Electronic Supplementary Information for

Metal-free Polypeptide Redox Flow Batteries

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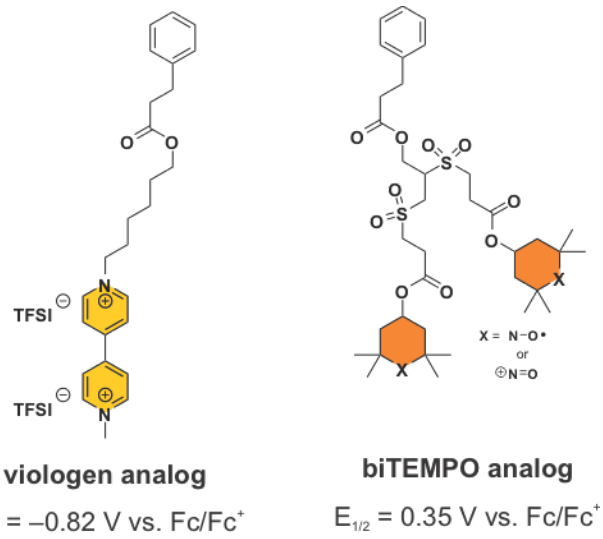

Fig. S1 Molecular structures of the viologen and biTEMPO small molecule analogs to the polypeptide materials.

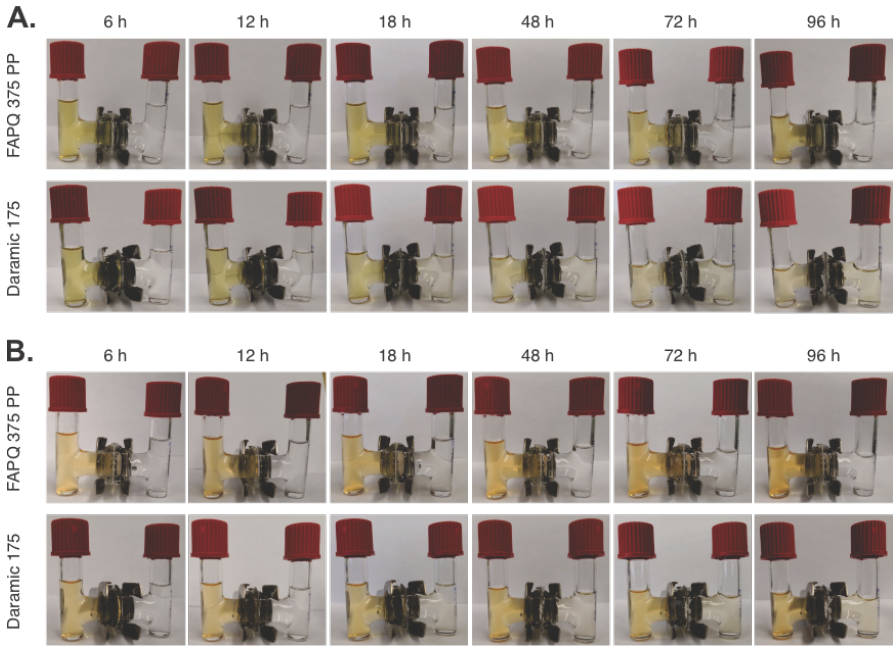

Fig. S2 Photographs of 20 mM active materials in 0.5 M TEATFSI/ACN stationary H-cells for crossover testing using Daramic 175 separators and FAPQ 375 PP membranes in the presence of (**A**) viologen-TFSI and (**B**) biTEMPO polypeptides. The left side of the H-cell originally contained 20 mM of active material in 0.5 M TEATFSI/ACN, and the right side originally contained 0.5 M TEATFSI/ACN. The images were taken at 6, 12, 24, 48, 72, and 96 h after the solutions were added to H-cells.

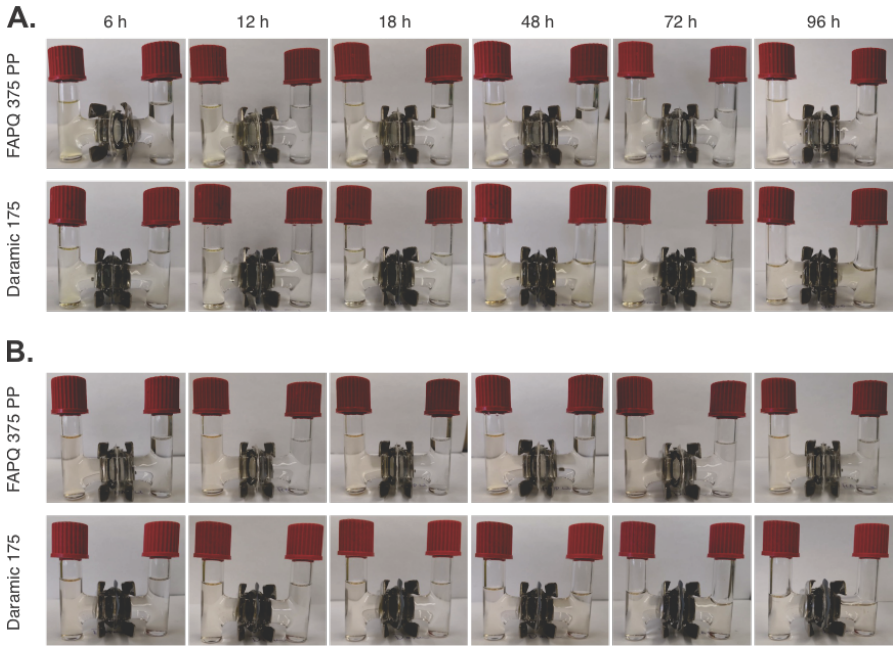

Fig. S3 Photographs of 20 mM active materials in 0.5 M TEATFSI/ACN stationary H-cells for crossover testing using Daramic 175 separators and FAPQ 375 PP membranes in the presence of (**A**) viologen-TFSI and (**B**) biTEMPO analogs. The left side of the H-cell originally contained 20 mM of active material in 0.5 M TEATFSI/ACN, and the right side originally contained 0.5 M TEATFSI/ACN. The images were taken at 6, 12, 24, 48, 72, and 96 h after the solutions were added to H-cells.

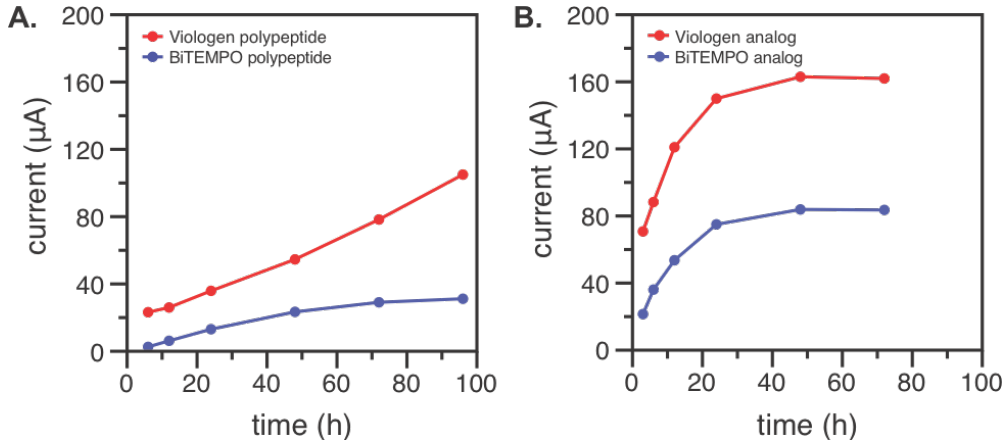

Fig. S4 Time-dependent crossover studies of (A) the redox-active polypeptides and (B) small-molecule analogs using Daramic 175 separator.

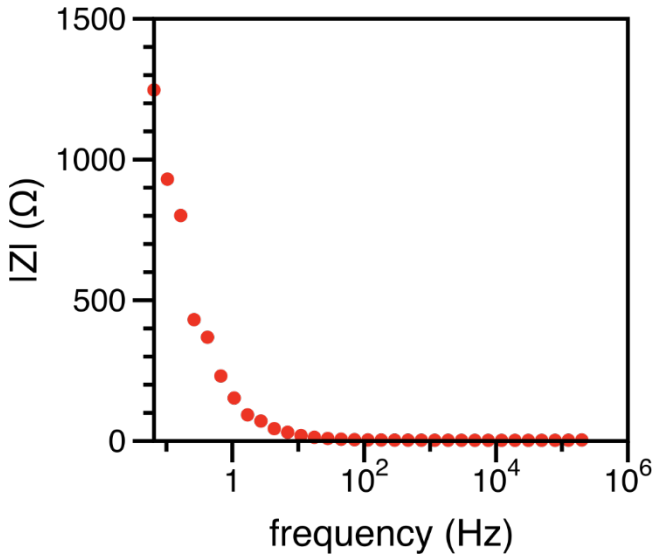

Fig. S5 Bode plot of the EIS data before galvanostatic cycling for the redox flow cell with a BiTEMPO polypeptide catholyte and viologen polypeptide anolyte. EIS was conducted with circulating electrolytes at open circuit potential with an amplitude of 10 mV in a frequency range of 200 kHz to 0.4 Hz (5 steps per decade).

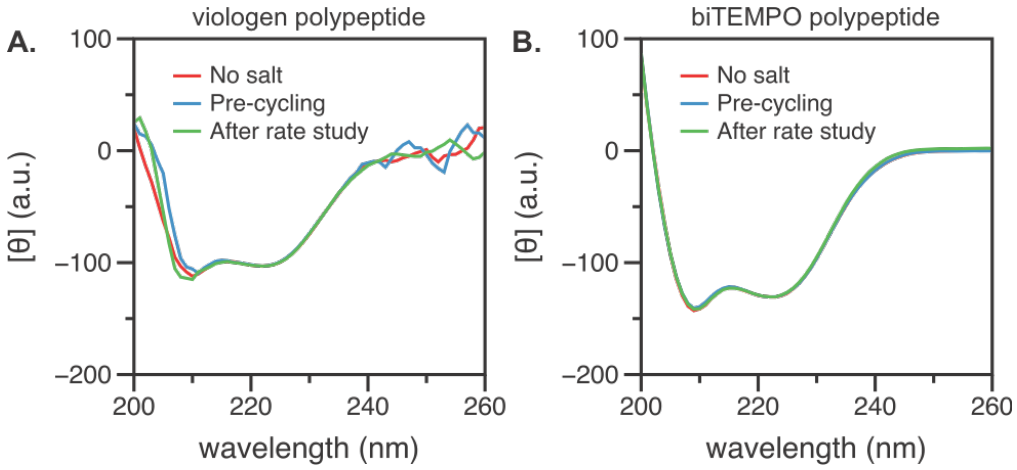

Fig. S6 Normalized CD spectra of (A) viologen polypeptide and (B) biTEMPO polypeptide without TEATFSI, before cycling, and after 500 cycles. The spectra were normalized to a wavelength of 222 nm. The "no salt" curve indicates electrolytes without supporting salt that had not been cycled. The other curves included supporting salt.

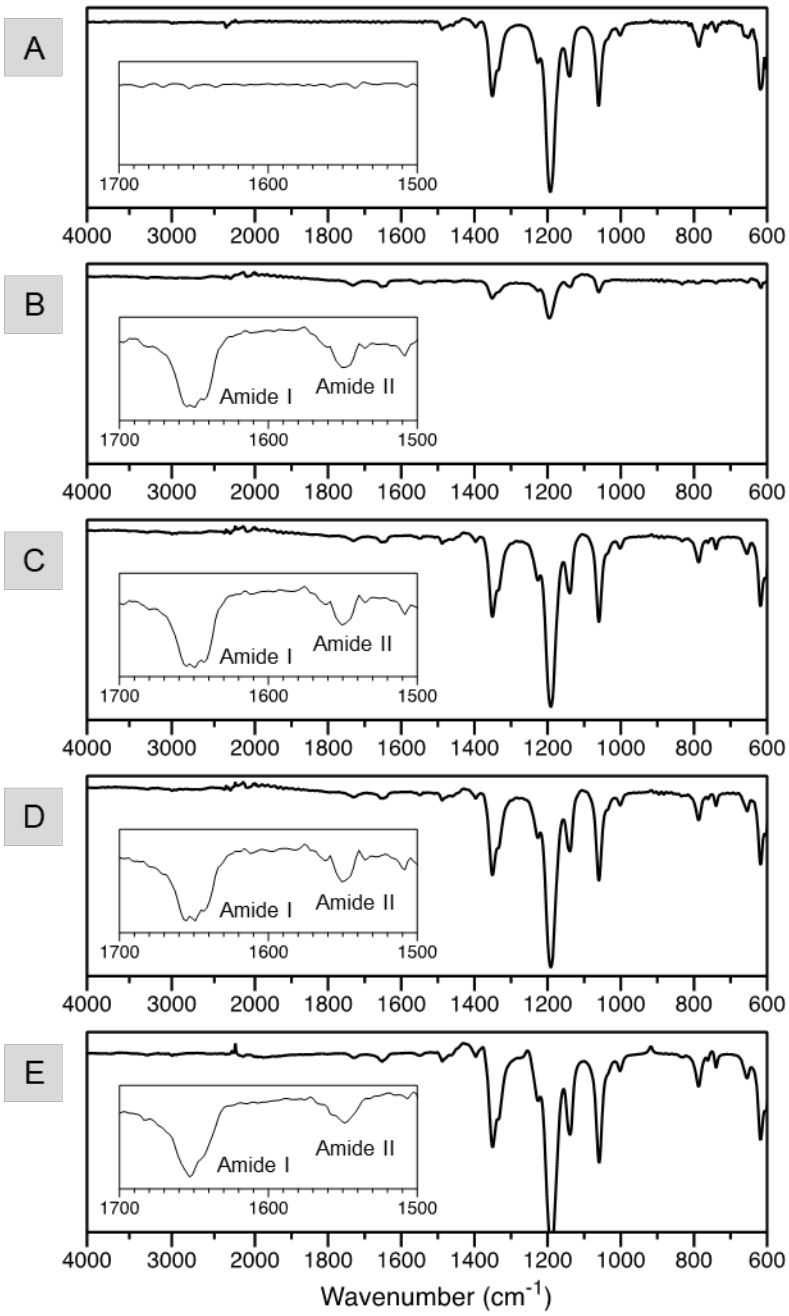

Fig. S7 ATR-FTIR spectra of (A) 0.5 M TEATFSI/ACN, (B) 50 mM viologen-TFSI polypeptide/ACN, and 50 mM viologen-TFSI polypeptide in 0.5 M TEATFSI/ACN (C) before cycling, (D) after rate study and (E) after 500 cycles at 10 mA·cm^{-2}. The y-axes of the spectra are transmittance (%).

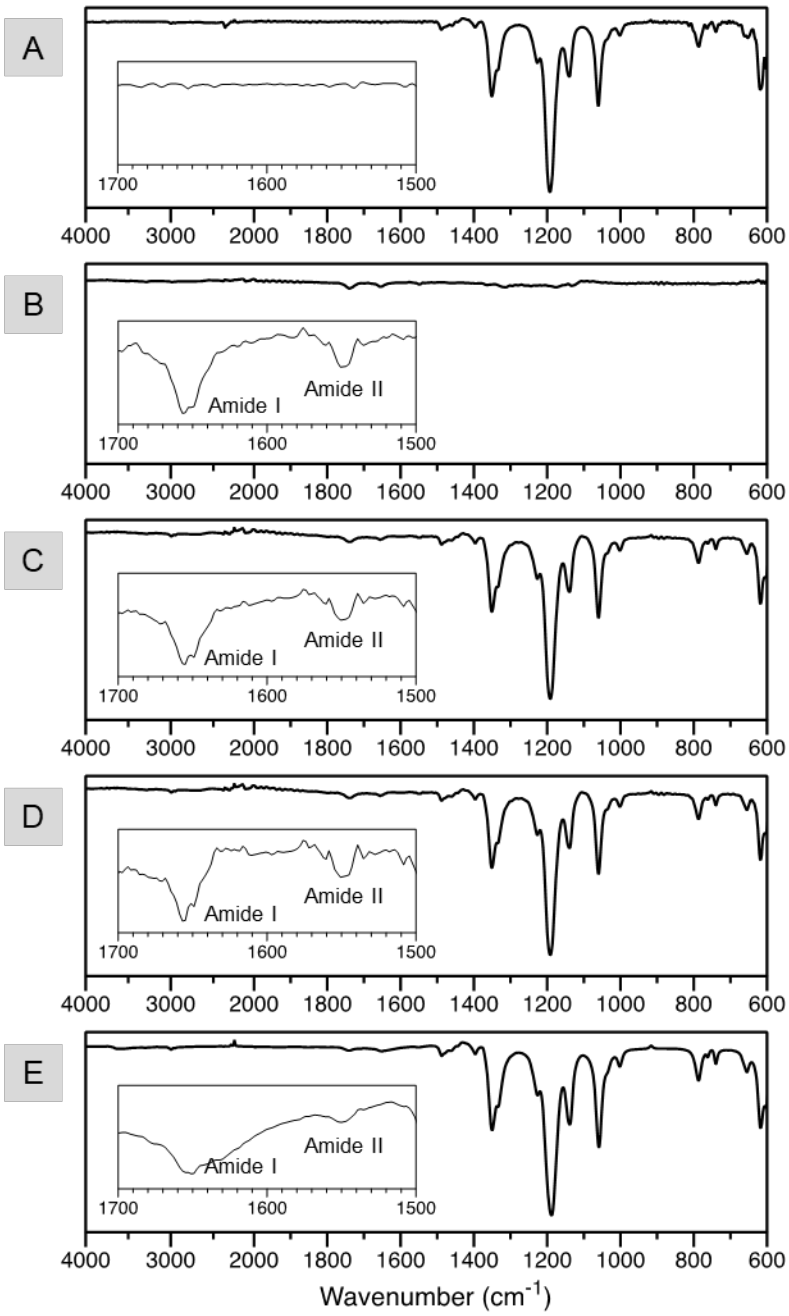

Fig. S8 ATR-FTIR spectra of (**A**) 0.5 M TEATFSI/ACN, (B) 25 mM biTEMPO polypeptide/ACN, and 25 mM biTEMPO polypeptide in 0.5 M TEATFSI/ACN (**C**) before cycling, (**D**) after rate study and (**E**) after 500 cycles at 10 mA·cm^{-2}. The y-axes of the spectra are transmittance (%).