Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Nanoscale Architecture of Bimetallic Hybrid Fe-Au Nanostructures with and without 1,4-Phenylene Diisocyanide Pre-Functionalization

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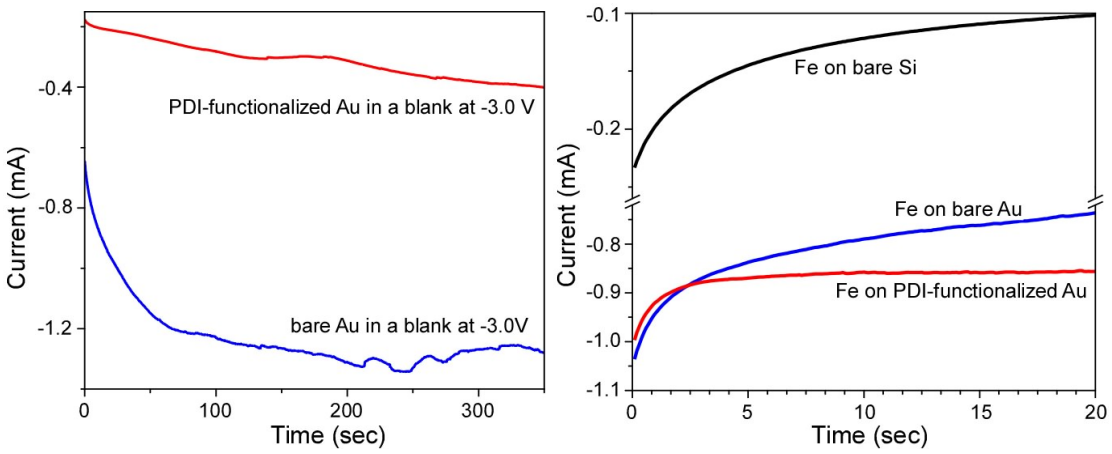

Figure S1: I-t curves of bare and PDI-functionalized Au NITs in a blank deionized water at a potential of –3.0 V (Figure 1, Samples A1 and A2, respectively), and Fe electrodeposition on bare Si, bare Au NIT, and PDI-functionalized Au NIT.

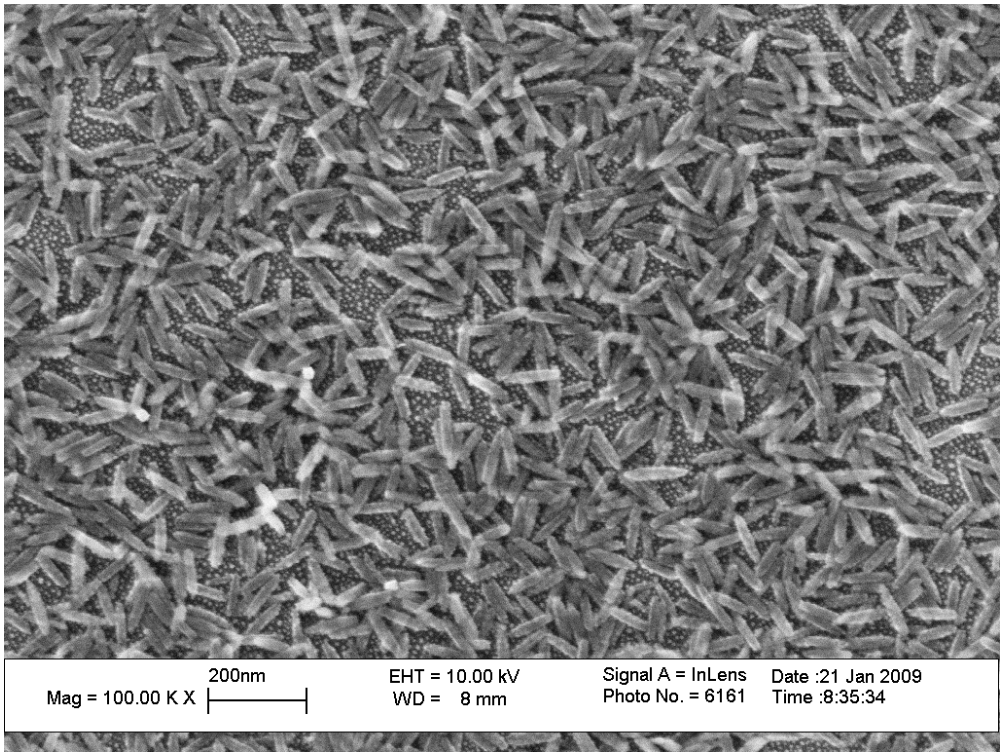

Figure S2a: SEM image of Fe NrPs electrodeposited on PDI-functionalized Au NIs.

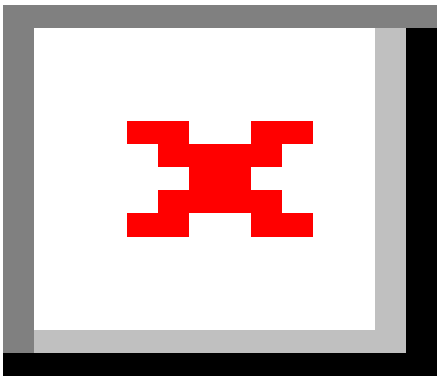

Figure S2b: Back-scattered electron image of Fe NrPs electrodeposited on bare Au NIs.

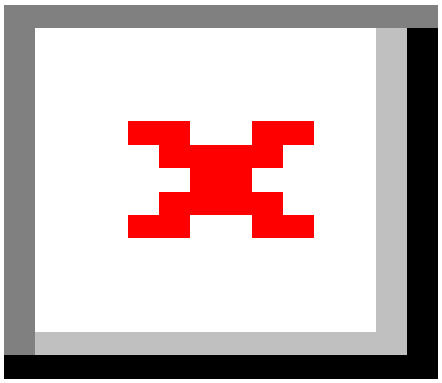

Figure S3a: SEM image of Fe NrPs electrodeposited on a bare Si substrate.

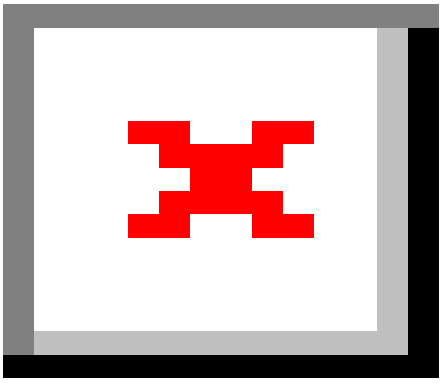

Figure S3b: SEM image of Fe NrPs electrodeposited on a bare Au NI template.

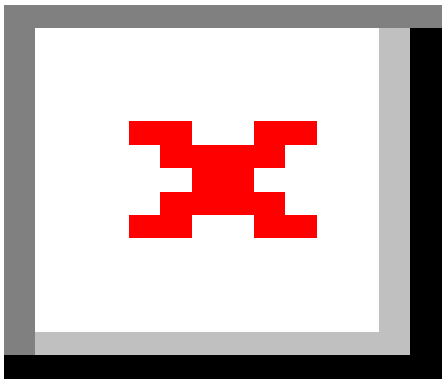

Figure S3c: SEM image of Fe NrP electrodeposited on PDI-functionalized Au NIs.

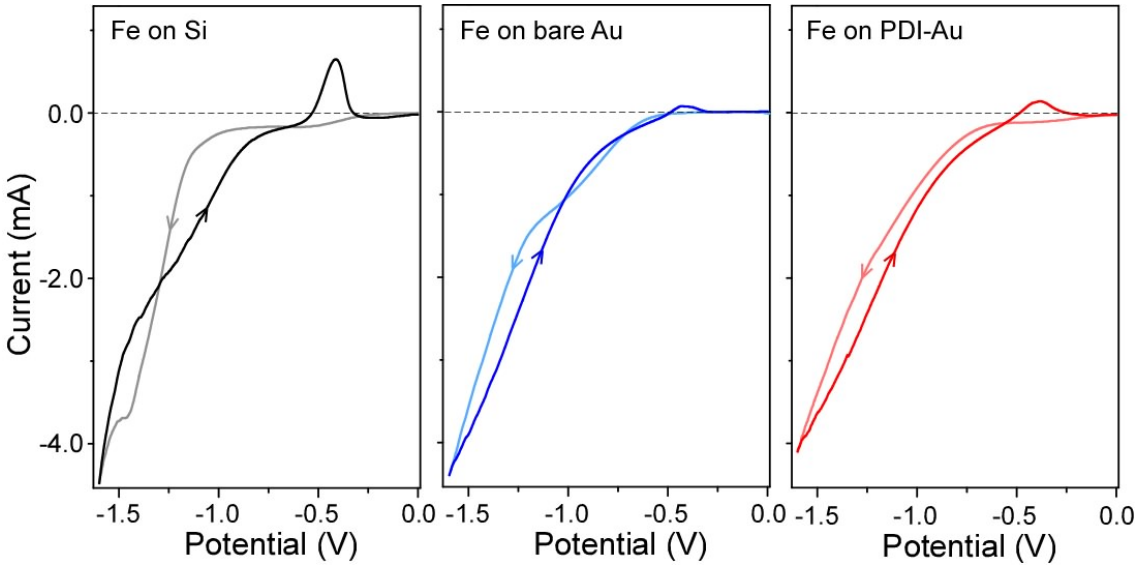

Figure S3d: Cyclic voltammograms for samples shown in Figure S3a, S3b, and S3c.

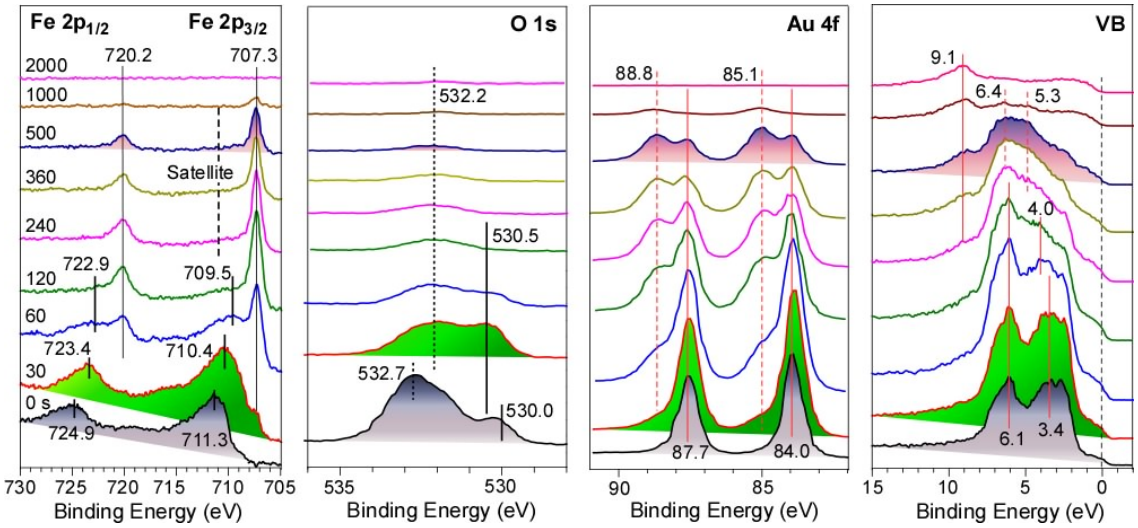

Figure S4: XPS spectra of Fe 2p, O 1s, Au 4f and valence band (VB) regions of Fe electrodeposited on large Au NIs, shown in Figure 2, Sample F1.

Table S1: Review of Au 4f XPS of Fe-Au hybrid materials.

Preparation method	System	Au Species ($4f_{7/2}$ Binding Energy, eV)	Ref.
Co-precipitation, 1wt% Au	Au/ FeO(OH), Fe_2O_3 Au/ Fe_3O_4, FeO	Au^0 (84.3) Au^0, electron-rich state (83.8)	51
Deposition-precipitation on Fe_xO_y, 3wt%	Au/ Fe_xO_y anneal(150-300˚C)	Au^0 (≤ 84.1)	52
Impregnation of $Au(PPh_3)(NO_3)$ on Fe oxides	$Au/Fe(OH)_3$, and Au/ Fe_2O_3	Au^I 84.9: strongly bound $[Au(PPh_3)]^+$ Au^0 84.0: upon annealing	53
Au reduction on Fe_3O_4 5nm core/1nm shell	Fe_3O_4@Au core-shell	Au^0 (84.2)	54
Reduction of Au into Porous alpha-Fe_2O_3 Nanorods 0.5 wt%	Au into porous alpha-Fe_2O_3	Au^0 (83.2) negative state	55
Co-precipitation and deposition-precipitation	Au/Fe_2O_3	Au^0 (84.0):70-85% AuO_x (84.8)30-15%	56
Co-precipitation, 5wt% Au	Au/Fe_2O_3	As-prepared: mixed Au^0 (84.3) and AuO_x (85.1) Upon 673K calcination: mainly Au^0 (84.3)	57
Sputter deposition of Au on Fe_xO_y	Au/ Fe_xO_y	Au^0 (84.1) Au-O (84.5) at the interface	This work
Electrodeposition of Au on Fe_xO_y	Au/ Fe_xO_y	Au^0 (84.1) Au-O (84.5) at the interface	This work
Electrodeposition of Fe oxides on Au/Si	Fe_xO_y /Au	Au^0 (84.1)	This work