Supporting Information

A dual-functional matrix with high absorption and electrocatalysis to suppress shuttle effect of lithium-selenium batteries

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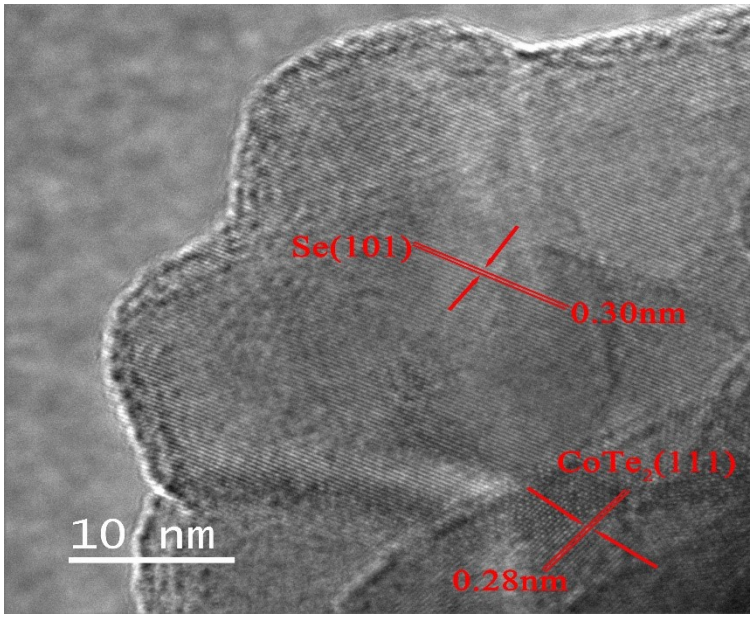

Fig. S1 TEM image of the Se/$CoTe_2$-MD.

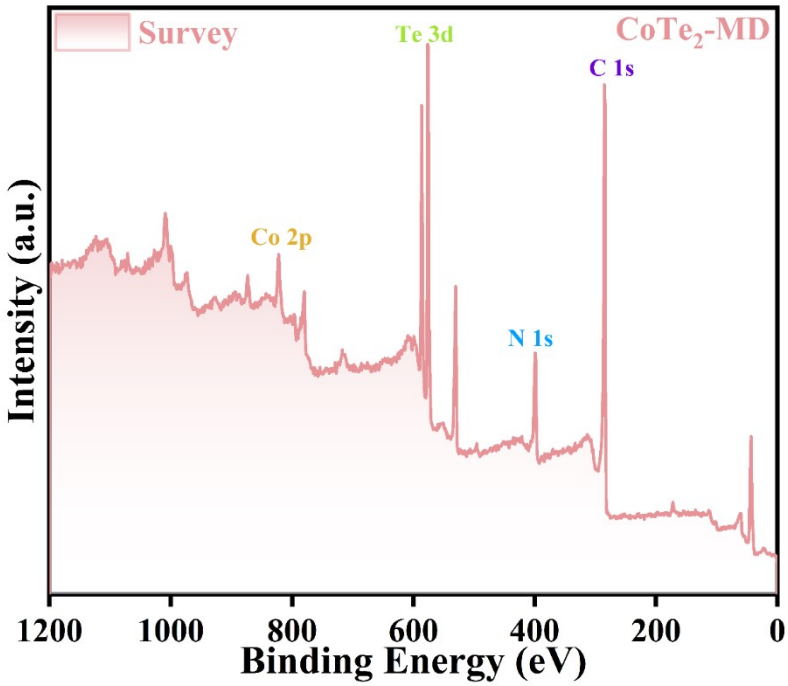

Fig. S2 High-resolution C 1s XPS spectra of the $CoTe_2$-MD.

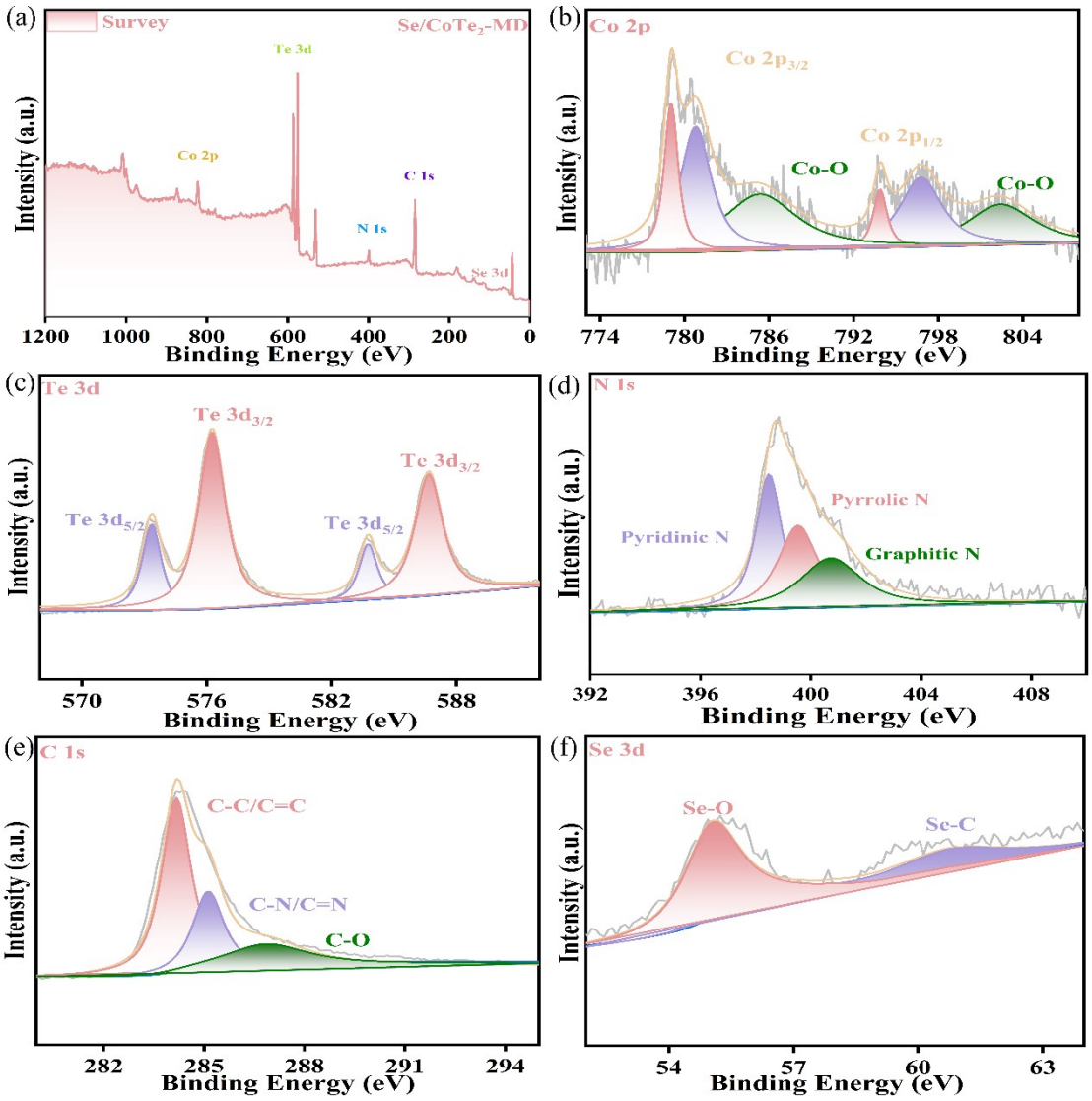

Fig. S3 (a) Full-scan XPS spectra and the high-resolution spectra of (b) Co 2p, (c) Te 3d, (d) N 1s (e) C 1s and (f) Se 3d of the Se/$CoTe_2$-MD.

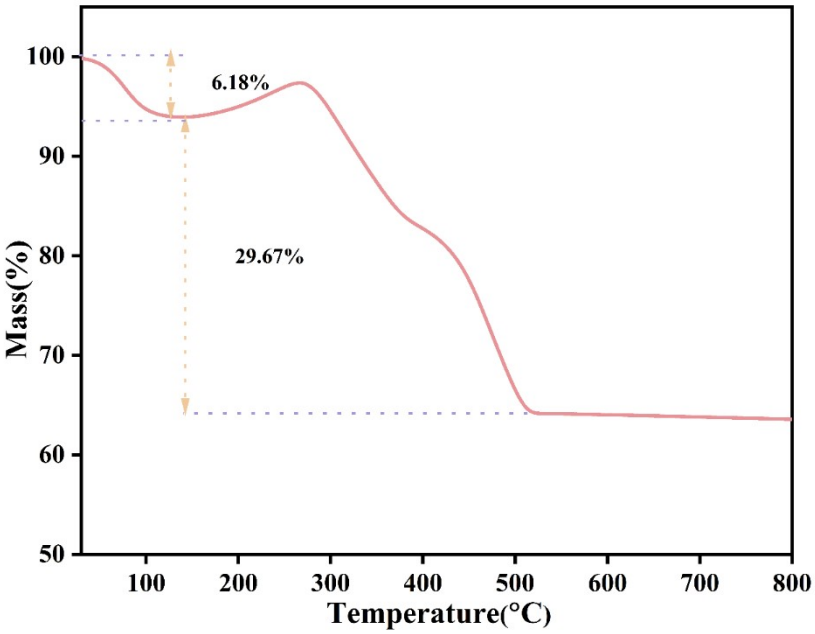

Fig. S4 TG curve of the $CoTe_2$-MD in air atmosphere.

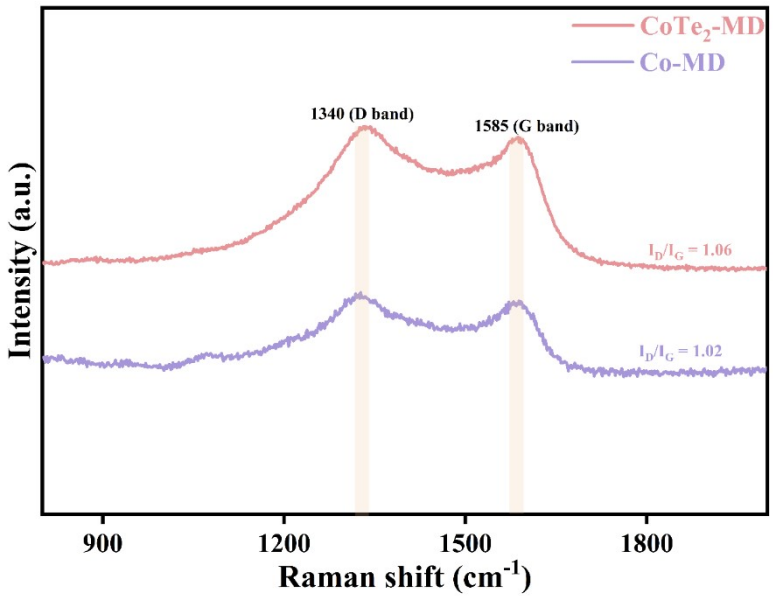

Fig. S5 Raman spectra of the $CoTe_2$-MD and Co-MD.

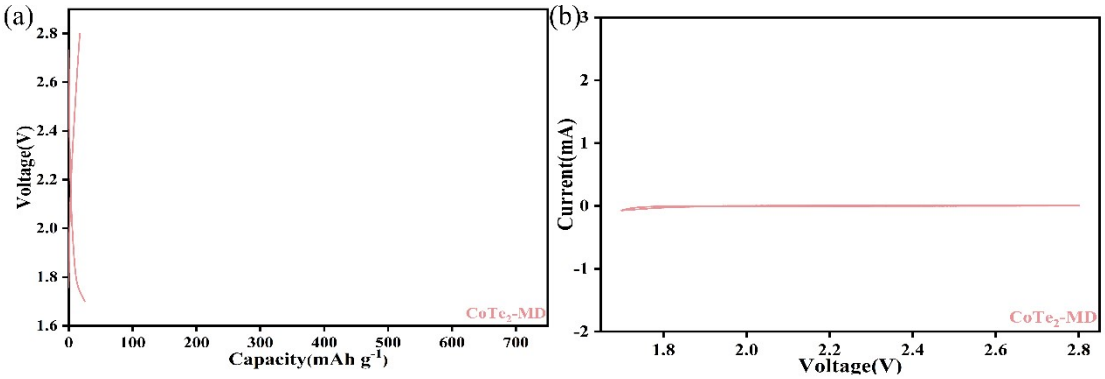

Fig. S6 (a) Charge/discharge curves of the $CoTe_2$-MD electrode at 0.1 C and CV curve of the $CoTe_2$-MD electrode at 0.1 mV/s.

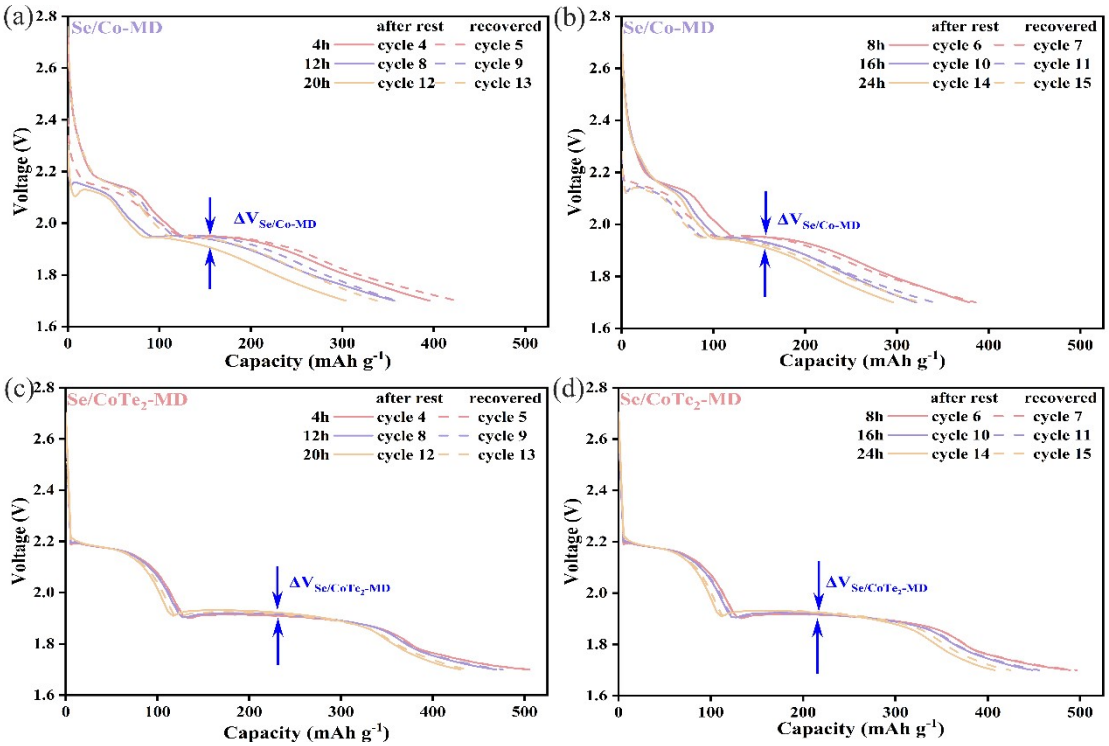

Fig. S7 Self-discharge profile shown after resting 4-8-12-16-20-24 h and respective recovery cycle for Se/$CoTe_2$-MD and Se/Co-MD electrodes.

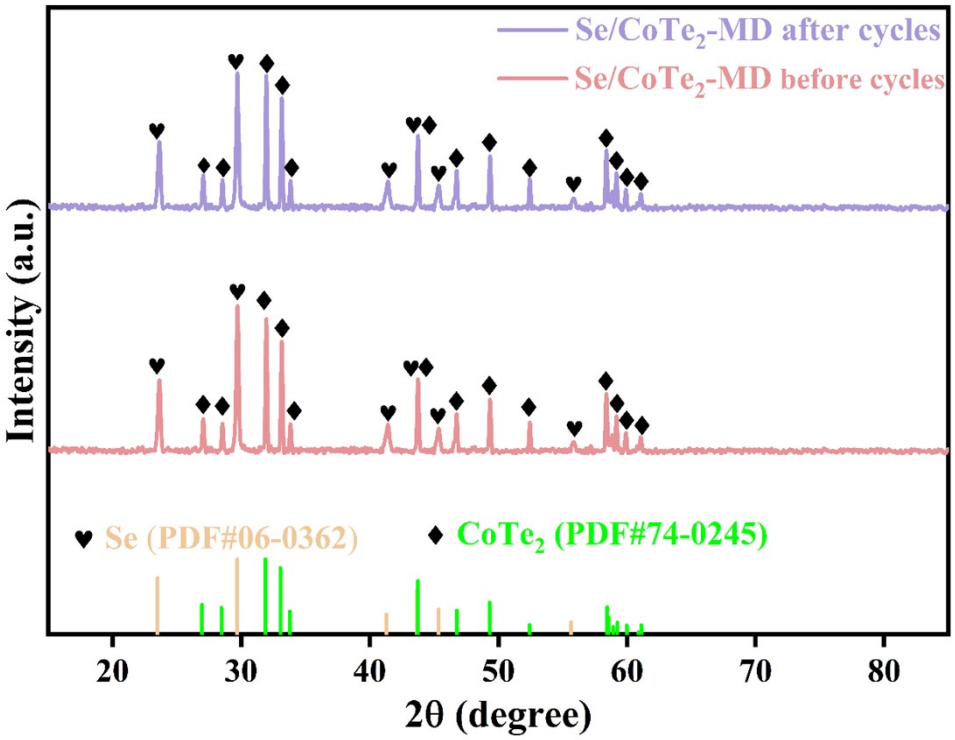

Fig. S8 XRD patterns of the Se/$CoTe_2$-MD electrode before and after cycles.

Table S1 Comparison of the electrochemical performance of Li-Se batteries using different matrix.

Matrix	Discharge capacity(cycle number)		Rate capacity(rate, cycle number)
	0.5C	2C	
$CoTe_2$-MD	540.4(1st) 454.1(200th)	451.2(1st) 377.1(100th) 250.0(500th)	592.9(0.2C,10th) → 538.7(0.5C, 20th) → 515.8(1C, 30th) → 457.3(2C, 40th) → 509.9(1C, 50th) → 526.9(0.5C, 60th)→ 539.0(0.2C, 70th)
MCM [S1]	513.0(1st) 300.0(100th)	-	455.0(0.5C,10th) → 400.2(1C, 20th) → 375.6(2C, 30th) → 320.0(5C, 40th) → 291.0(0.5C, 50th)
HPCA [S2]	587.0(1st) 367.0(50th)	-	425.0(0.5C,5th) → 400.0(1C, 10th) → 352.3(2C, 15th) → 303.2(3C, 20th) → 270.3(5C, 25th) → 305.7(0.5C, 30th) → 393.6(0.2C, 35th)
CTAB-MWCNT [S3]	570.4(1st) 230.8(200th)	-	586.0(0.2C,10th) → 399.0(0.5C, 20th) → 215.7(1C, 30th) → 69.5(2C, 40th) → 205.6(1C, 50th) → 306.9(0.5C, 60th)→ 397.8(0.2C, 70th)
CMC [S4]	517.6*(1st) 257.6*(200th)	378.9*(1st) 166.3(460th)	420.4(0.2C,10th) → 352.6*(0.5C, 20th) → 302.6*(1C, 30th) → 250.2*(2C, 40th) → 218.1(5C,50th) →242.3*(2C, 60th) →292.9*(1C, 70th) → 310.3*(0.5C, 60th)→ 331.5(0.2C, 70th)
TiO_2 [S5]	481.0(1st) 158.0(50th)	-	-
MnO_2 [S6]	-	312.0(1st) 273.0(100th)	-
α-MoO_3 [S7]	652.3(1st) 355.6(200th)	520.3(1st) 315.5(100th)	569.4(0.2C,10th) → 456.7(0.5C, 20th) → 371.9(1C, 30th) → 318.2(2C, 40th) → 398.7(1C, 50th) → 458.4(0.5C, 60th) →440.6* (0.2C, 70th)

* Means the values from the images in the references.

References

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