Electronic supplementary Information for

Highly Stable and Active PtNiFe Dandelion-Like Alloys for Methanol Electrooxidation

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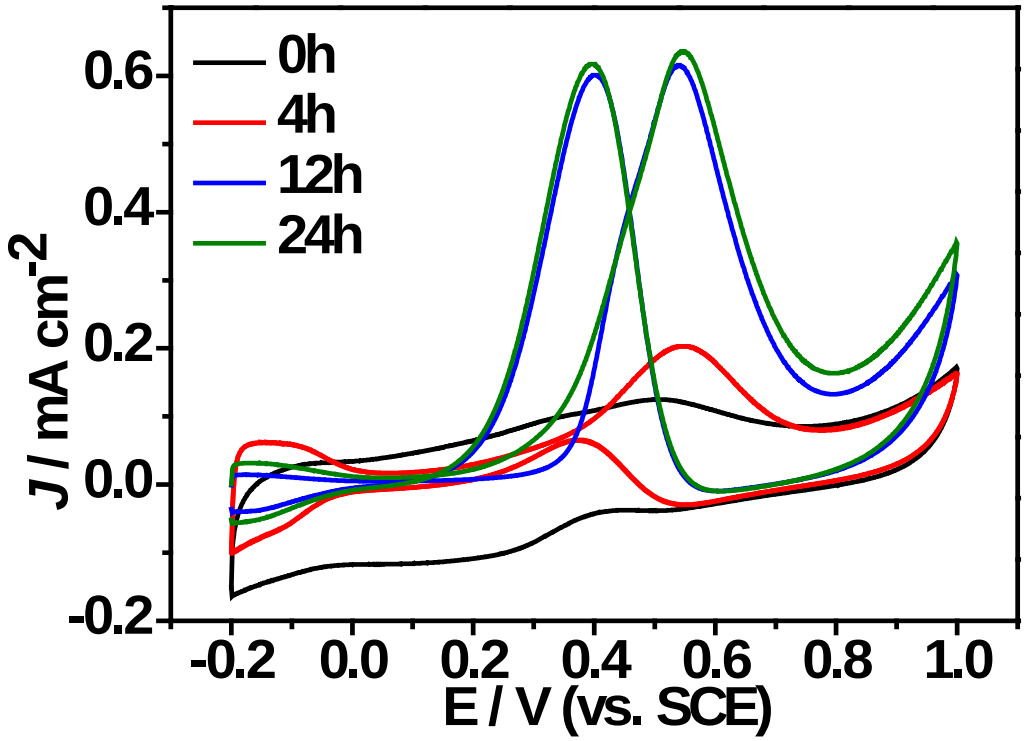

Figure S1. Effect of the UV-ozone treatment on the specific activity of PtNiFe-20 for methanol electrooxidation in solution of 0.1 M CH_3OH+0.1 M H_2SO_4 at 50 mV s^{-1}.

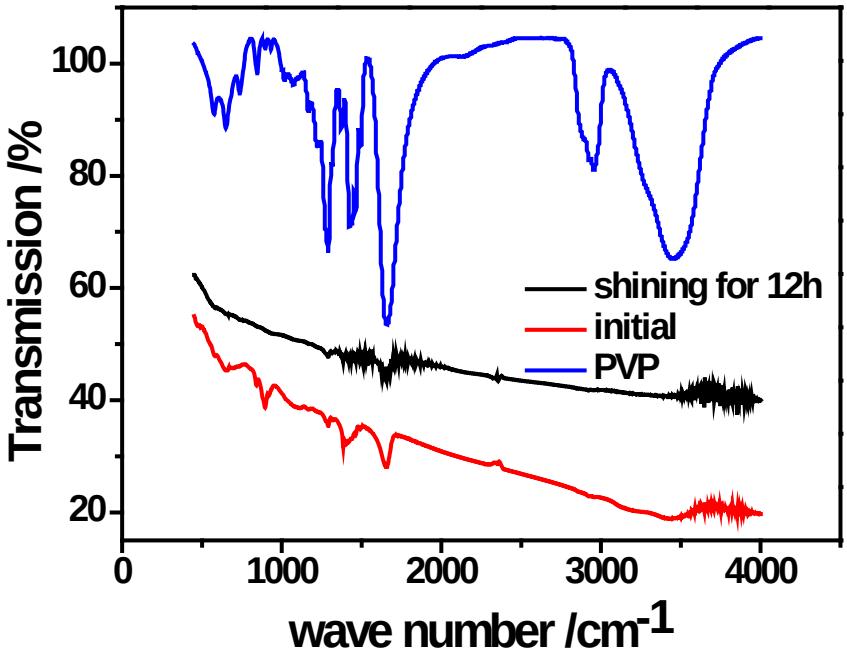

Figure S2. FT-IR spectra of PVP (blue), as synthesized PtNiFe-20 (red), and PtNiFe-20 after shining under UV-ozone for 12 h (black).

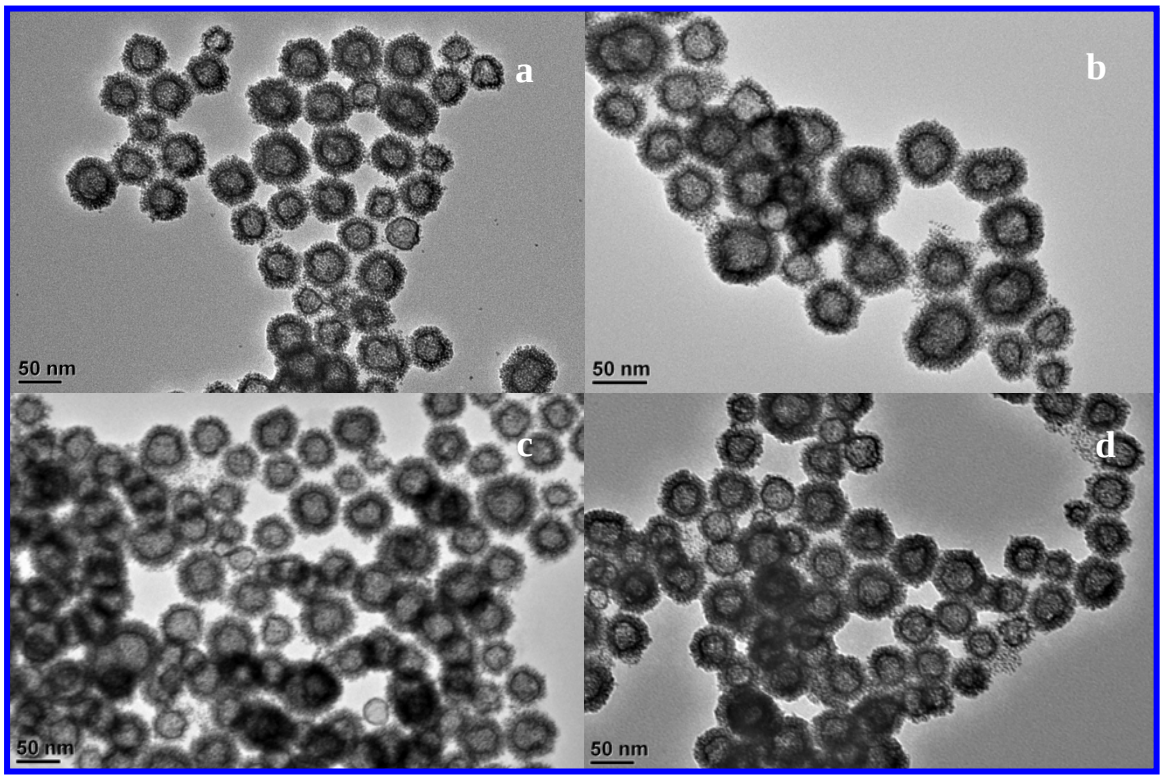

Figure S3. Effect of UV-ozone treatment on the TEM images of PtNiFe-20 catalyst (a) UV-ozone shining for 0 h, (b) shining for 4 h, (c) shining for 12 h, and (d) shining for 24 h.

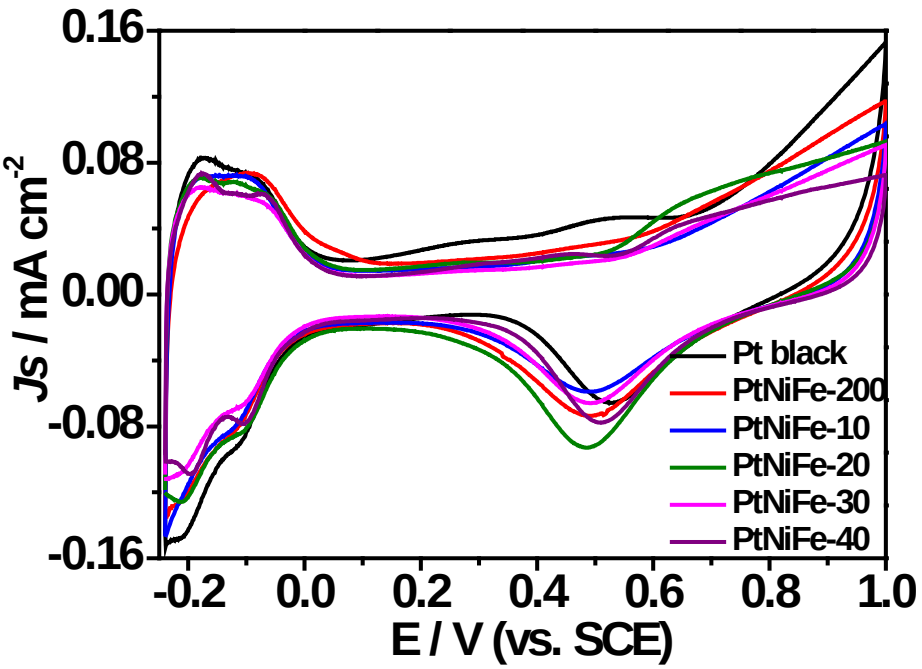

Figure S4.CV curves measured in 0.1 M H_2SO_4 solution with a rate of 50 mV s^{-1} on PtNiFe-10, -20, -30, -40, -200 and Pt black catalysts.

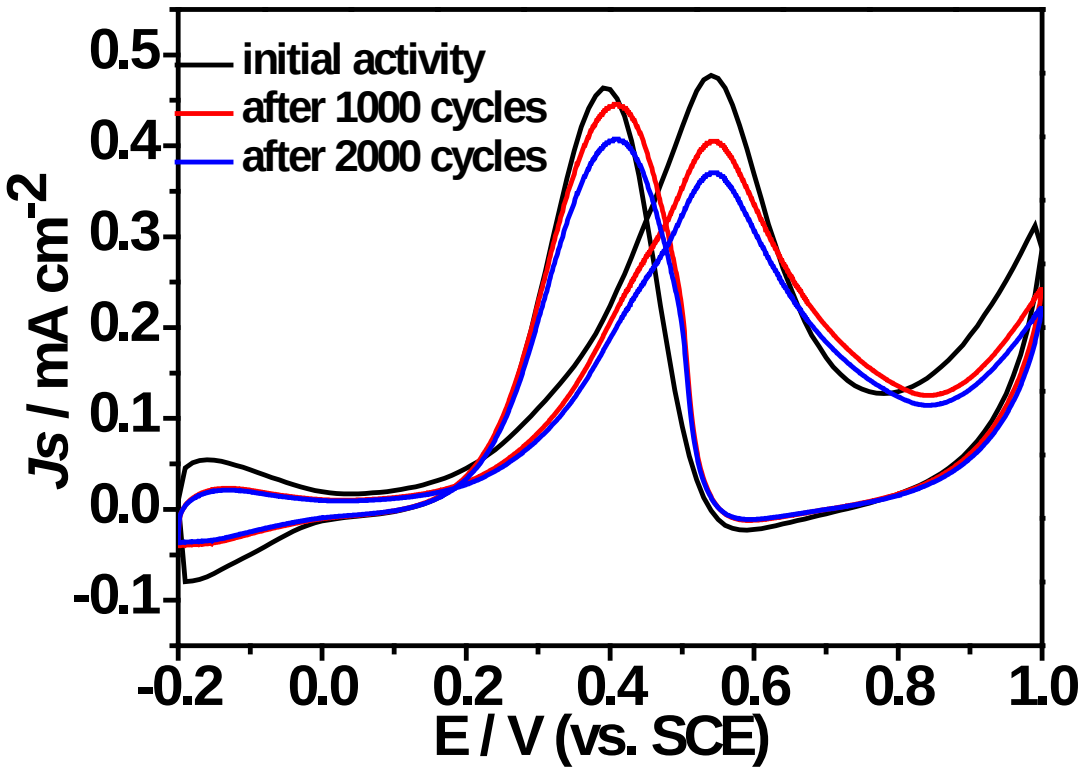

Figure S5. The variation of CV curves of commercial Pt black during the successive 1000, 2,000 cycles [CV curves were measured in solution of 0.1 M CH_3OH+0.1 M H_2SO_4 at 50 mV s^{-1}].

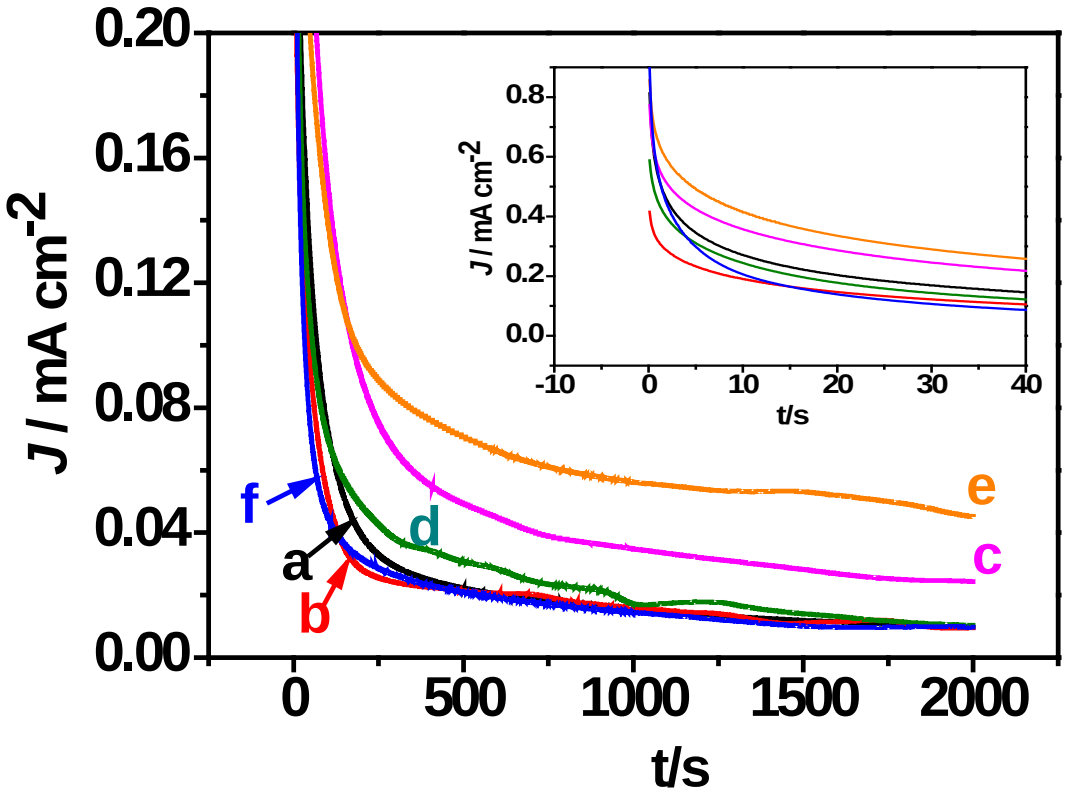

Figure S6. The variation of I-t curves of PtNiFe-20 during the successive 1000, 2000, 3000, 4500, 5500, and 7000 cycles: (a) initial activity for PtNiFe-20; (b) commercial Pt black; (c-g) after 1000 cycles, 3000 cycles, 4500 cycles and 7000 cycles for PtNiFe-20. The insert in (D) is the enlarged I-t curves within 40 s.

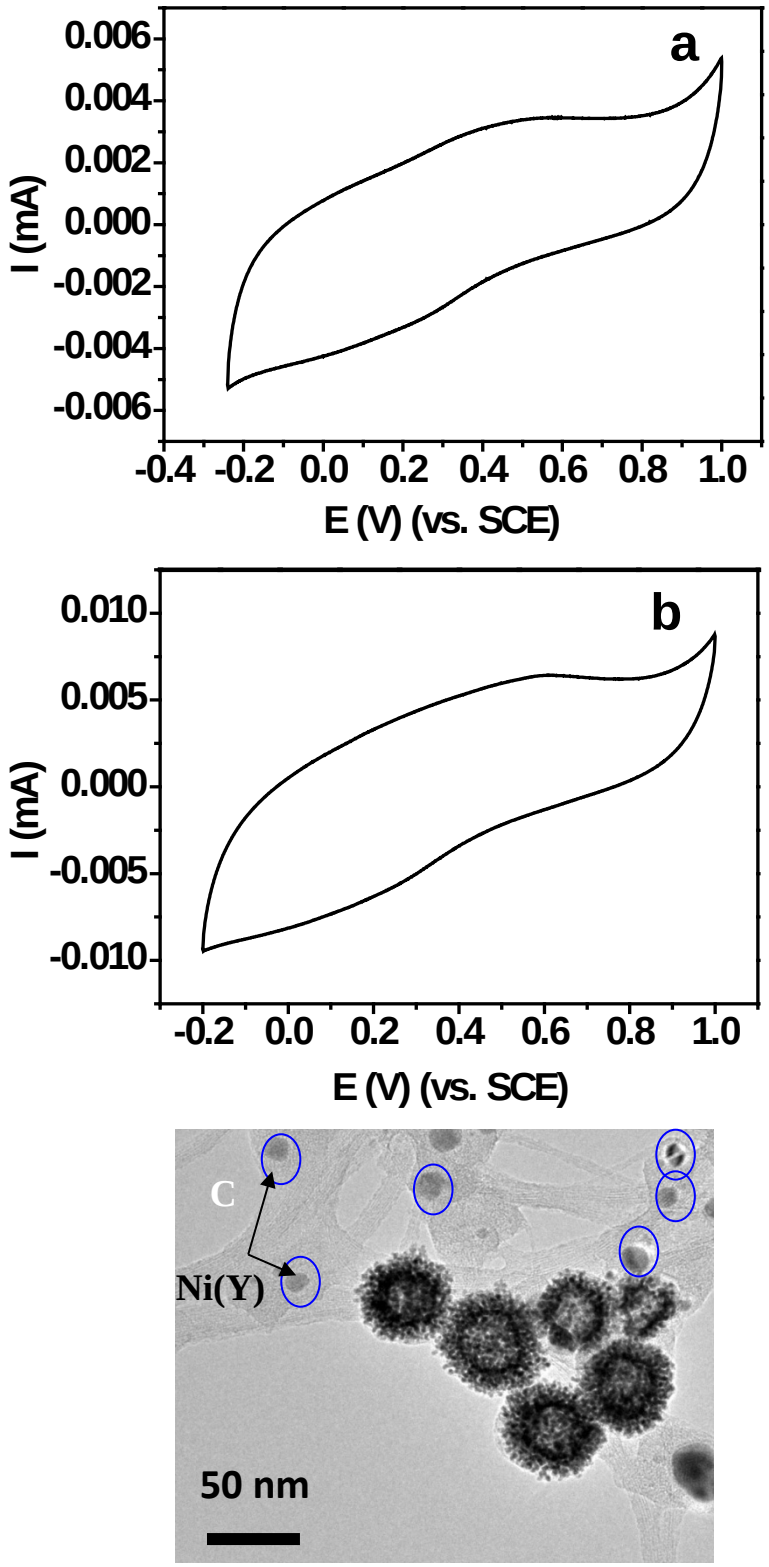

Figure S7. CV curves of SWNTs (a) measured in 0.1 M H_2SO_4 solution with a rate of 50 mV s^{-1}, (b) measured in 0.1 M CH_3OH+0.1 M H_2SO_4 solution with a rate of 50 mV s^{-1}. (c) TEM images of PtNiFe-20/SWNTs, the encircled particles are Ni and Y particles. From the curves of a and b, we can see that there are no hydrogen adsorption/desorption peaks and methanol electrooxidation peaks, which illuminates

that the SWNTs containing Ni and Y metals show no catalytic activity for the methanol electrooxidation.

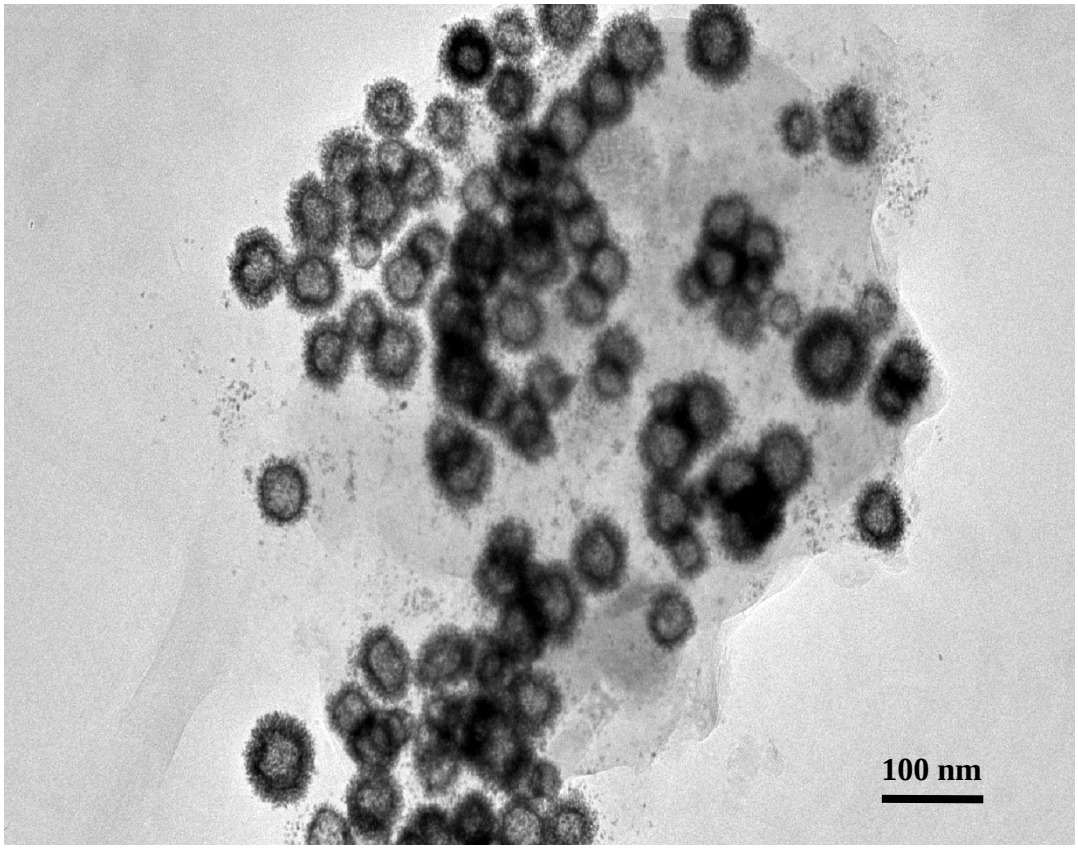

Figure S8. TEM images of PtNiFe-20 after total 7000 cycles in MOR. Note that Nafion can be observed.

Table S1. ICP-AES analysis for the as-synthesized PtNiFe alloys

PtNiFe alloys	Fe		Ni		Pt	
	mole ratio	mass ratio	mole ratio	mass ratio	mole ratio	mass ratio
PtNiFe-10	0.232	0.082	0.032	0.012	0.736	0.906
PtNiFe-20	0.086	0.027	0.0343	0.011	0.881	0.962
PtNiFe-30	0.088	0.028	0.031	0.010	0.881	0.962
PtNiFe-40	0.048	0.014	0.03	0.010	0.922	0.976
PtNiFe-200	0.01	0.003	0.19	0.067	0.8	0.930

Table S2. The specific activity and mass activity for the as-synthesized PtNiFe alloys and commercial Pt black towards methonal electrooxidation.

Samples	Specific activity (mA cm^{-2})	The times of specific activity to Pt black	mass activity (mA mg_{Pt}^{-1})	The times of mass activity to Pt black
PtNiFe-10	0.34	1.55	36.2	2.74
PtNiFe-20	0.64	2.9	61.1	4.63
PtNiFe-30	0.54	2.45	66.5	5.04
PtNiFe-40	0.53	2.41	76.8	5.82
PtNiFe-200	0.49	2.23	114.8	8.70
Pt black	0.22	1.00	13.2	1.00