

## **Supporting Information**

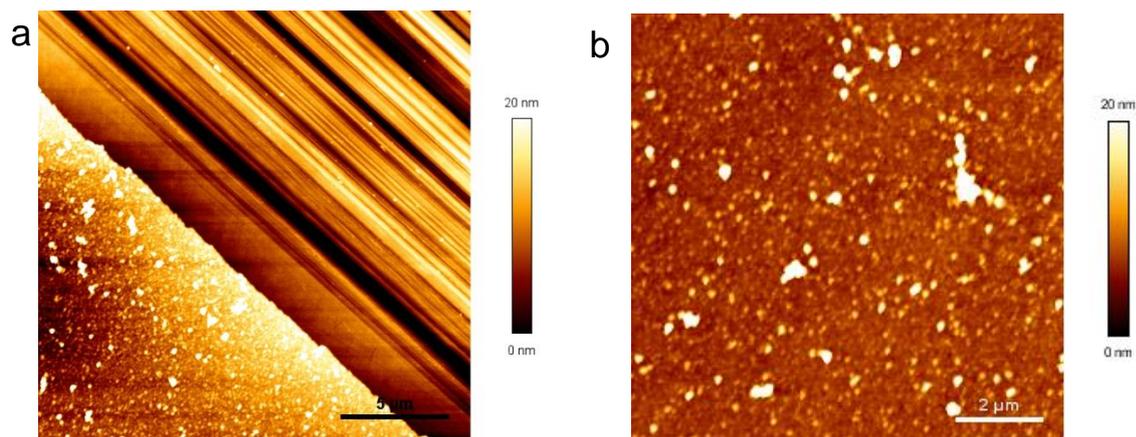
### **Spray Assembly of Metal–Phenolic Networks: Formation, Growth, and Applications**

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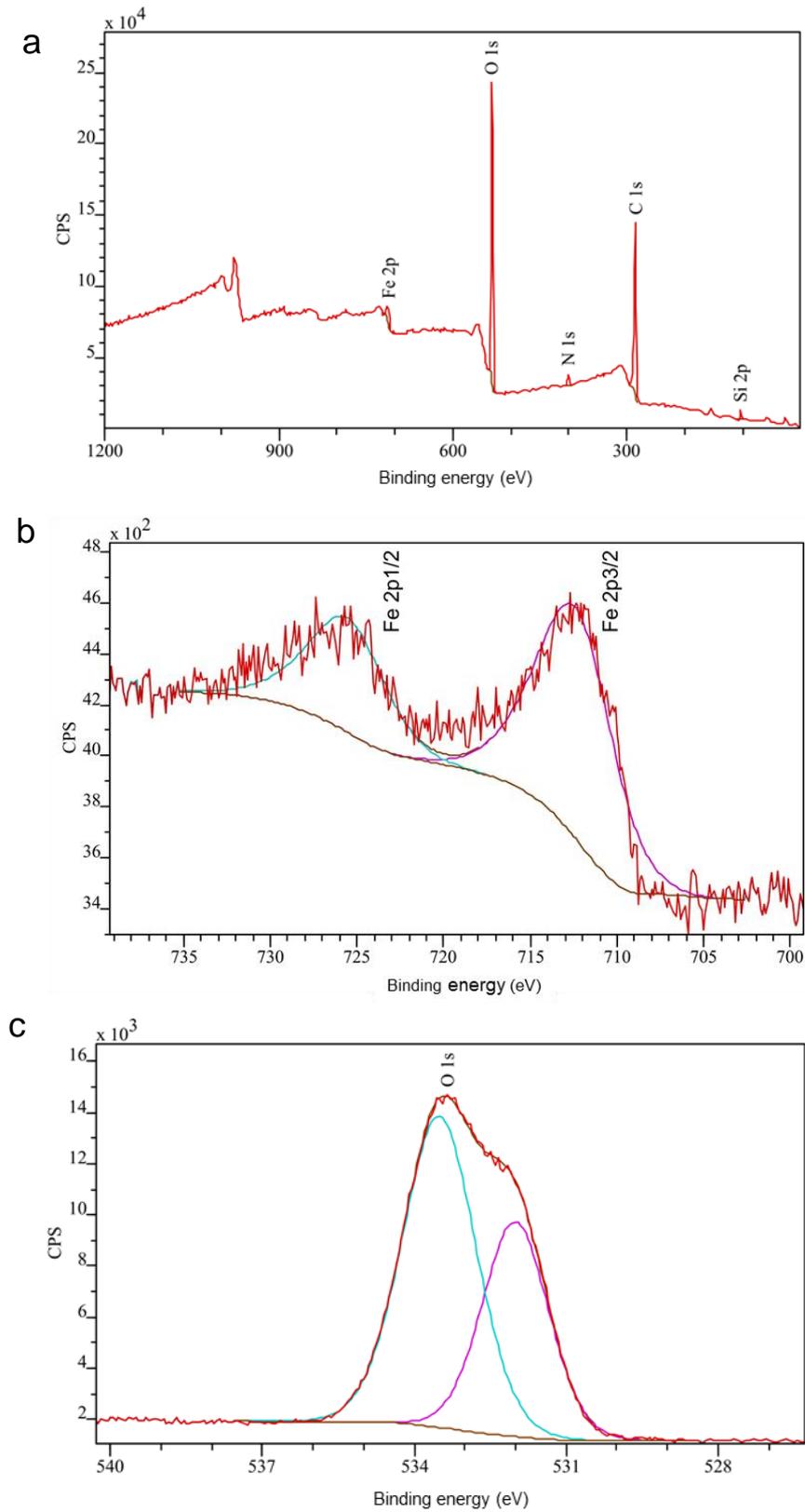
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#### **Corresponding Author**

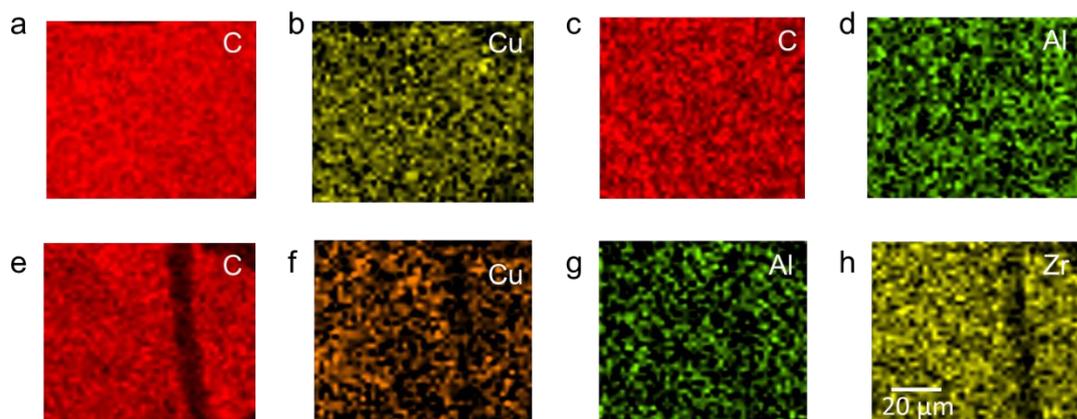
\*Email: [fcarus@unimelb.edu.au](mailto:fcarus@unimelb.edu.au)



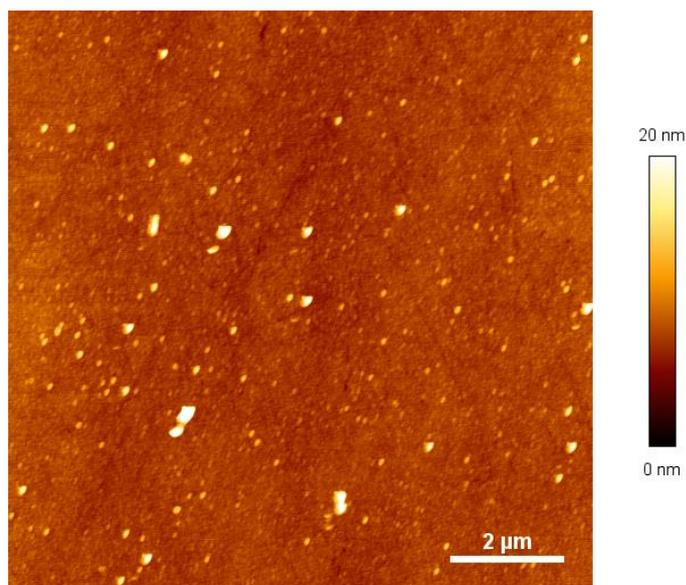
**Figure S1.** Atomic force microscopy (AFM) height images of (a) a scratched zone of a TA-Fe<sup>III</sup> coating on a quartz substrate showing the bare substrate and (b) a 15-nm thick TA-Fe<sup>III</sup> film, with a roughness of 2.9 nm.



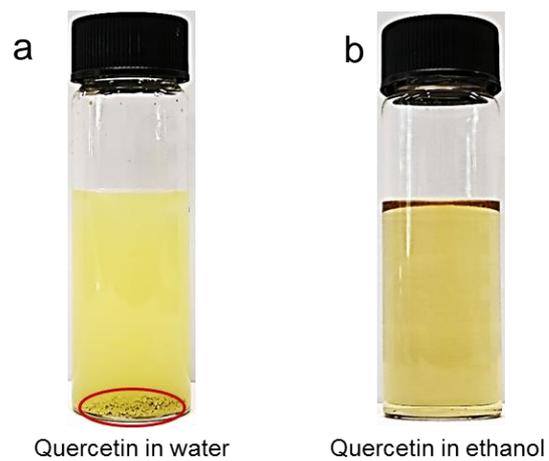
**Figure S2.** XPS spectra of TA-Fe<sup>III</sup> coating: (a) survey, (b) Fe 2p, and (c) C 1s.



**Figure S3.** Energy-dispersive X-ray spectroscopy maps showing the different elements present in the (a, b) TA-Cu<sup>II</sup>, (c, d) TA-Al<sup>III</sup>, and (e–h) TA-Cu<sup>II</sup>-Al<sup>III</sup>-Zr<sup>IV</sup> coatings.



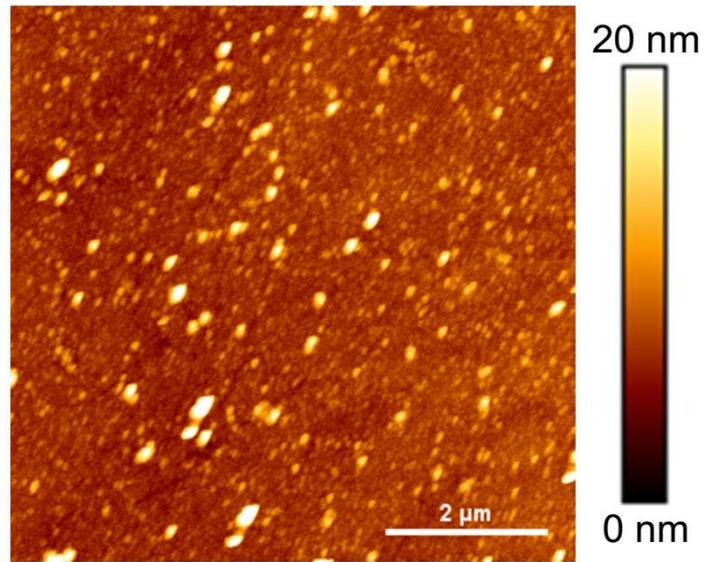
**Figure S4.** AFM topography image of a TA-Al<sup>III</sup> coating, with a roughness of 1.5 nm.



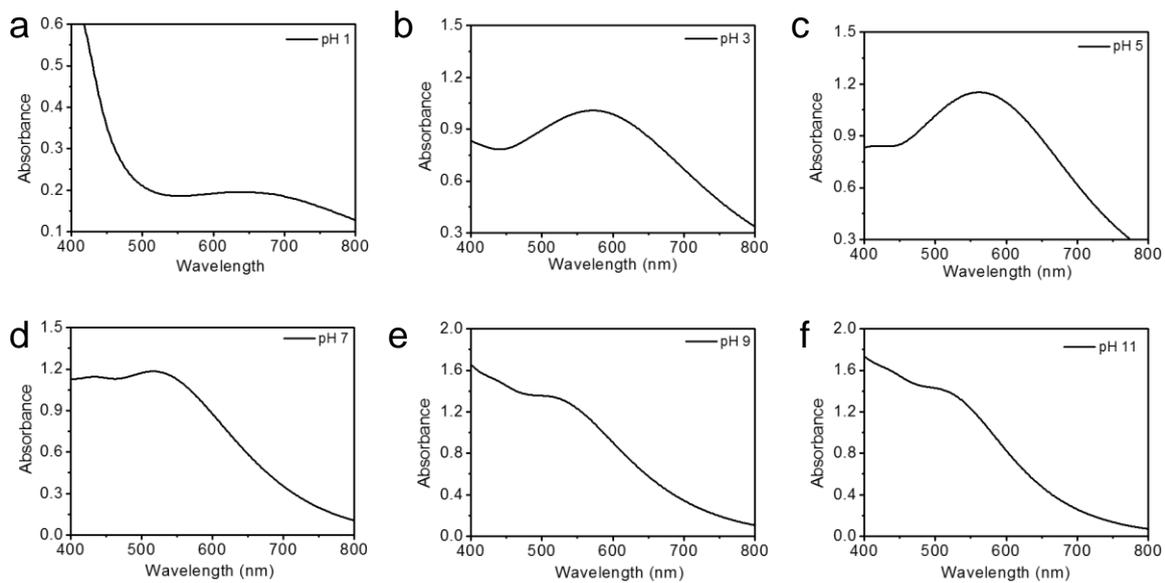
**Figure S5.** Solubility of quercetin in (a) water and (b) ethanol.

Substrate	Iron plate	Glass	PS	PP	PU foam
Uncoated					
Que-Fe coated					

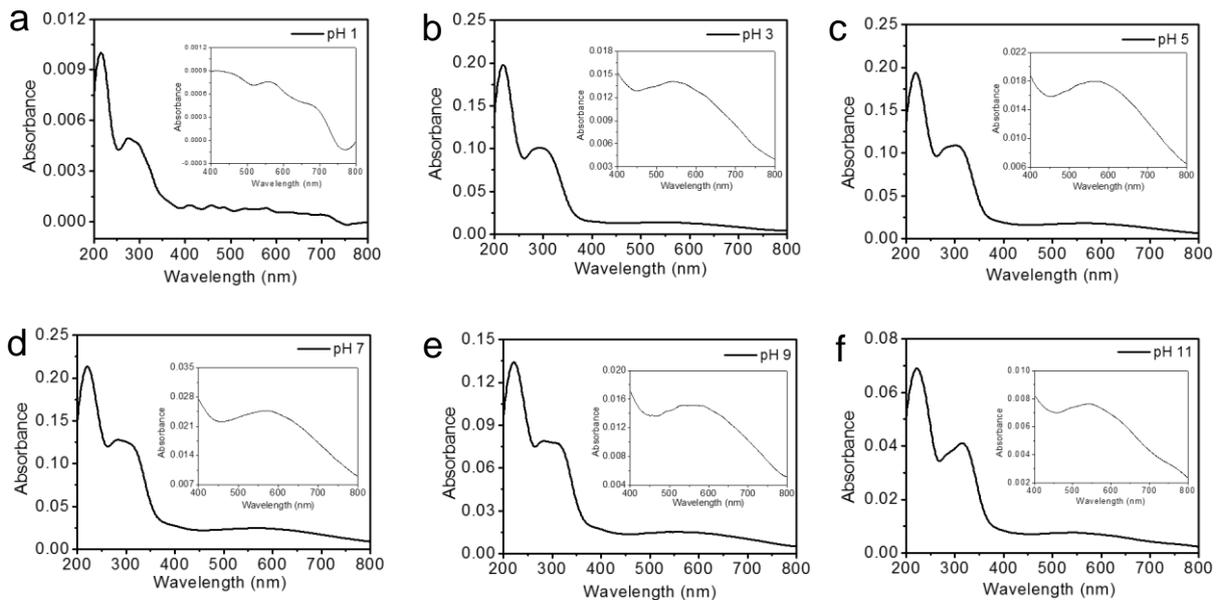
**Figure S6.** Spraying quercetin (Que) and Fe<sup>III</sup> in ethanol onto various substrates. PS, polystyrene; PP, polypropylene; PU, polyurethane.



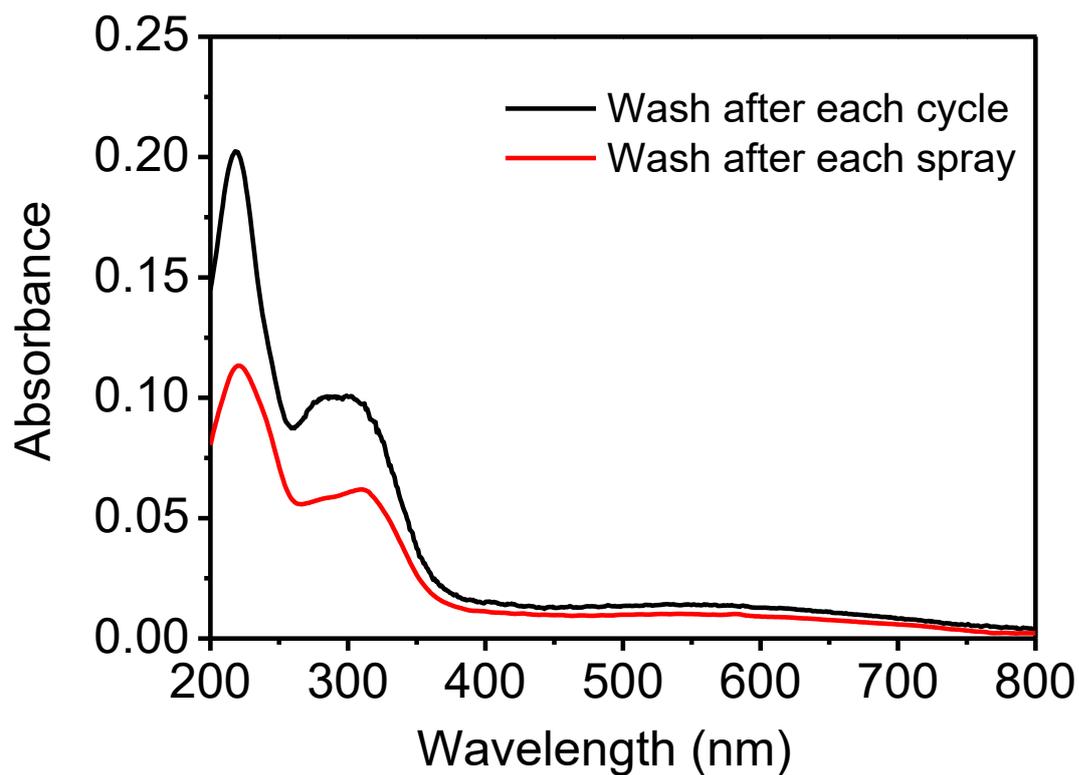
**Figure S7.** AFM topography image of a GA-Fe<sup>III</sup> film, with a roughness of 2.7 nm.



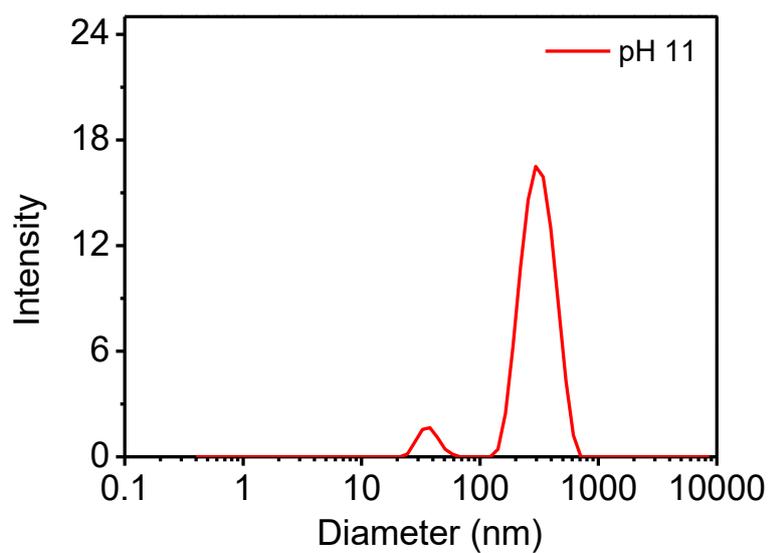
**Figure S8.** UV-visible absorbance spectra of TA-Fe<sup>III</sup> complexes in water at different pHs: (a) 1, (b) 3, (c) 5, (d) 7, (e) 9, and (f) 11.



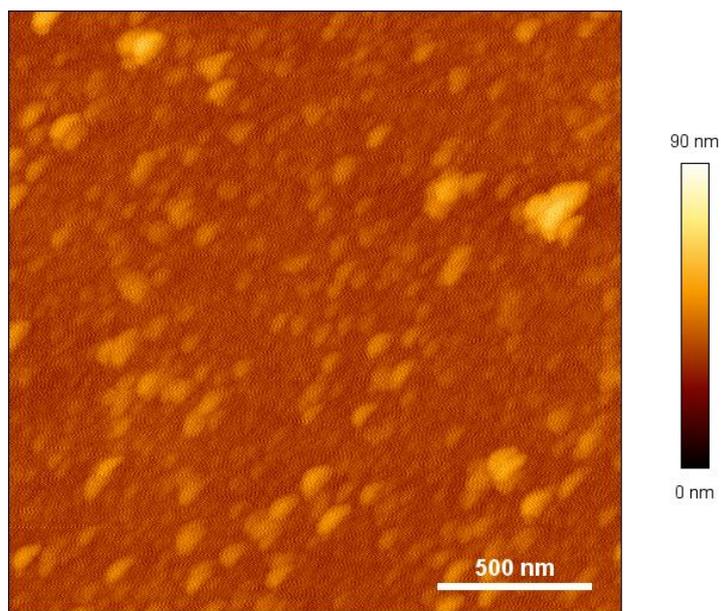
**Figure S9.** UV–visible absorbance spectra of TA-Fe<sup>III</sup> coatings prepared at different solution pHs (5 cycles): (a) 1, (b) 3, (c) 5, (d) 7 (e) 9, and (f) 11. The insets show the magnified spectra in the wavelength range of 400–800 nm.



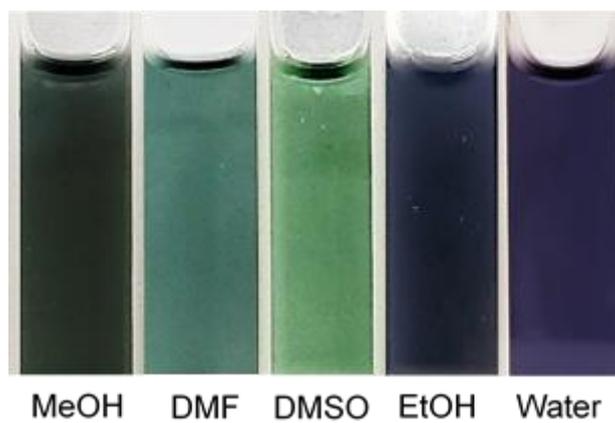
**Figure S10.** UV-visible absorbance spectra of TA-Fe<sup>III</sup> coatings prepared using different washing protocols. The coating prepared using a washing step after each cycle showed higher absorbance values (black trace) than the coating prepared using a washing step after each spray (red trace). This result indicates that the complexes in the liquid layer may influence the thickness of the coating.



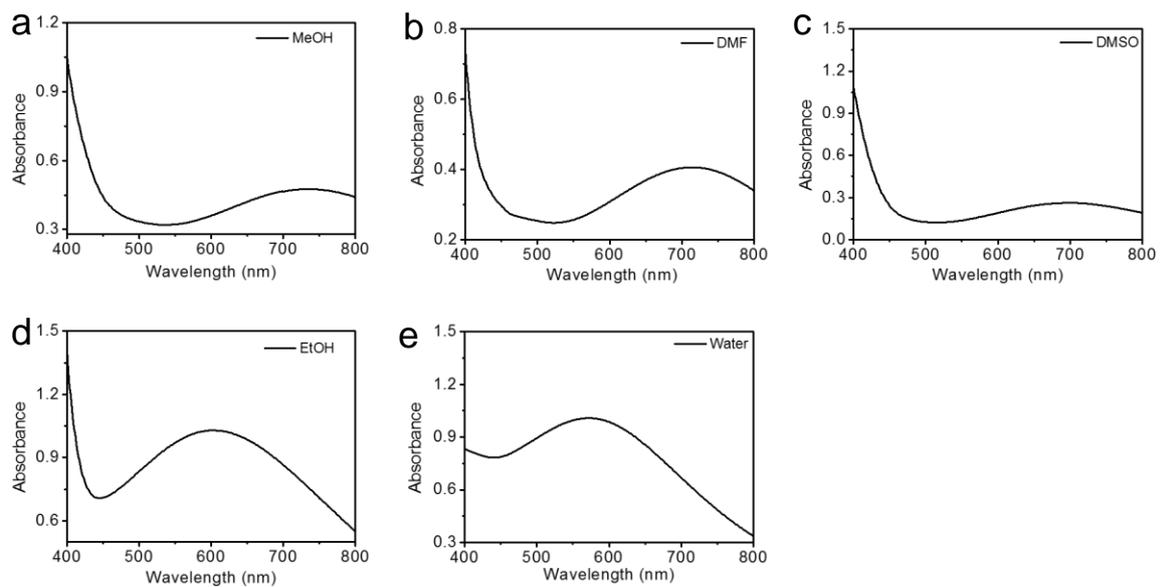
**Figure S11.** Dynamic light scattering spectrum of TA molecules ( $2 \text{ mg mL}^{-1}$ ) in water at pH 11.



**Figure S12.** AFM topography image of a TA-Fe<sup>III</sup> film at pH 11, with a roughness of 5.1 nm.

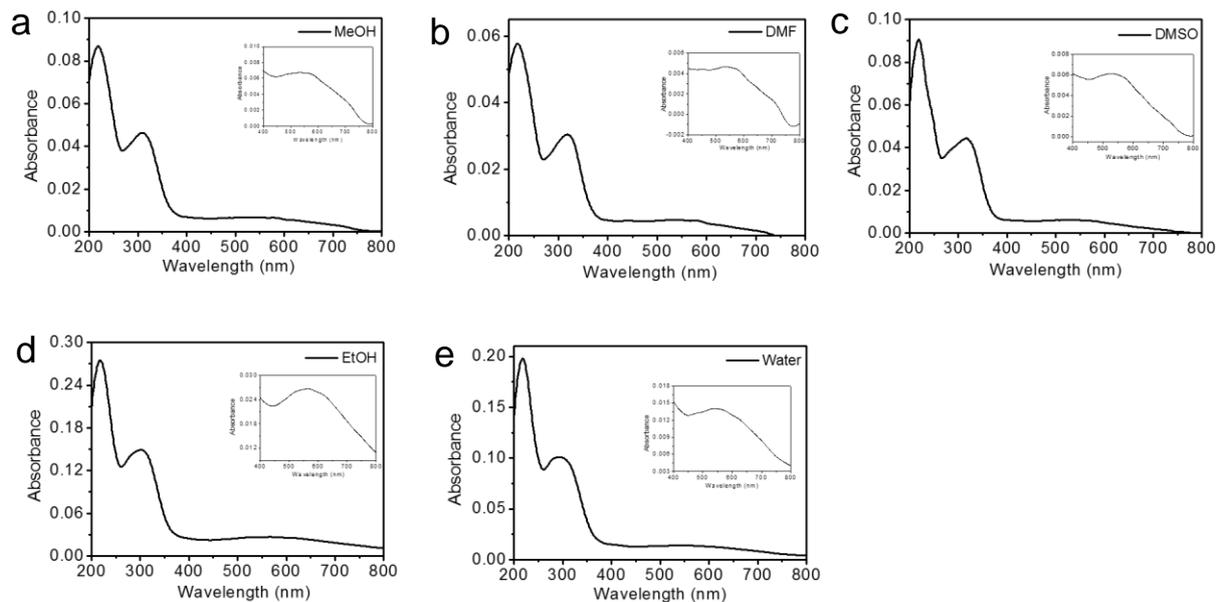


**Figure S13.** Photographs of TA-Fe<sup>III</sup> complexes formed in various solvents. MeOH, methanol; DMF, *N,N*-dimethylformamide; DMSO, dimethyl sulfoxide; EtOH, ethanol.

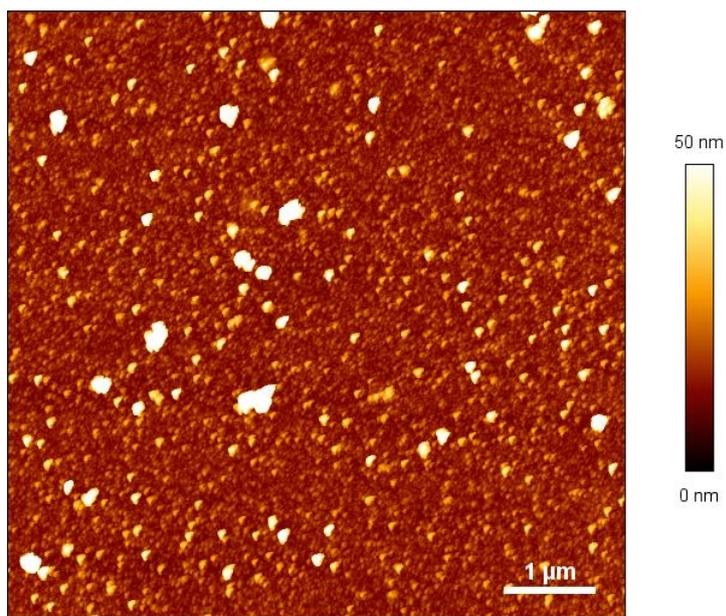


**Figure S14.** UV–visible absorbance spectra of TA-Fe<sup>III</sup> complexes formed in different solvents:

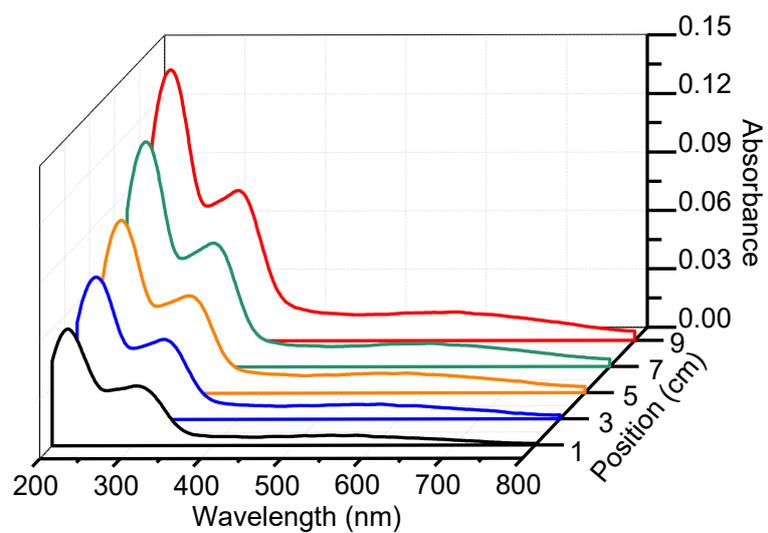
(a) MeOH, (b) DMF, (c) DMSO, (d) EtOH, and (e) water.



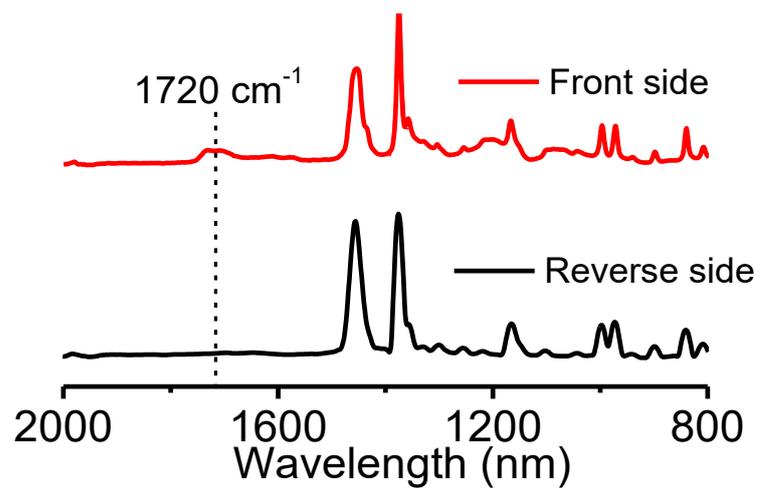
**Figure S15.** UV-visible absorbance spectra of TA-Fe<sup>III</sup> coatings obtained using different solvents after 5 cycles: (a) MeOH, (b) DMF, (c) DMSO, (d) EtOH, and (e) water. The insets show the magnified spectra in the wavelength range of 400–800 nm.



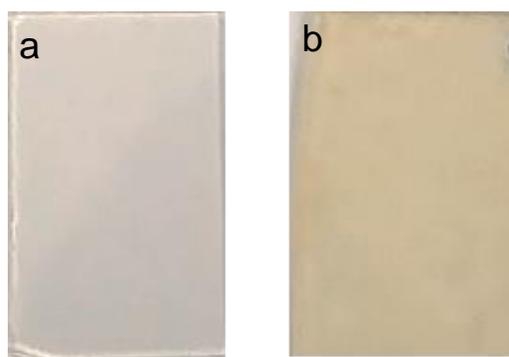
**Figure S16.** AFM topography image of a TA-Fe<sup>III</sup> film, prepared in the presence of 1 M NaCl in TA and FeCl<sub>3</sub>·6H<sub>2</sub>O solutions, with a thickness of 16.2 nm and an rms roughness of 6.5 nm.



**Figure S17.** UV-visible absorbance spectra of the gradient TA-Fe<sup>III</sup> coating on a quartz slide.



**Figure S18.** Fourier transform infrared spectra of TA-Fe<sup>III</sup>-coated Janus membranes. The absorbance at 1720 cm<sup>-1</sup> indicates the formation of TA-Fe<sup>III</sup> coating on the front side of the membrane.



**Figure S19.** Photographs of (a) clean quartz slide and (b) TA-Zr<sup>IV</sup>-coated quartz slide.