Electronic Supplementary Information

Contribution of constitutional liquation of the segregation phase to improve the electrochemical performance of Al-Sn based anodes

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Table S1 The performance of Al-based anodes in different electrolytes.

No.	Anodes	Electrolytes	E_{OCP} (vs Hg/HgO)/V	Corrosion potential (vs Hg/HgO)/V	Corrosion current density/(mA cm^{-2})	Ref.
1	Al-Ga	synthetic seawater		-0.83	-	1
2	Al-In	2 M NaCl	-1.22	-1.15	-	2
3	Al-Sn	2 M NaCl	-1.26	-1.43	-	2
4	Al-In-Sn	2 M NaCl	-1.34	-1.53	-	2
5	Al-Ga-In	0.6 M NaCl	-1.05	-	-	3
6	Al-Mg-Ga-Sn	2 M NaCl	-	-1.226	0.03795	4
7	Al-Mg-Sn-Ga	3.5 wt.% NaCl	-	-1.37	0.3	5
8	Al-Bi-Pb-Ga	2 M NaCl	-1.43	-1.47	0.0443	6
9	Al-Mg-Sn-Ga	2 M NaCl	-	-1.509	0.0204	7
10	Al-Mg-Sn-Ga-In	2 M NaCl	-	-1.53	0.0162	7
11	Al-Mg-Sn-Ga-In	2 M NaCl	-	-1.578	0.0128	8
12	Al-Mg-Ga-Sn-Mn	2 M NaCl	-	-1.499	0.0293	4
13	Al-Sn-Ga-Mg-Zn	3.5 wt.% NaCl	-	-1.502	0.3	9
14	Al-Ga-In-Sn	2 M NaCl	-1.626	-1.591	11.4	This work

The anode utilization (η) and energy density were calculated using the following formulas:

Anode utilization $\eta = 100It/(\Delta mF/9)$.

Energy density $= U \cdot Ih/\Delta m$

Real device energy density = Energy density•(m/M)

Where η is the anode utilization, %; I is the current, A; Δm is the weight loss, g; F the faraday constant, t is the time, s; U is the operating voltage, V; h is the time, h; m is the weight of the Al anode, g; M is the weight of device, g.

Table S2 The discharge performance of Al-air battery with different anodes.

Anodes	Operating voltage (V)	Anode utilization (%)	Energy density (Wh/kg)	Real device energy density (Wh/kg)
Alloy 0	0.61	87.2	1360.32	18.14
Alloy 1	0.64	78.5	1373.75	18.32
Alloy 2	0.89	76.4	1699.9	22.67
Alloy 3	1.32	65.7	2148.39	28.65
Alloy 4	1.42	68.9	2538.97	33.85
Alloy 5	1.31	72.5	2200.38	29.34

Notes and references

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