Supplementary Information

Integrating Surface Coating and Quasi-Solid Deep Eutectic Electrolytes for Enhanced Cycling of Micro-Si Anodes in Li-ion Batteries

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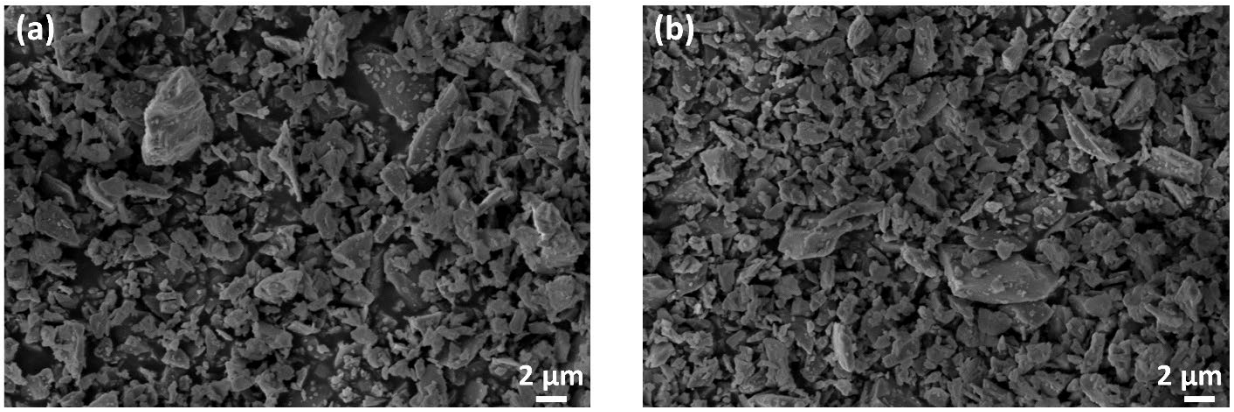

Fig. S1 SEM images. (a) pristine Si microparticle. (b) PD@Si microparticle.

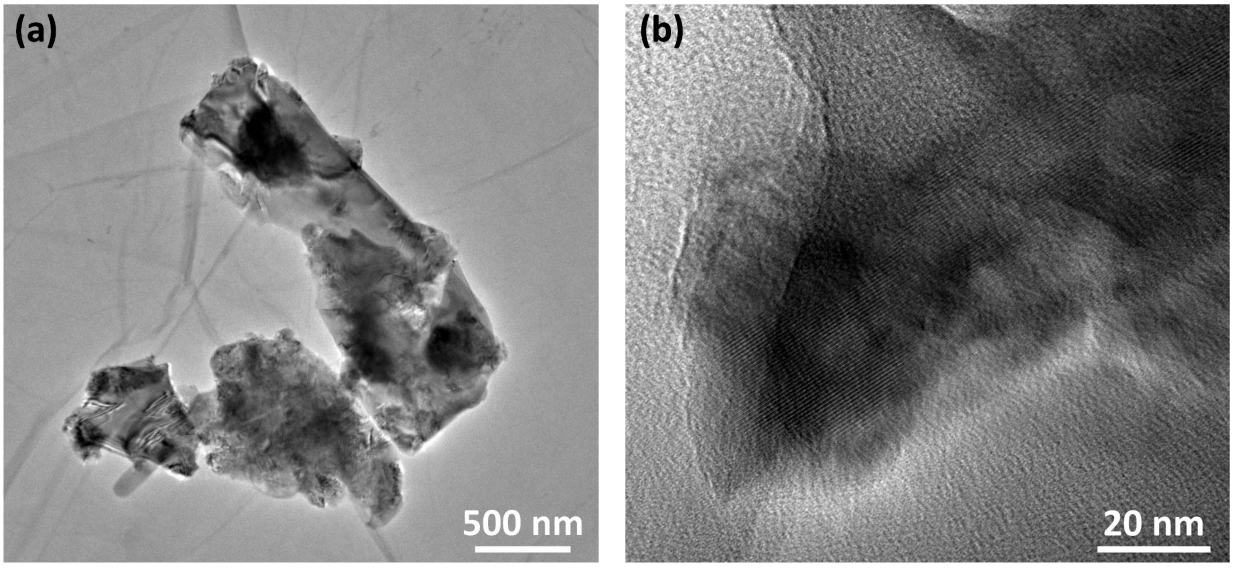

Fig. S2 (a, b) TEM images of pristine Si particle.

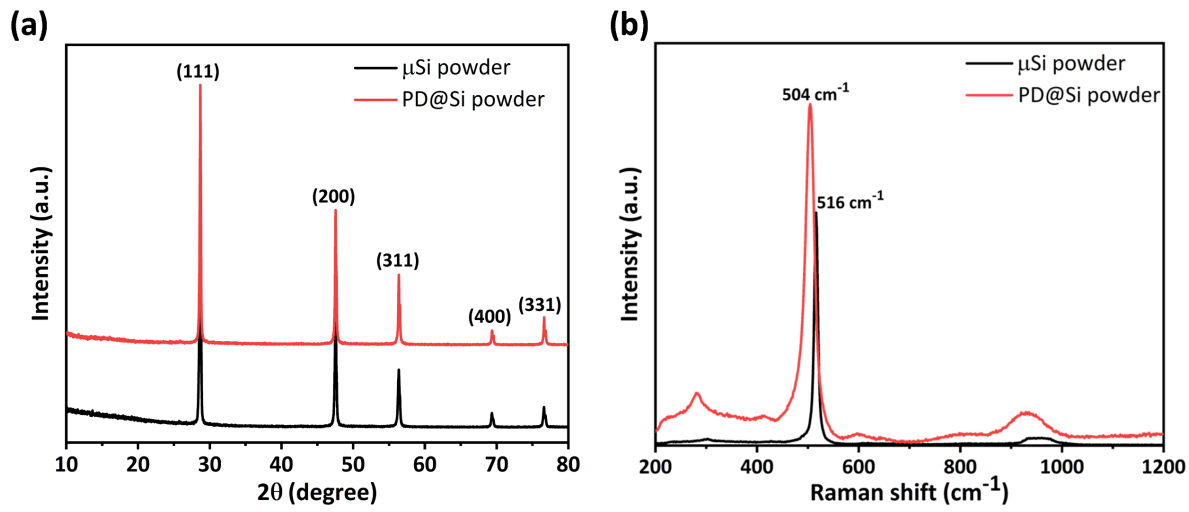

Fig. S3 (a) XRD patterns of μ-Si and PD@Si powder. (b) Raman spectra of μ-Si and PD@Si powder.

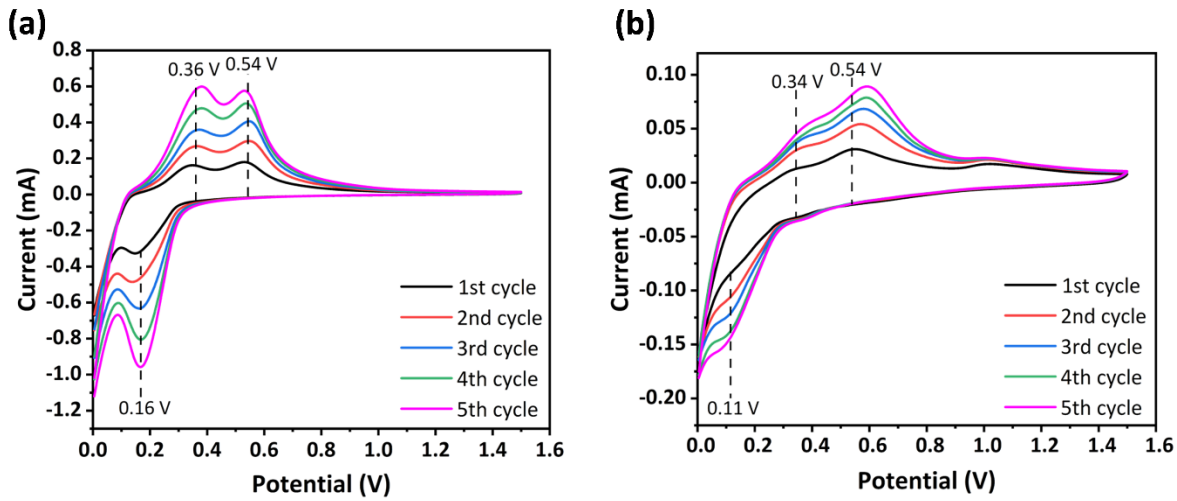

Fig. S4 Electrochemical property of PD@Si anode. (a) CV curves of PD@Si anode in liquid electrolyte. (b) CV curves of PD@Si anode in gel electrolyte.

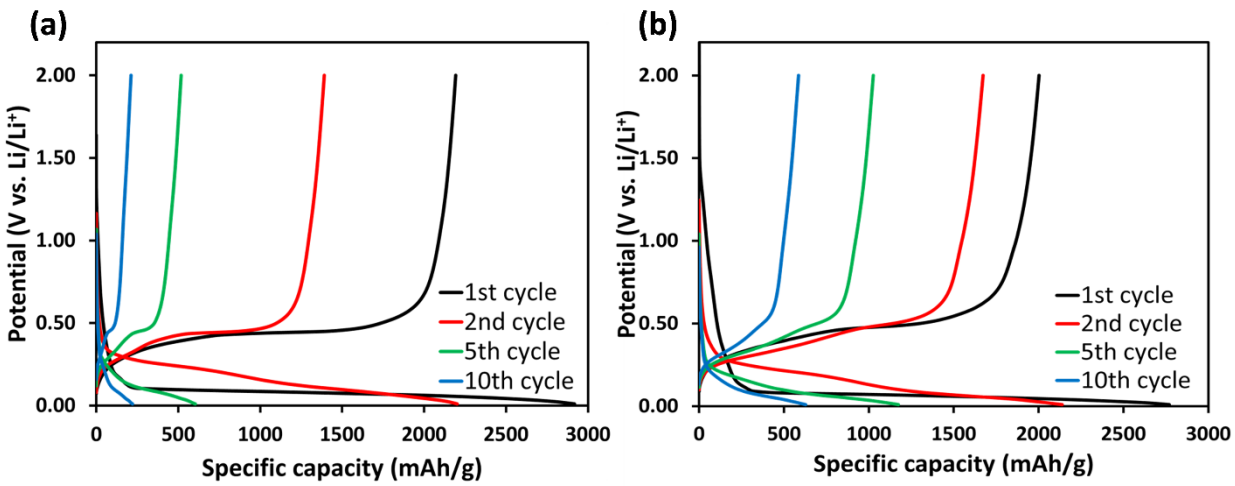

Fig. S5 Voltage profiles. (a) Pristine Si anode in liquid electrolyte. (b) Pristine Si anode in gel electrolyte.

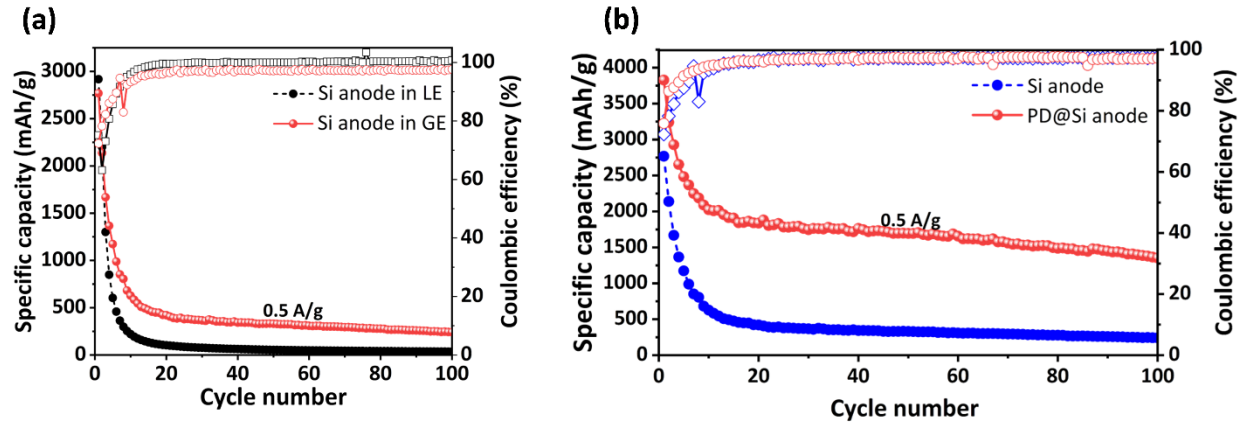

Fig. S6 Cycling performance at 0.5 A/g. (a) Pristine Si anode in liquid electrolyte (black) and gel electrolyte (red). (b) Comparison cycling performance of pristine Si (blue) and PD@Si anodes (red) in gel electrolyte.

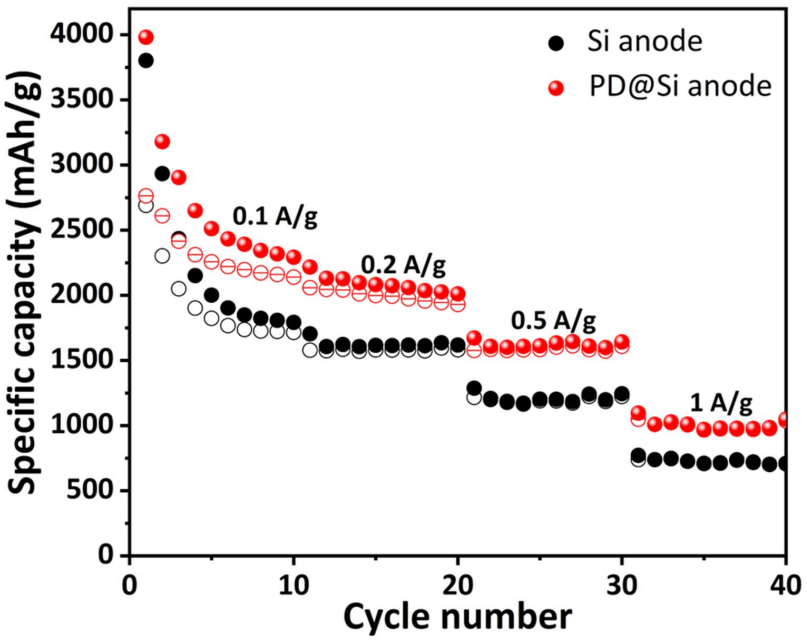

Fig. S7 The rate performance of pristine Si and PD@Si anodes in gel electrolyte.

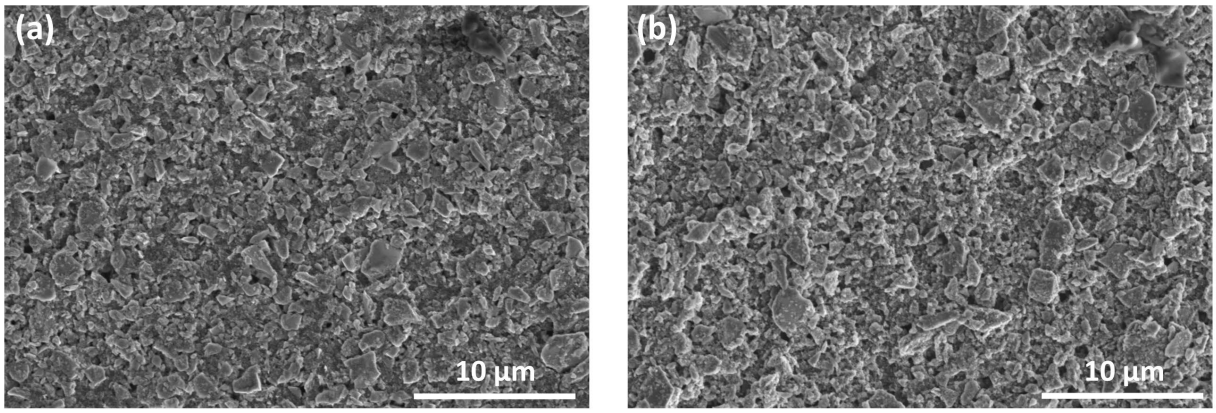

Fig. S8 SEM images. (a) Pristine Si electrode surface before cycling. (b) PD@Si electrode surface before cycling.

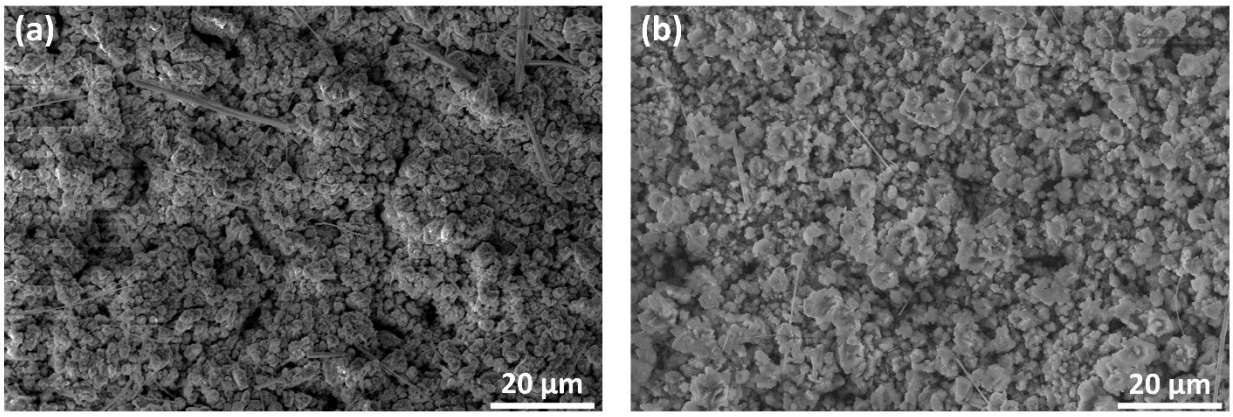

Fig. S9 Morphology evolution. (a) Pristine Si anode surface after cycling in liquid electrolyte. (b) Pristine Si anode surface after cycling in gel electrolyte.

Table S1. Table of comparison LIBs performcane of our work and recently reported composite Si nanoparticles and μ-Si-based anodes.

Si anode	Current density	Capacity (mAh/g) after cycling	Cycles	References
SiMP	0.1C	1700	100	[S1]
Si@MOF	0.2 A/g	1442	50	[S2]
$PANa_{0.8}Fe_{0.01}$/Si-MP/CB	0.5C	1386.3	400	[S3]
Micro-sized bulk porous Si	0.5 A/g	1250	100	[S4]
Submicron Si particle	-	1192	100	[S5]
PD@Si	**1 A/g**	**1000**	**100**	**This work**
Raspberry-like YS Si/C	0.2 A/g	1064	250	[S6]
SiO	-	1068	150	[S7]
Si-coated VACNF	2.6 A/g	1050	120	[S8]
$Si@SiO_2@LPO@C$	0.5 A/g	1012.4	200	[26]
DP-Si-1.0	0.5 A/g	935.9	100	[S9]
SiO_x/C-6	0.1 A/g	926.5	100	[S10]
Mxene-Si-CNT	2 A/g	841	200	[S11]
Porous SiMP	0.5 A/g	796	100	[S12]
SiFS/G@C	1 A/g	729.1	100	[S13]
SiNP/DPA	1C	750	100	[S14]
PD-coating Si/C	0.1C	560	100	[S15]

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