Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting information

A deep eutectic electrolyte of $AlCl_3$- acetamide for rechargeable aluminum-ion batteries

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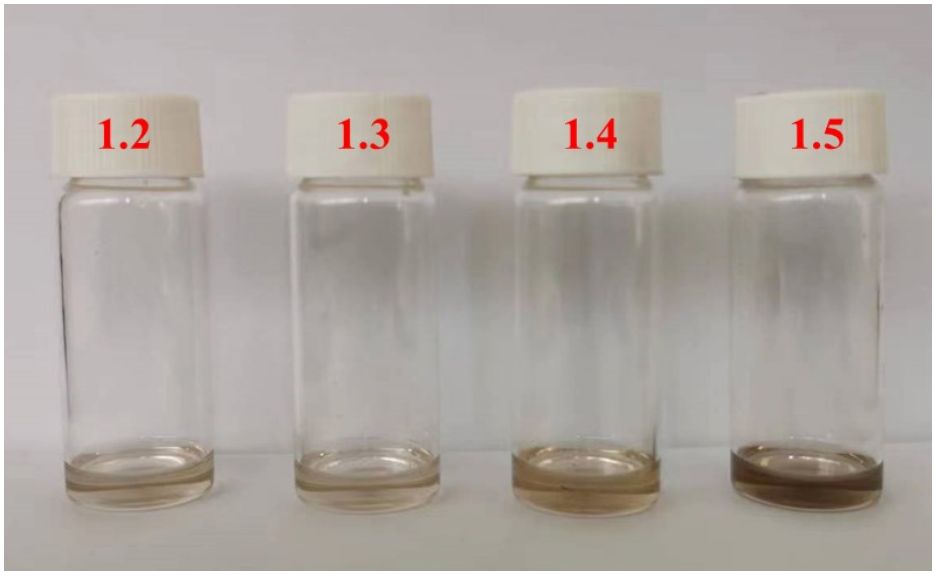

Figure S1. Physical state of the $AlCl_3$-acetamide DESs with 1.2–1.5 molar composition.

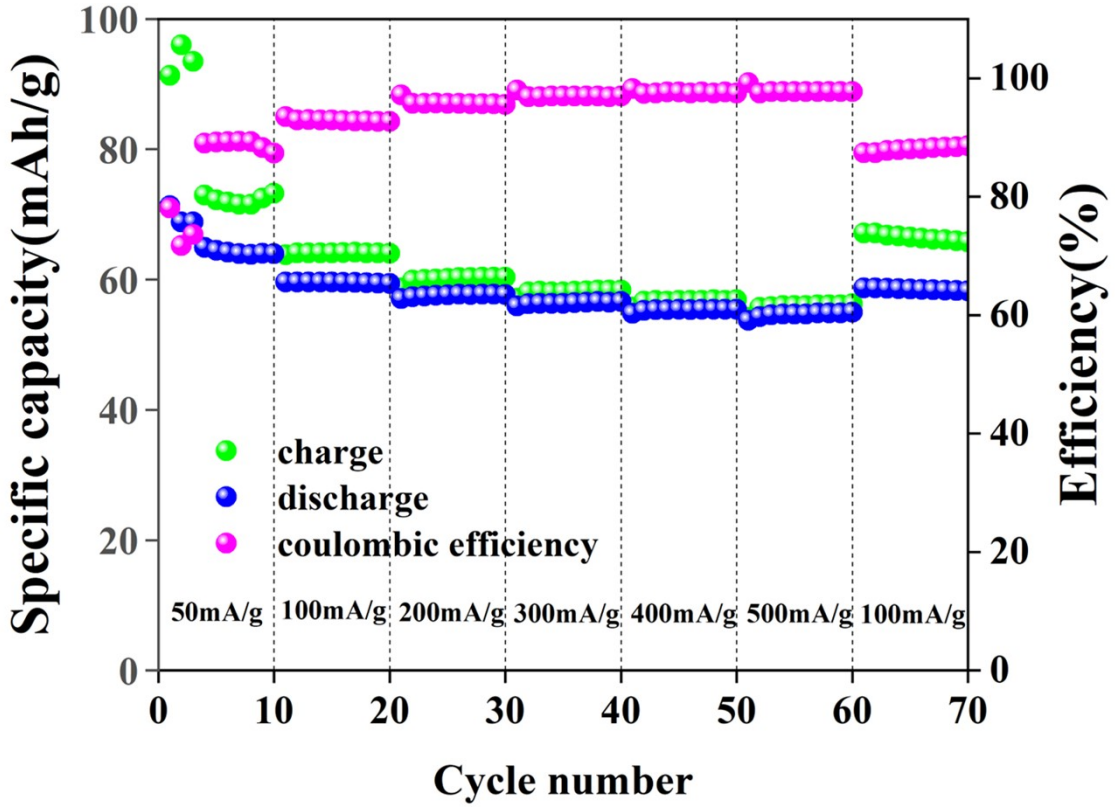

Figure S2. Rate performance image of button battery with $AlCl_3$-[EMIm]Cl-1.3 electrolyte.

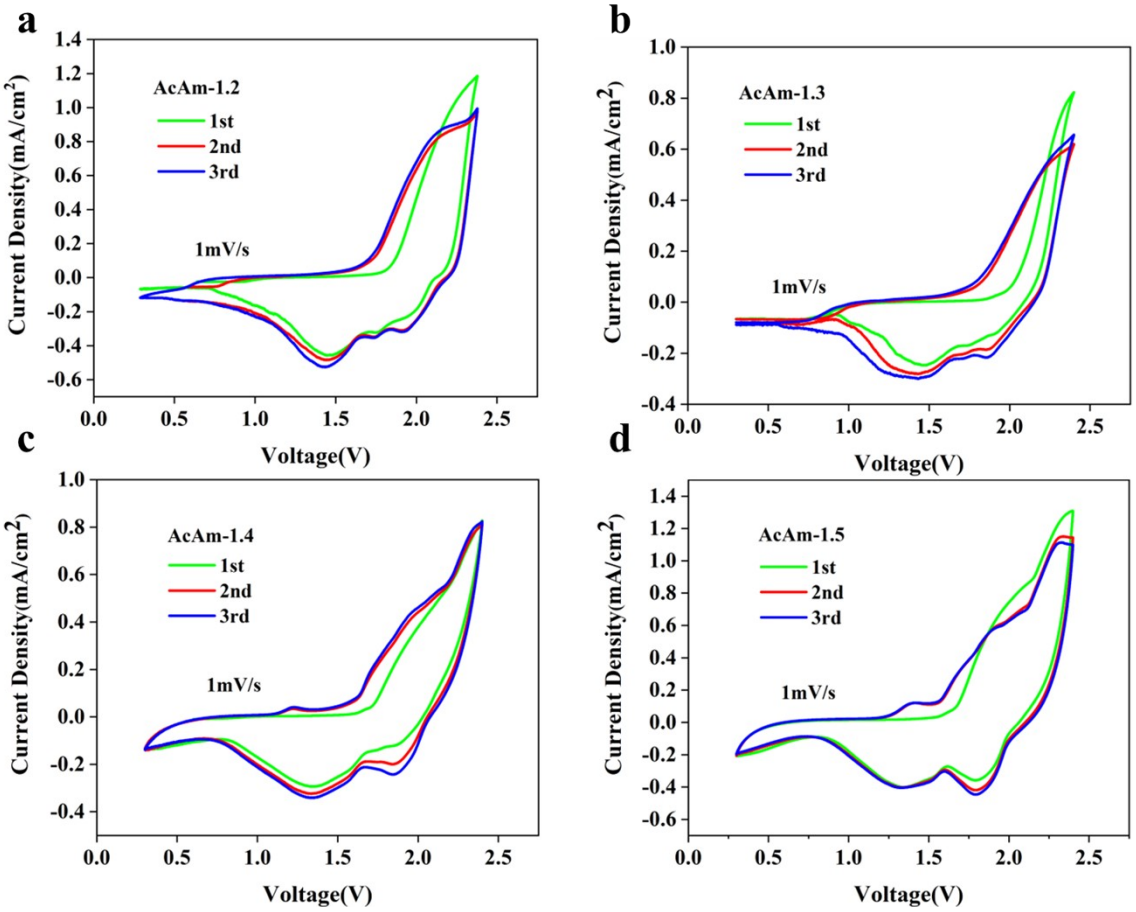

Figure S3. CV curves of button batteries with different molar ratios of electrolytes at 1mV/s scanning speed.

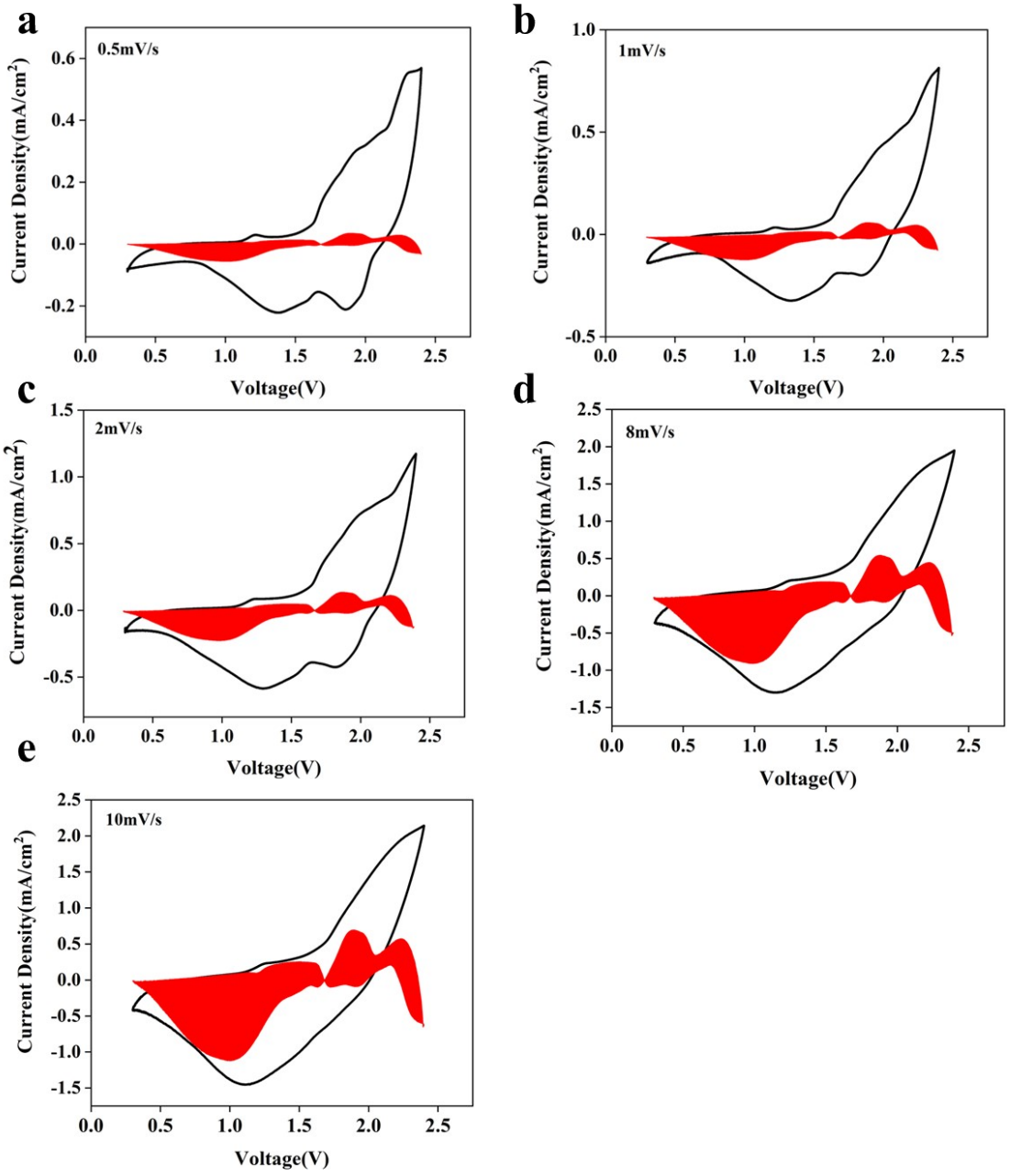

Figure S4. CV curves with capacitive contribution at 0.5 (a), 1 (b), 2 (c), 8 (d), 10 (e) mV/ s.

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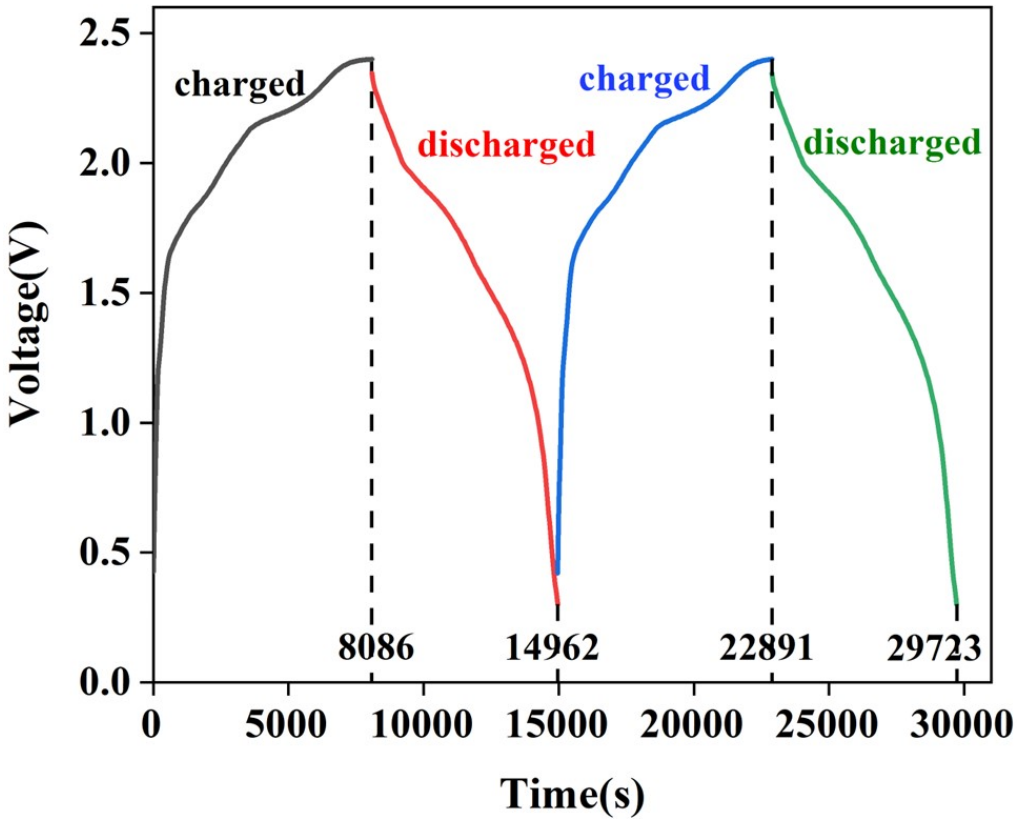

Figure S5. Image of slow charge and slow discharge of battery at low current density (50 mA/g).

Table S1

The conductivity data of different molar ratio electrolyte and the simulated charge resistance values of the fitted circuit.

$AlCl_3$/AcAm molar ratio	Conductivity (ms/cm)	R_{ct} (Ω)	Rs (Ω)	R_{SEI} (Ω)
1.2	0.53	219.1	41.92	2725
1.3	0.76	73.77	54.03	4005
1.4	0.97	35.34	51.35	2032
1.5	0.72	163	49.84	1132

Table S2

The previously reported reversible capacity of amide batteries at corresponding current densities.

Electrolytes	Cathode material	Current density (mA/g)	Reversible specific capacities (mAh/g)	Ref.
AcAm	Natural graphite	50 and 100	78 and 77	[1]
AcAm	Commercial graphite	100 and 500	72.8 and 66	[2]
Urea	Graphite	100	73	[3]
Urea	Natural graphite	50 and 100	91 and 90	[4]
Me-Ur	Graphite	100,200 and 400	78.6,70.8 and 51.2	[5]
Et-Ur	Graphite	100,200 and 400	77.1,70.6 and 52.3	[5]
[EMIm]Cl	Commercial artificial graphite	50, 100, 200, 300, 400 and 500	64,59,57,56,55,54	This work
AcAm	Commercial artificial graphite	50, 100, 200, 300, 400, 500 and 1000	101, 94, 88, 84, 80, 77 and 46	This work

References

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