Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Micelle–assisted electrodeposition of highly mesoporous Fe-Pt nodular films with soft magnetic and electrocatalytic properties

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Mesoporous film	**S_a** (nm)	**S_q** (nm)
Pt-rich Fe-Pt grown onto Au	19.27	25.23
Pt-rich Fe-Pt grown onto Cu	17.63	24.59
Pt-rich Fe-Pt grown onto Al	19.87	27.50
Fe-rich Fe-Pt grown onto Au	19.47	24.55

Table S1: Values of the arithmetic mean height of the surface (S_a) and the root mean square height of the surface (S_q) (which are indicative of the films' surface roughness) obtained for the different investigated samples.

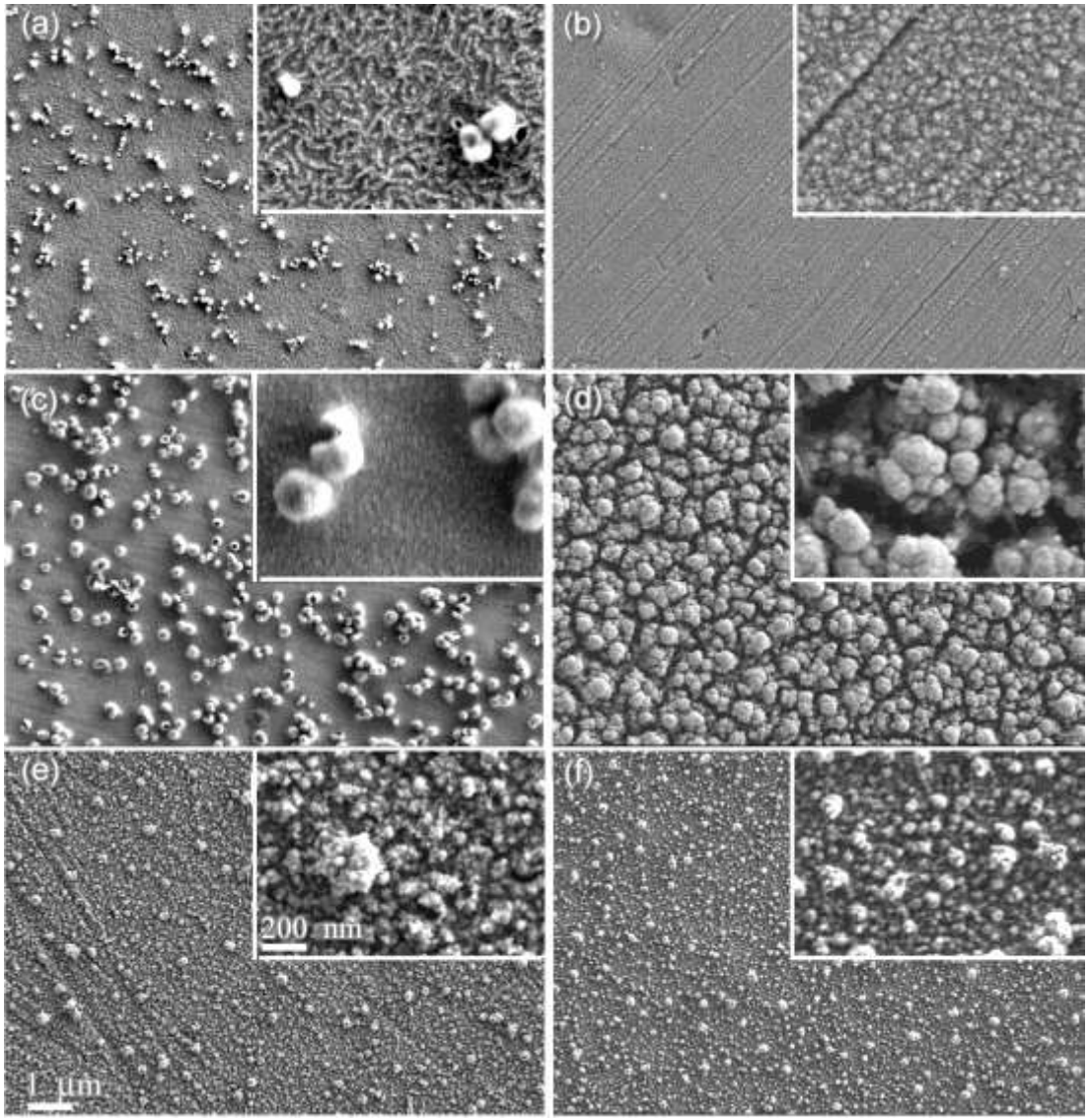

Fig. S1. Top-view scanning electron microscopy (SEM) images of Pt-rich Fe-Pt films electrodeposited onto Au-metallized Si substrates using the following conditions: (a) 0.87 mM P123, 600 s deposition time, E = –1100 mV, T = 25 ºC, pH = 2.3; (b) 3.48 mM P123, 600 s deposition time, E = –1100 mV, T = 25 ºC, pH = 2.3, adding ascorbic acid (2.8 mM); (c) 1.71 mM P123, 600 s deposition time, E = –1100 mV, T = 25 ºC, pH = 2.3; (d) 3.48 mM P123, 600 s deposition time, E = –1100 mV, T = 75 ºC, pH = 2.3; (e) 3.48 mM P123, 900 s deposition time, E = –1000 mV, T = 25 ºC; (f) 3.48 mM P123, 600 s deposition time, E = –1100 mV, T = 25 ºC adjusting the pH to 2.0.

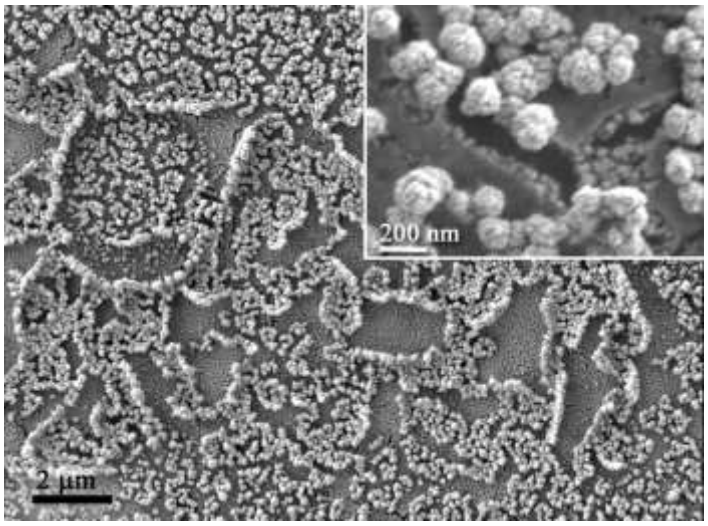

Fig. S2. Scanning electron microscopy (SEM) image of the surface of a Pt-rich Fe-Pt layer grown onto the Al substrate, revealing the presence of small clusters, incomplete coating and delamination in some regions (x 10.000). The top right inset shows a detail of this film (x 50.000).

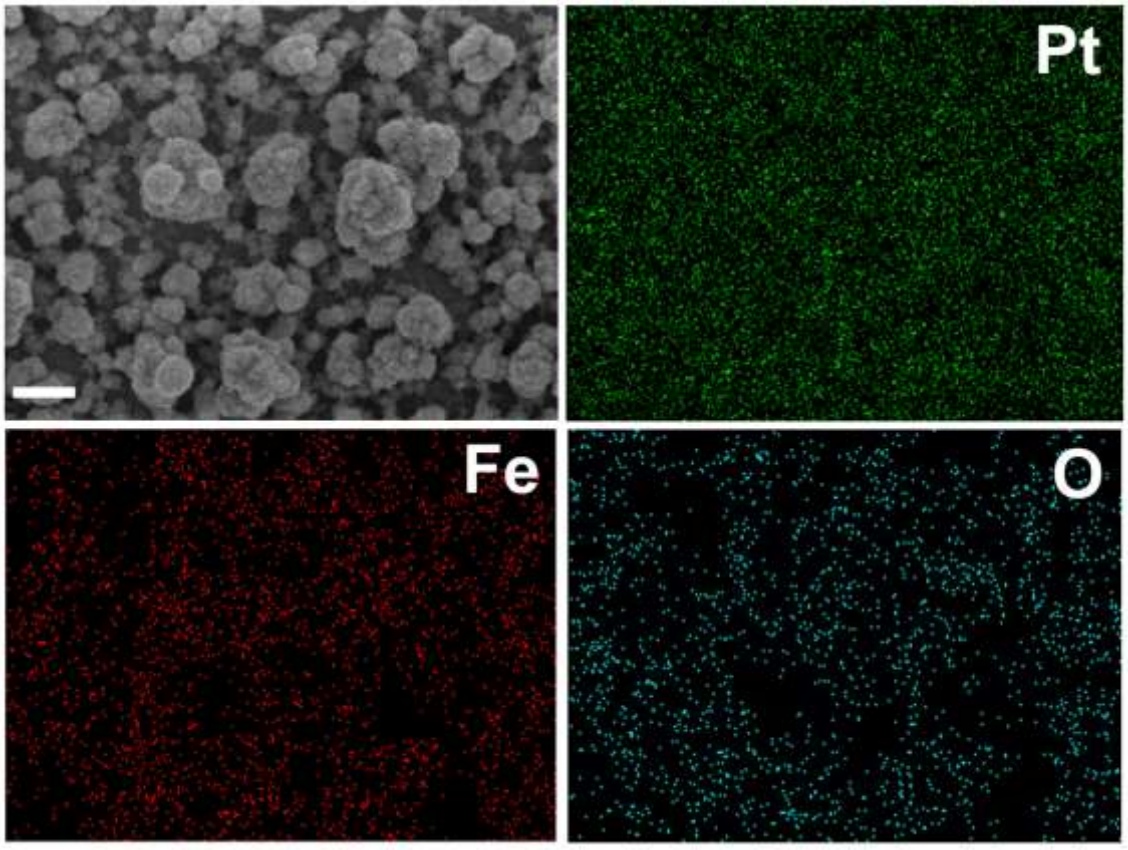

Fig. S3: Energy–dispersive X–ray (EDX) mapping images acquired at the surface of the Pt-rich film grown on Au, corresponding to platinum, oxygen and iron atom concentrations. The scale bar is 200 nm.

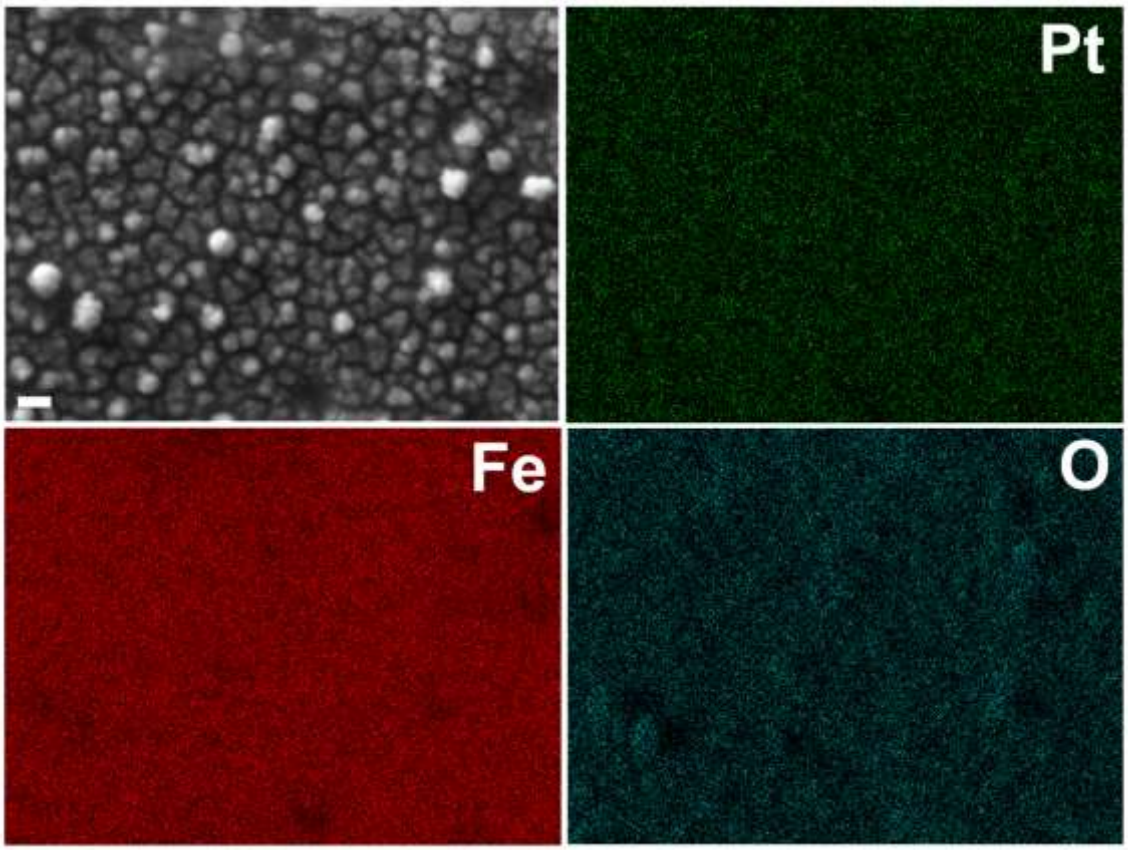

Fig. S4: Energy–dispersive X–ray (EDX) mapping images acquired at the surface of the Fe-rich film grown on Au, corresponding to platinum, oxygen and iron atom concentrations. The scale bar is 800 nm.

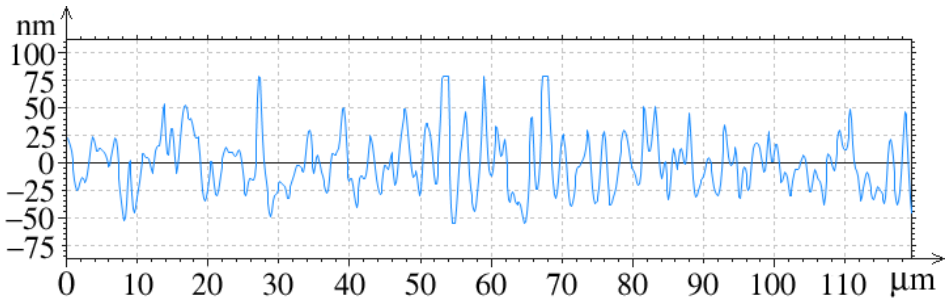

Fig. S5. Representative line scan of the height profile obtained from the Pt-rich Fe-Pt film grown onto the evaporated Au layer.

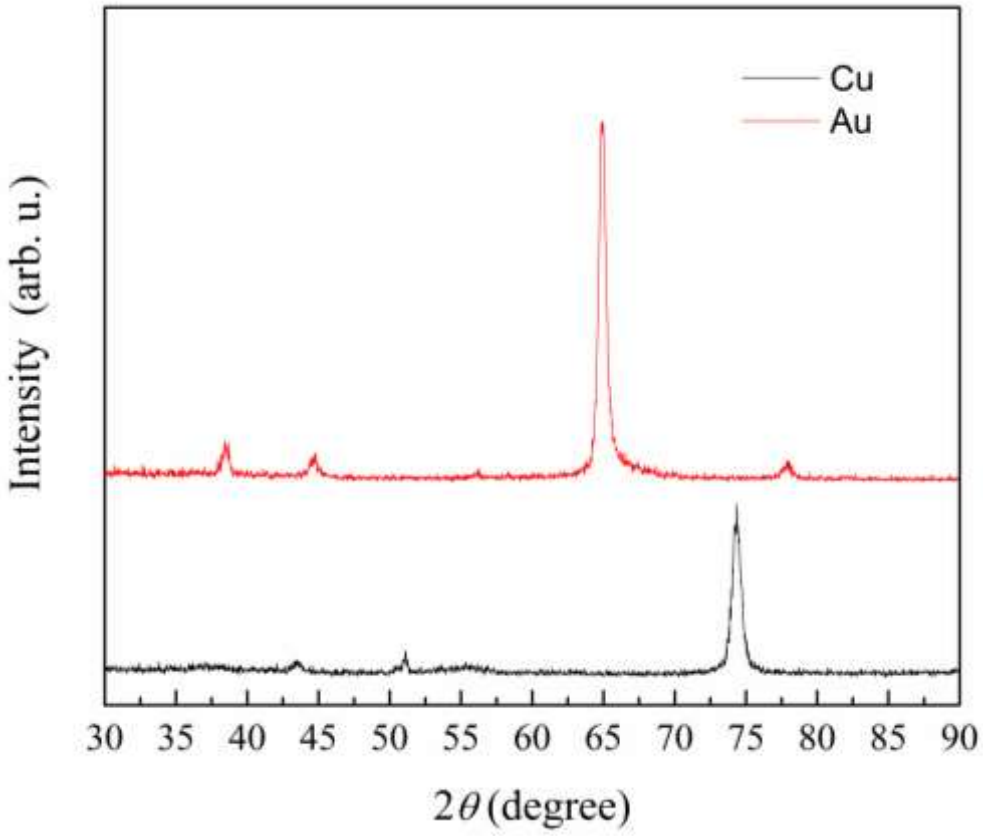

Fig. S6. XRD patterns acquired from the substrates with the Cu and Au seed layers, without the electrodeposited Fe-Pt films.

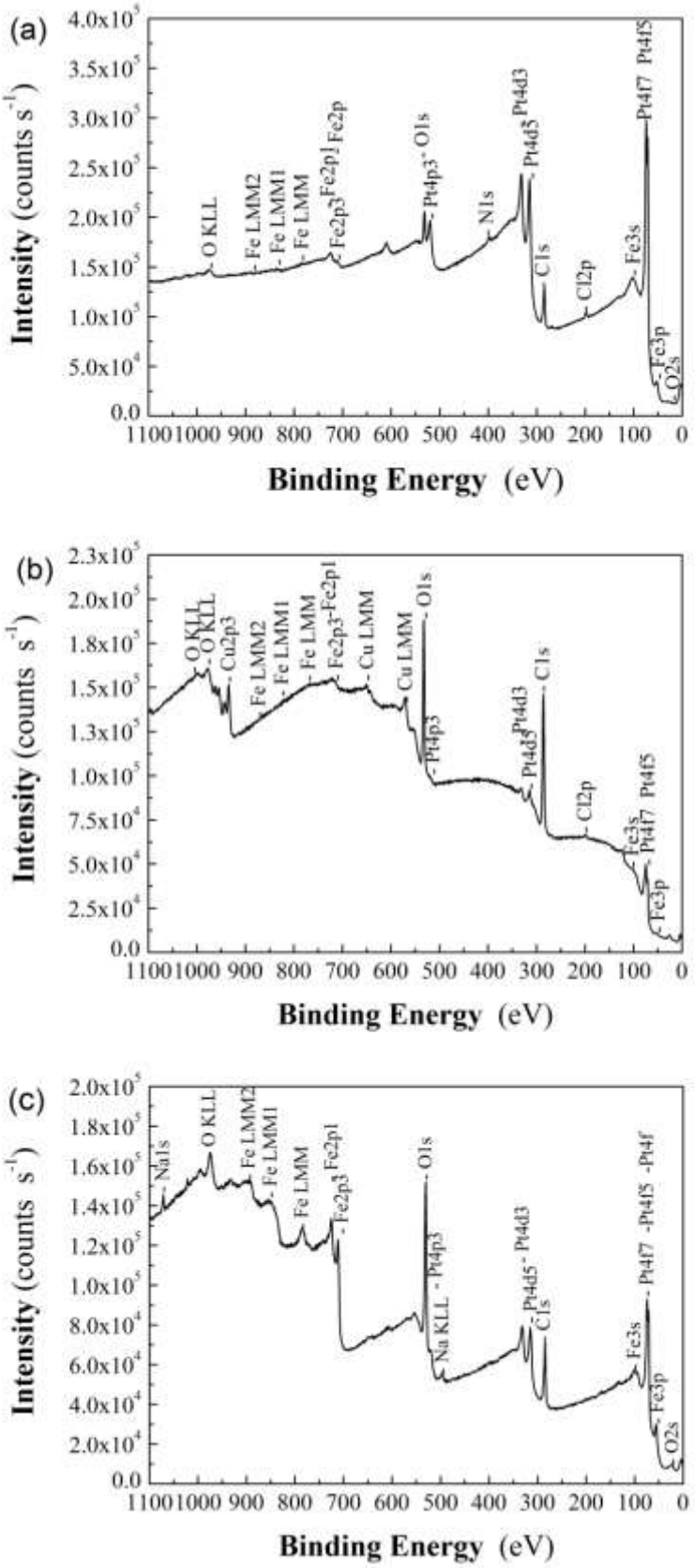

Fig. S7. X–ray photoemission spectroscopy (XPS) survey spectra of (a) Pt-rich Fe-Pt films grown onto Au, (b) Pt-rich Fe-Pt grown onto Cu and (c) Fe-rich Fe-Pt grown onto Au, all obtained before Ar^+ ions sputtering.

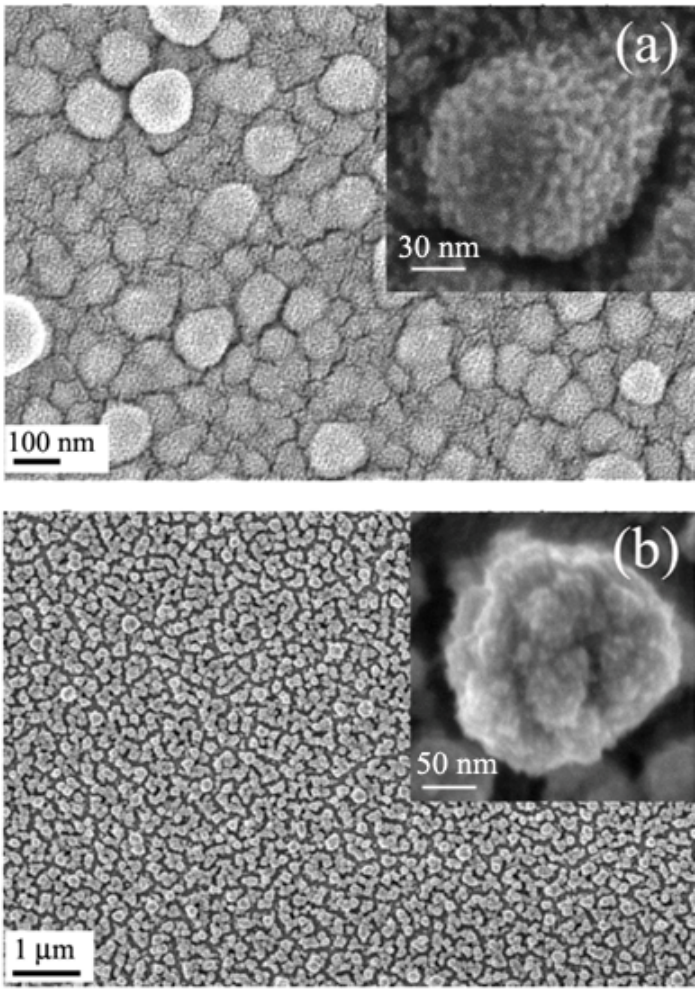

Fig. S8. SEM images of the (a) Pt-rich and (b) Fe-rich Fe-Pt films, electrodeposited onto the Au substrates, both obtained after HER experiments in alkaline media. The insets are higher magnification images.

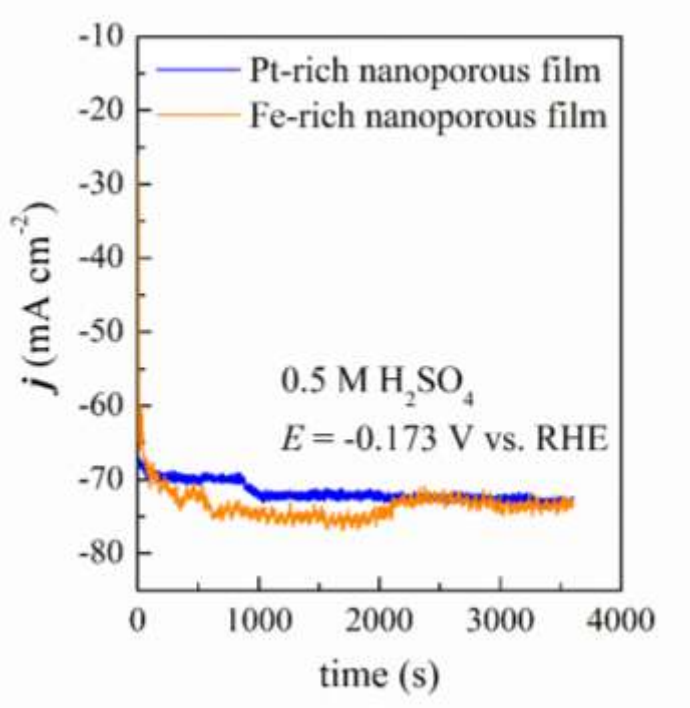

Figure S9. Chronoamperometric curves recorded in acidic media for both Pt-rich and Fe-rich nanoporous films (deposited on Au).

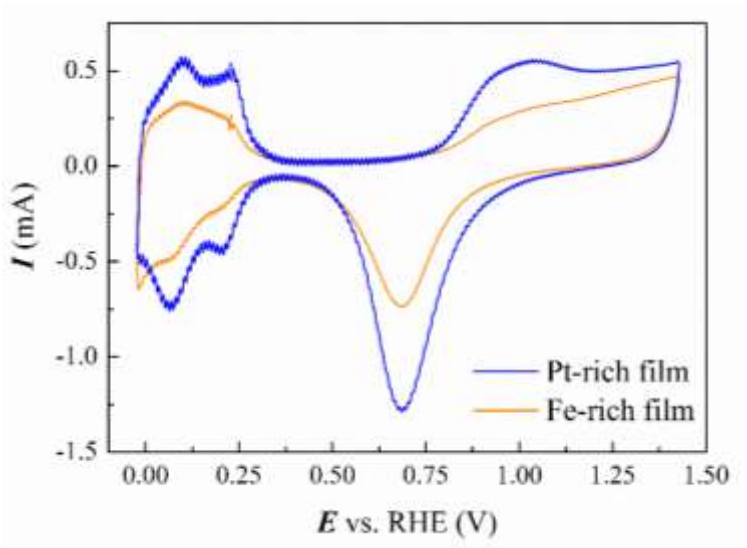

Figure S10. CV curves recorded in 0.5 M H_2SO_4 at 100 mV s^{-1} for both Pt-rich and Fe-rich Fe-Pt nanoporous films (deposited on Au) for the determination of the ECSA values.