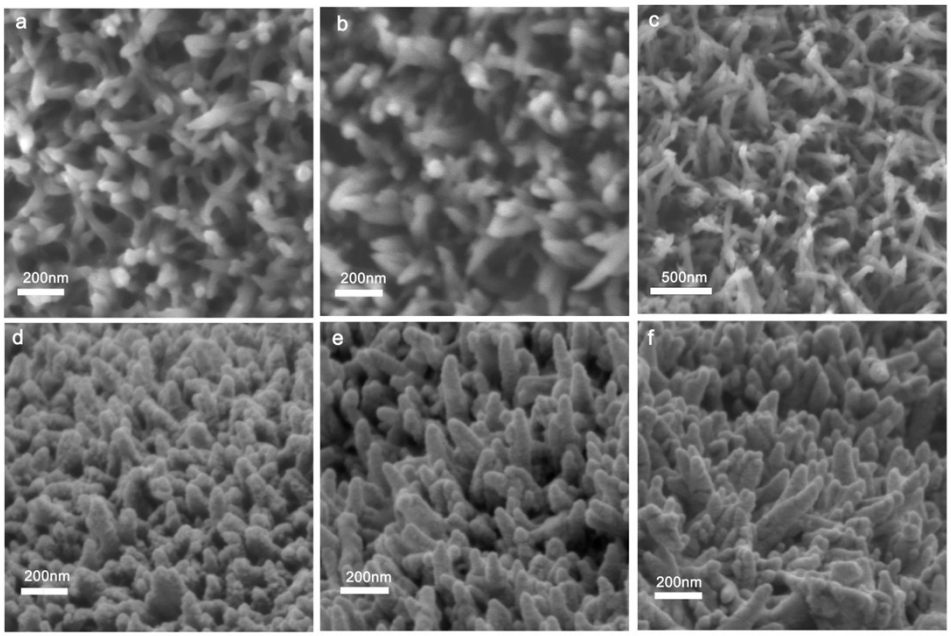

Fig.S2 SEM images of PANI-GDL electrodes (a, b, c) and Pt-PANI-GDL electrodes (d, e, f). PANI nanowires was polymerized at 270 K (a, d), 277 K (b, e) and 297 K (c, f).

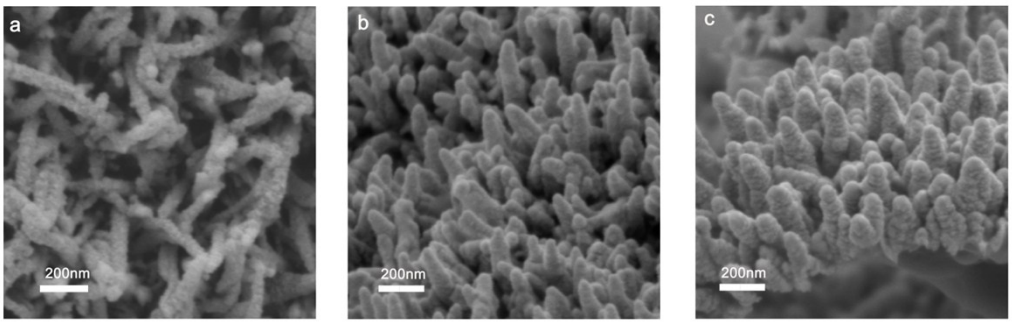

Fig.S3 SEM images of Pt-PANI-GDL electrodes with different sputtering time. (a) 1 min, (b) 5 min, (c) 10 min.

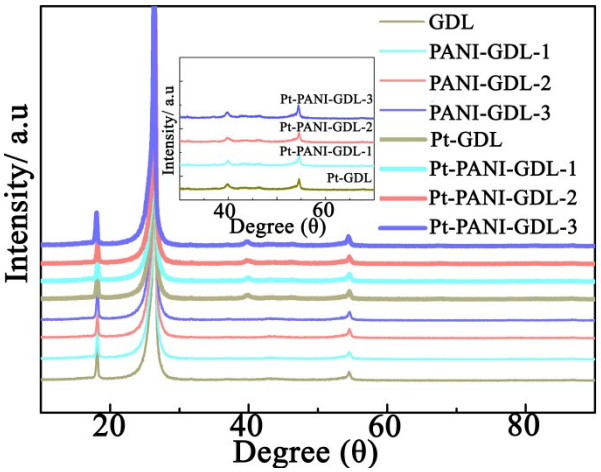

Fig.S4 XRD patterns of Pt-GDL electrode and Pt-PANI-GDL electrodes with different PANI nanowires under the same sputtering time.

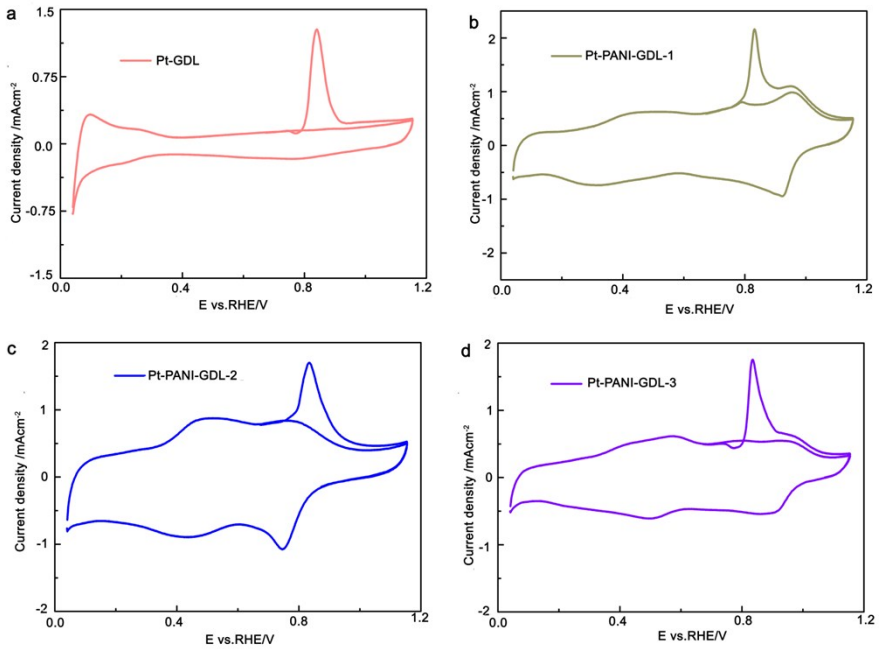

Fig.S5 CO stripping curves of Pt -GDL electrode and Pt-PANI-GDL electrodes. CO stripping measure was conducted in CO saturated $HClO_4$ electrolyte (0.1 M) at 0.1 V vs. RHE kept 20 min, and then in N_2 saturated $HClO_4$ electrolyte (0.1 M) with the same potential kept 60 min, and thus cyclic voltammetry (CV) at a scan rate of 20 mV s^{-1} was performed

Table 1 Electrochemical properties of different electrodes.

electrochemical properties	ECSA (m^2/g_{Pt})	MA (mA/mg_{Pt})	SA (mA/cm^2_{Pt})
Pt-PANI-GDL-3	13.853	14.695	0.108
Pt-GDL	11.818	11.133	0.0942
Pt-C (JM)	45.225	15.340	0.0339

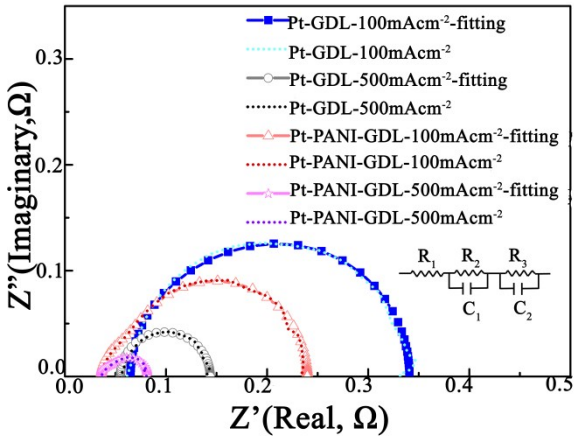

Fig.S6 EIS curves of PEMFC single cells with Pt-PANI-GDL-3 and Pt-GDL electrode at different current density.

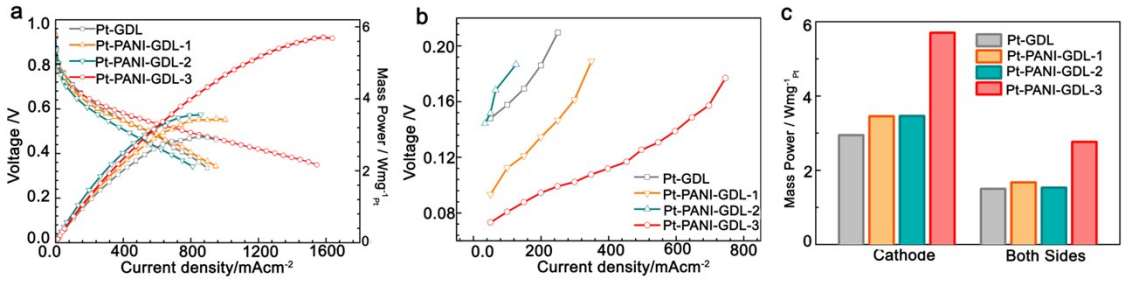

Fig.S7 Performances of PEMFC single cells for Pt-PANI-GDL electrodes with different orderliness.