Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supplementary Information

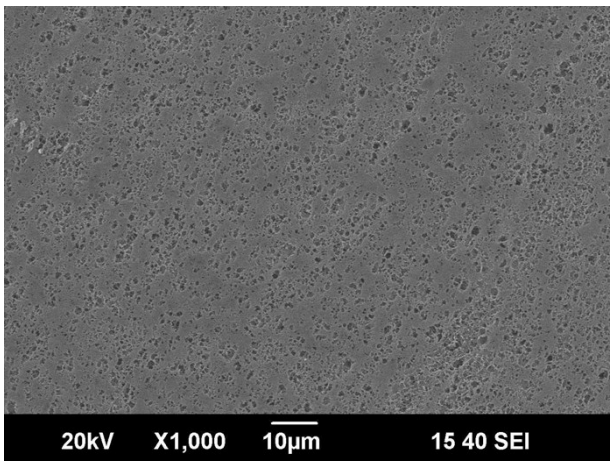

Figure S1. SEM image of surface area of polypyrrole film.

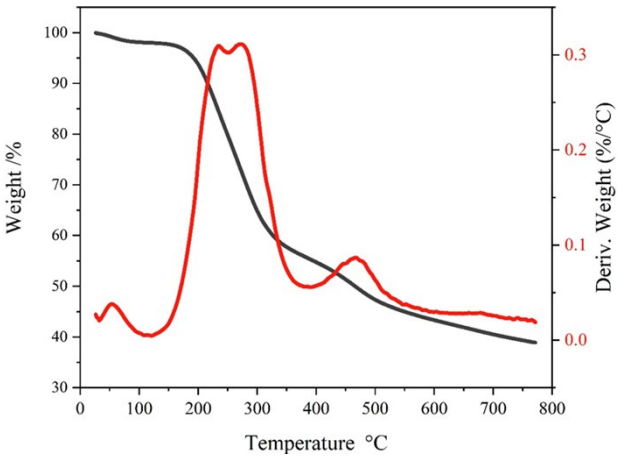

Figure S2. TG analysis of as-prepared DSA doped polypyrrole.

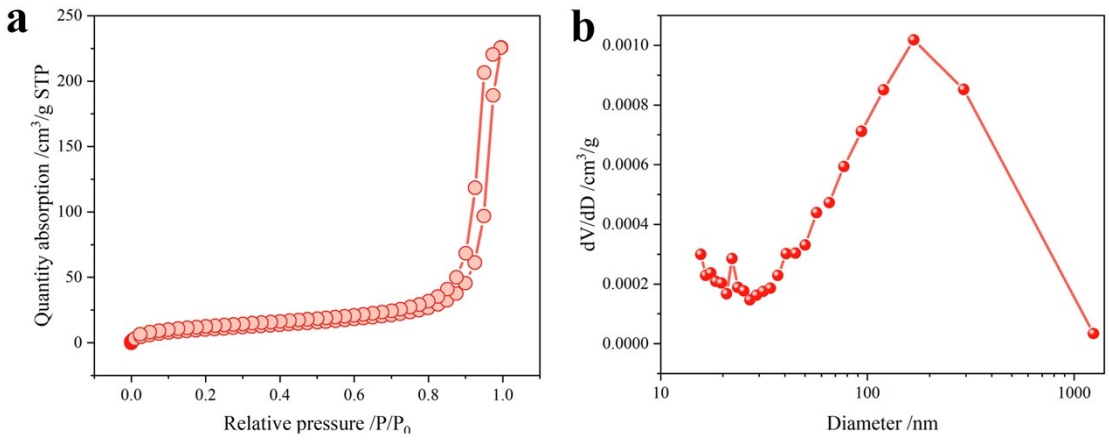

Figure S3. (a) Nitrogen adsorption–desorption isotherms and (b) corresponding pore-size distribution.

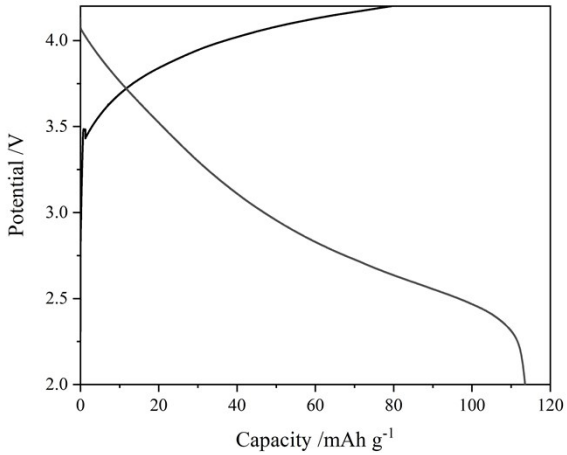

Figure S4. The initial charge-discharge cycle of DSA-doped PPy.

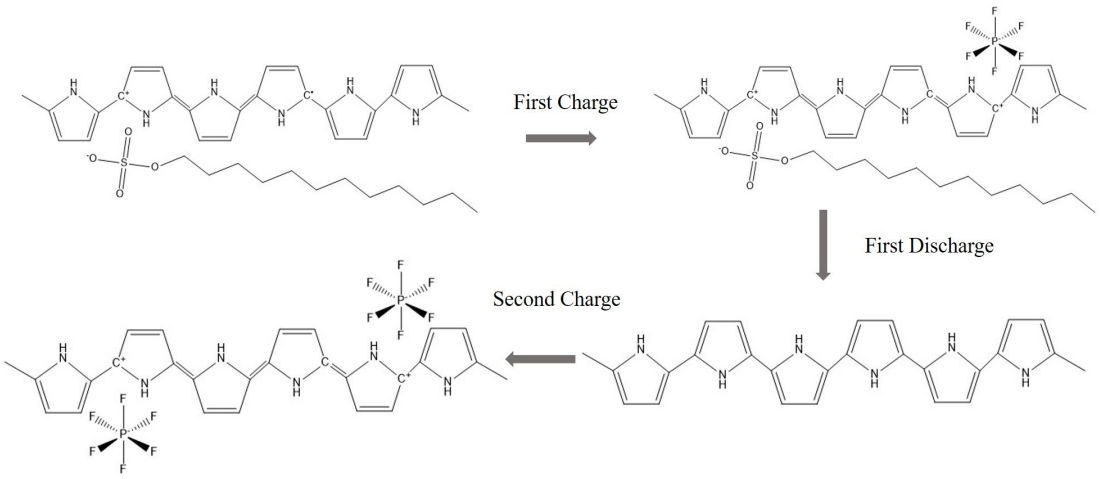

Figure S5. Proposed mechanism for the differences between the first cycle and the subsequent charge-discharge cycles.

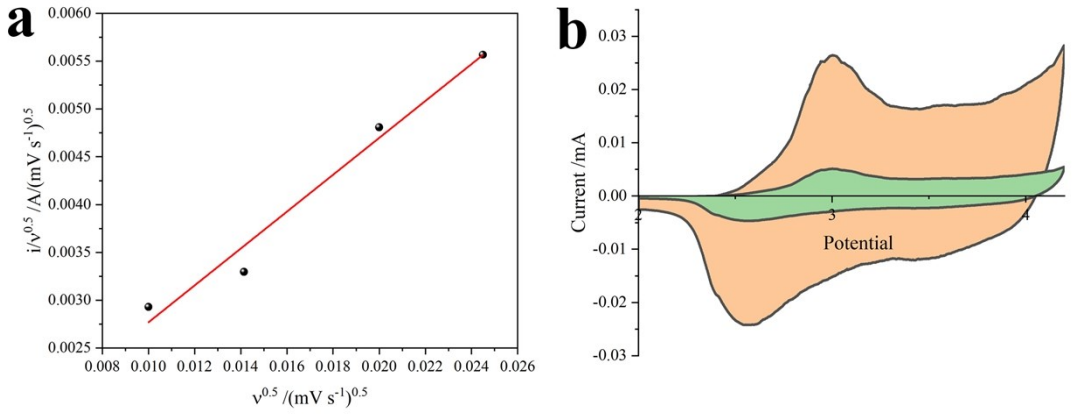

Figure S6. (a) Linear behavior of $i/v^{1/2}$ as a function of $v^{1/2}$ calculated from Figure 3c. (b) CV profile with estimated capacitive contribution shown in the shaded region.

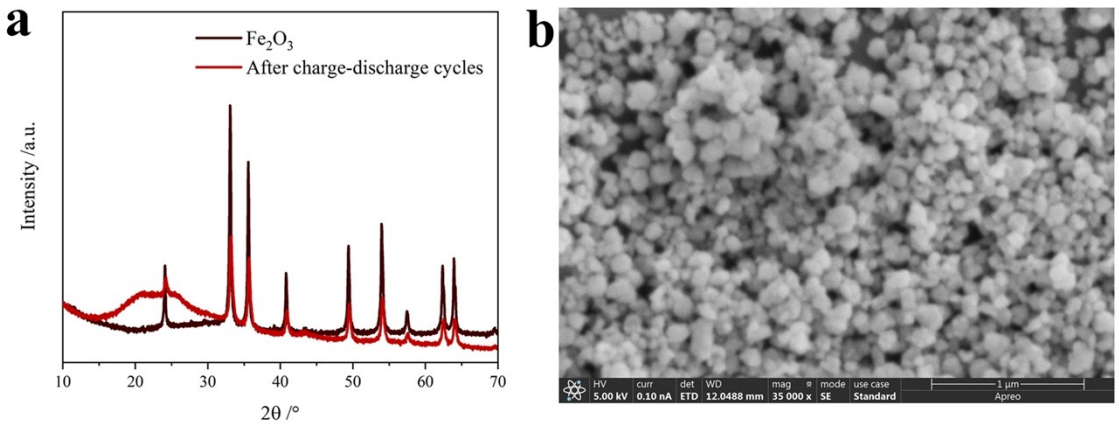

Figure S7. (a) XRD patterns of Fe_2O_3 before and after cycling. (b) SEM images of Fe_2O_3 nanoparticles.

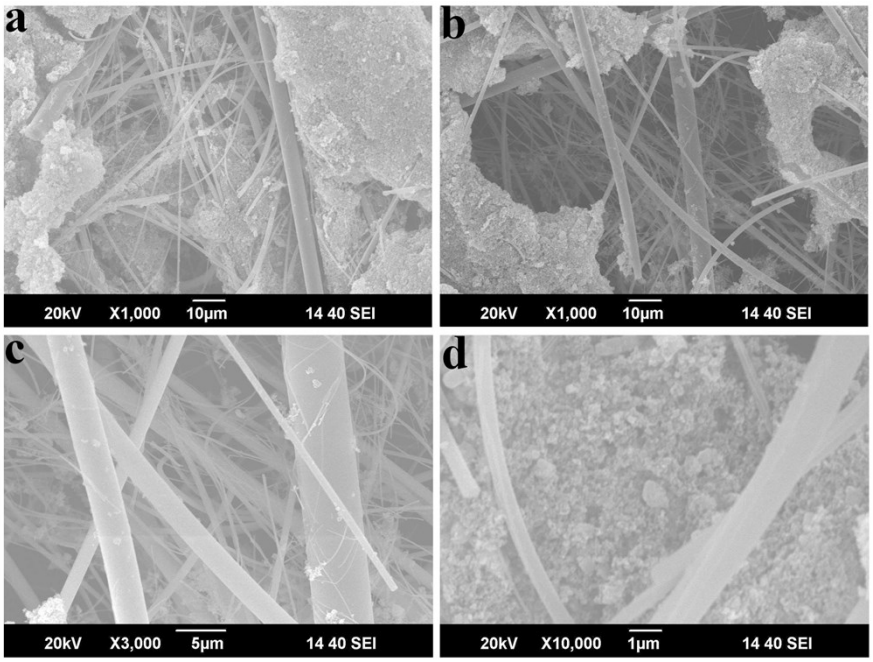

Figure S8. SEM images of Fe_2O_3 nanoparticles coated on a glass fiber with different magnitudes.

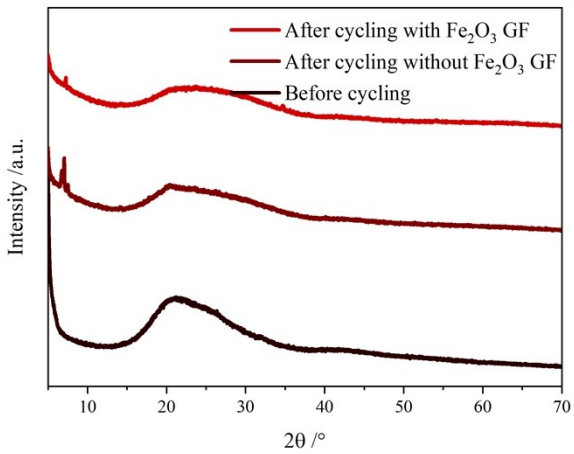

Figure S9. Comparison of XRD patterns of PPy samples with or without Fe_2O_3 GF.

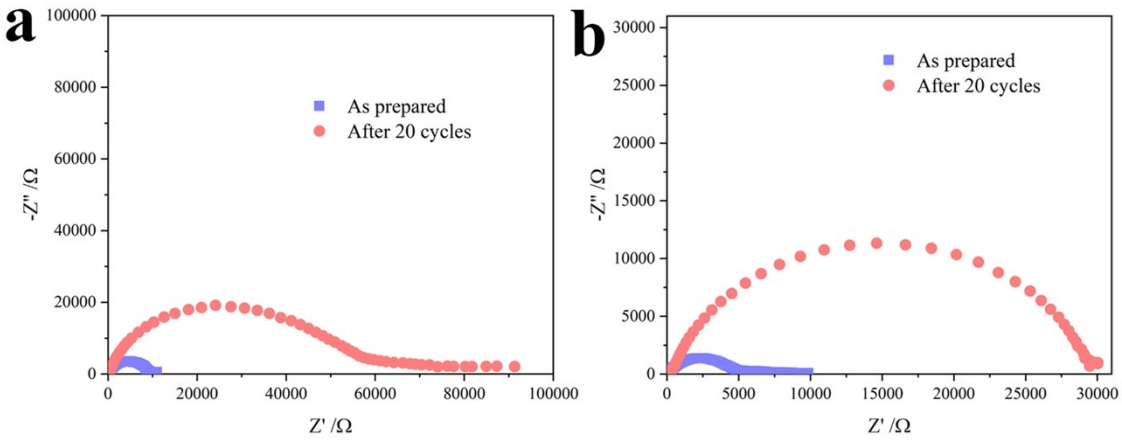

Figure S10. EIS plots before and after cycling for PPy-based KIBs (a) without Fe_2O_3 GF and (b) with Fe_2O_3 GF.

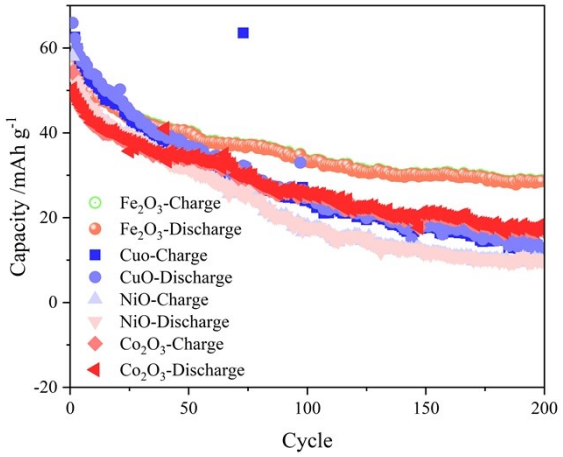

Figure S11. Capacity retentions for samples with different coating layer of metal oxides at a current density of 10 mAh g^{-1}.

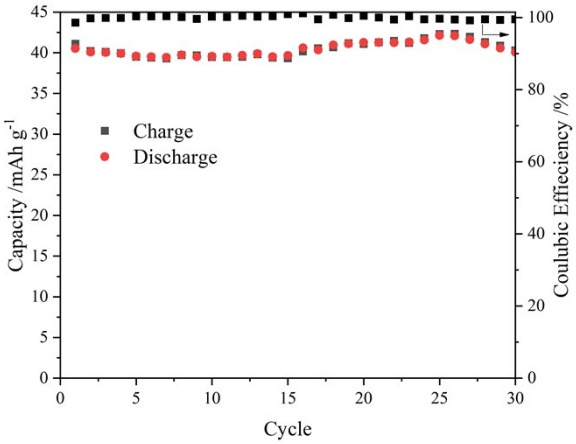

Figure S12. Charge-discharge cycles for PPy film at -10 ℃.

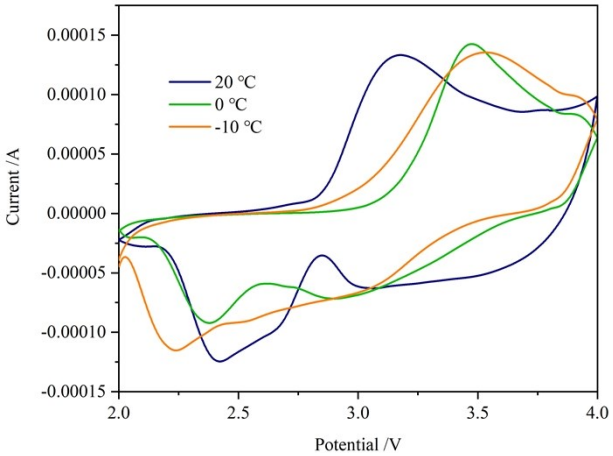

Figure S13. CV curves of PPy film at different temperatures.

Table 1 Summary of polypyrrole with different dopants

Parameter / Additive	2θ /°	d /Å	Gel or not
SDS	**20.38**	**5.36**	**Gel**
HTAB	**21.80**	**5.02**	**Not**
HCl	**23.56**	**4.65**	**Not**
DA	**23.34**	**4.69**	**Not**
PEO	**23.92**	**4.61**	**Gel**