SUPPLEMENTARY MATERIAL

- **Brass corrosion Test**

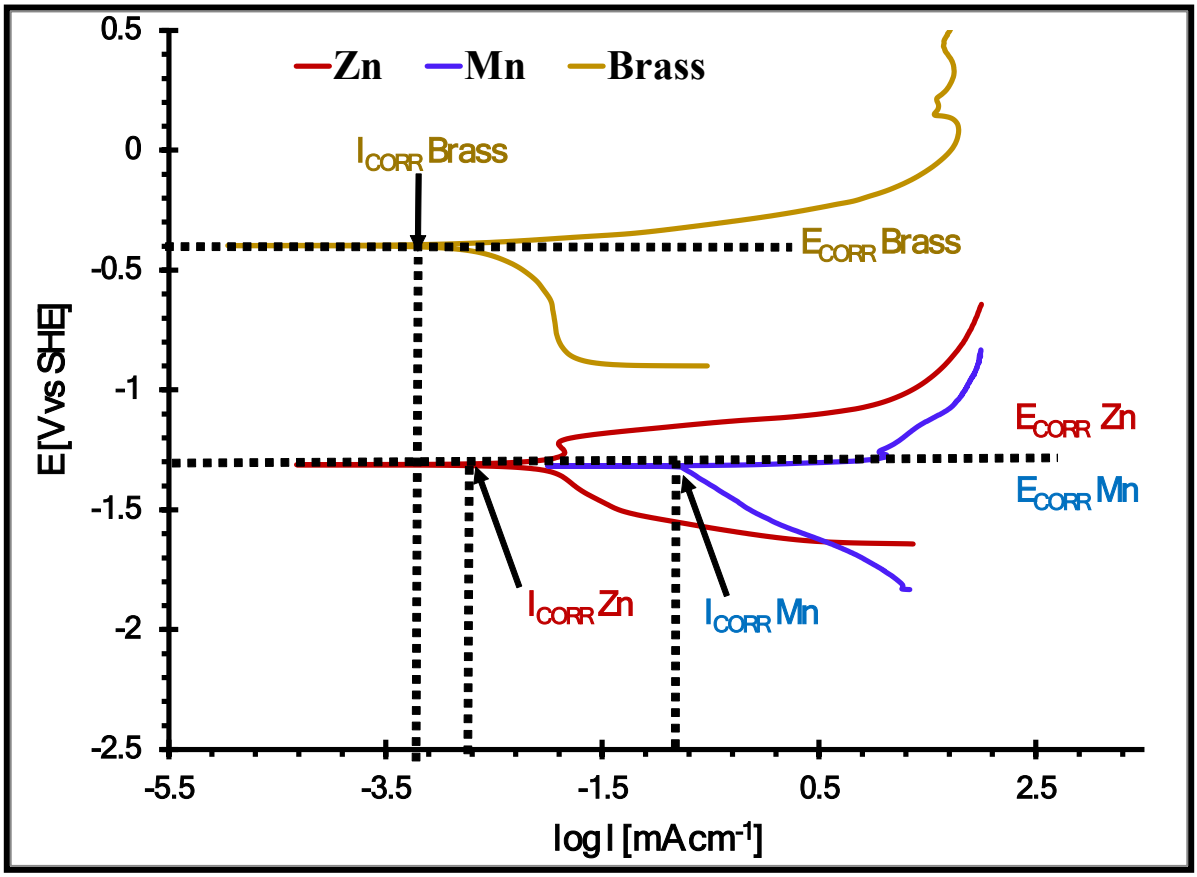

Fig. s1. Comparison of Tafel diagrams of Zn, Mn and Brass

Table s1: ICORR and ECORR of Brass, Manganese and Zinc

Metal	I_{CORR} [mA·cm^{-2}]	E_{CORR} [V]
Brass	6.45 x 10^{-4}	0.401
Manganese	340 x 10^{-3}	1.328
Zinc	1.54 x 10^{-3}	1.300

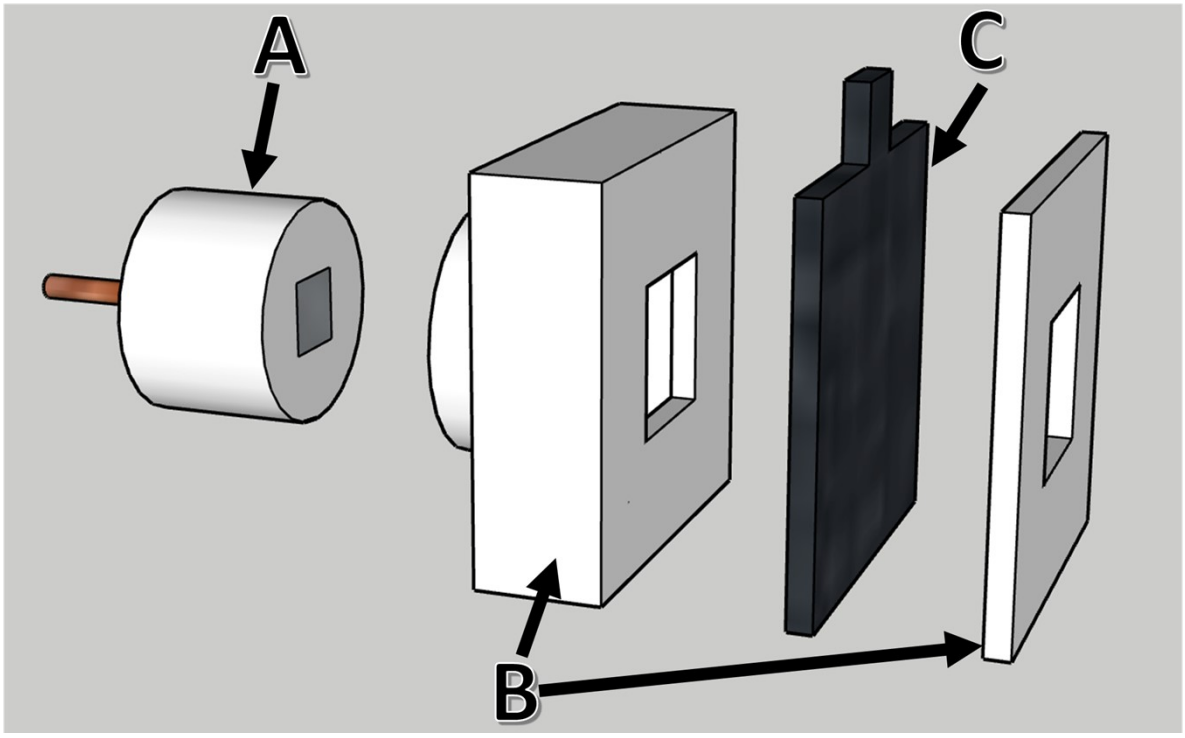

Fig. s2. Schematic representation of Metal-Air battery cell used for discharge tests: A) 1 cm2 anode, B) acrylic cell body, and C) Air-cathode.

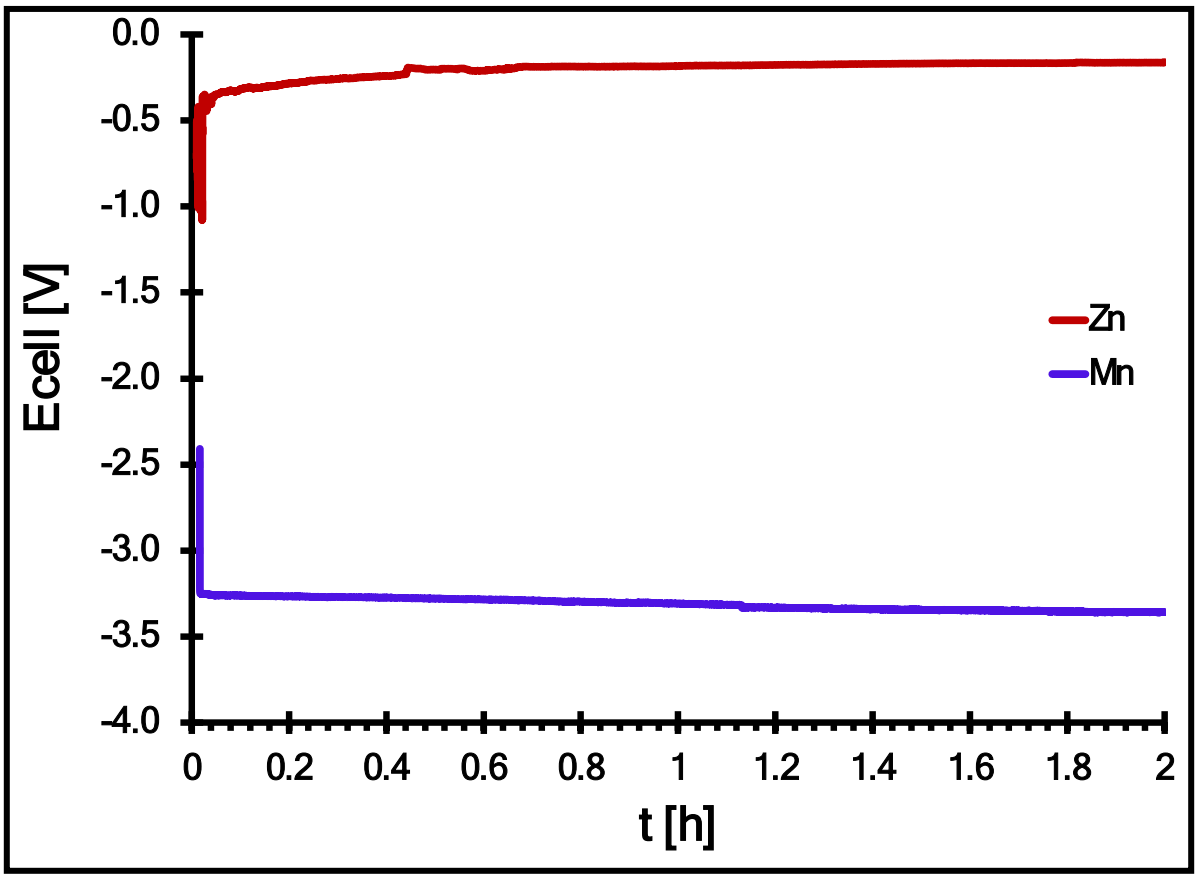

Fig. s3. Galvanostatic transient for the Zn galvanoplastic deposition and Mn galvanostatic electrowinning after 2 hours of electrolysis.

- **Equilibrium diagrams of Mn in NaCl 2M**

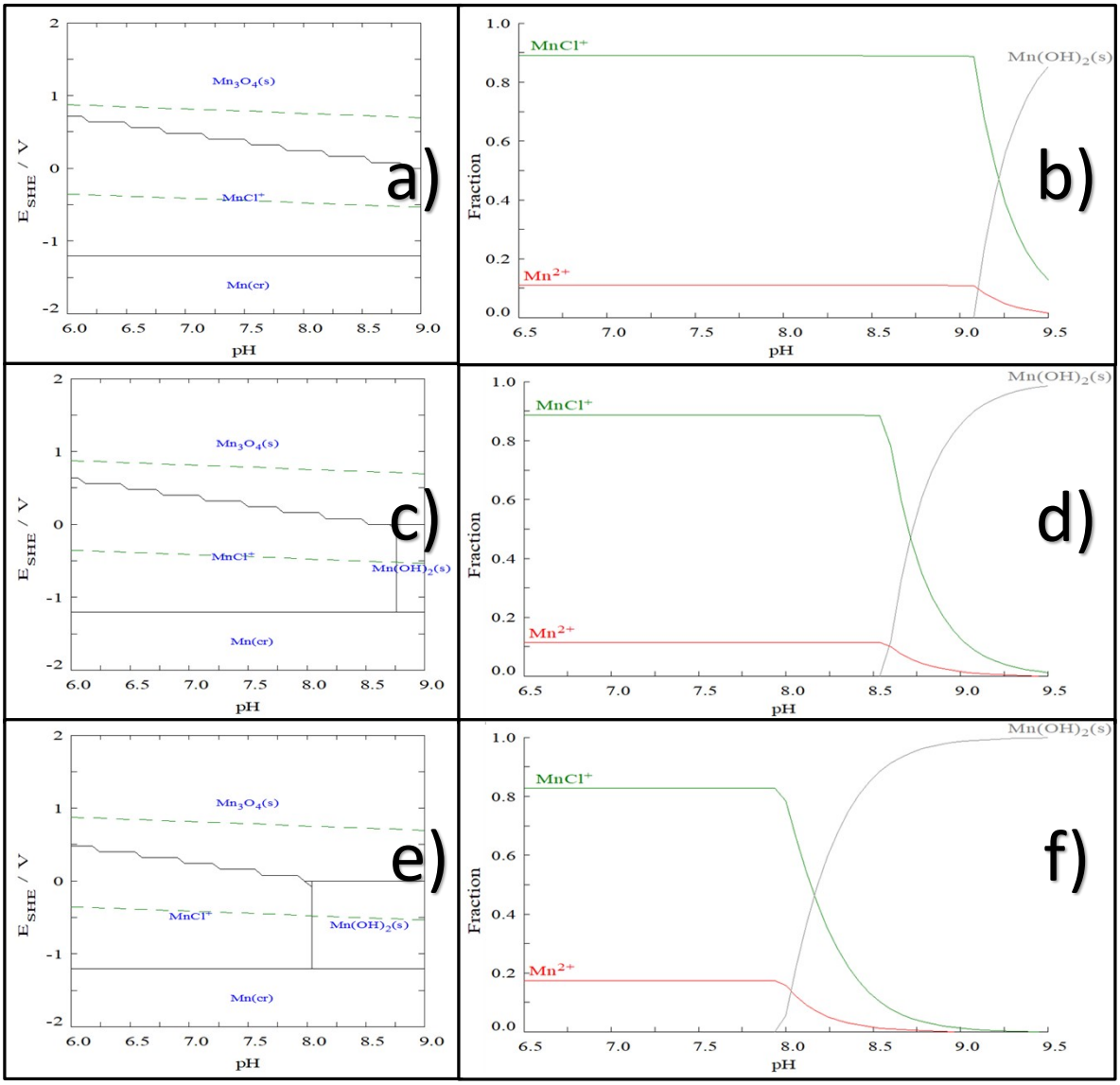

Fig. s4. Pourbaix diagrams for 0.01 (a), 0.1 (c), and 1 M (e) of Mn in 2M NaCl and molar fraction equilibrium diagram for 0.01 (a), 0.1 (c), and 1 M (e) of Mn in 2M NaCl.

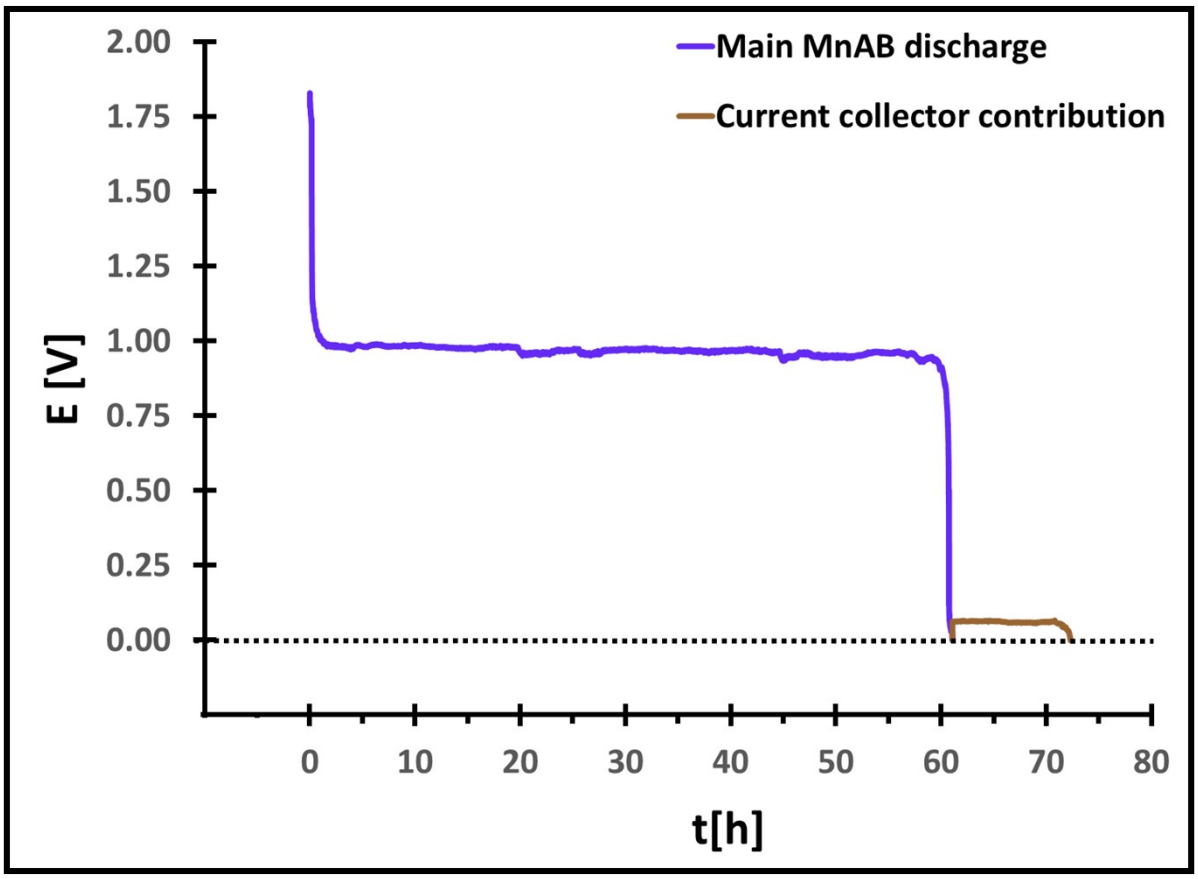

Fig. s5. Raw data discharge curve of manganese-air battery showing the contribution of current collector after main Mn-air battery discharge ends.

	Theoretic Ecell *[V]*	Z (*Number of electrons*)	Theoretic Specific Capacity *[A·h·kg^{-1}]*	Theoretic Energy Density *[Wh·kg^{-1}]*
$3Mn + 4H_2O \rightarrow Mn_3O_4 + 8H^+ + 8e^-$	2.097	$2^2/_3$	1299.66	3073.74
$Mn \rightarrow Mn^{2+} + 2e^-$	2.365	2	974.75	2044.01
	Total energy balance:		**2274.41**	**5117.75**

Table s2.- energetic data for the two synergic anodic reactions proposed.

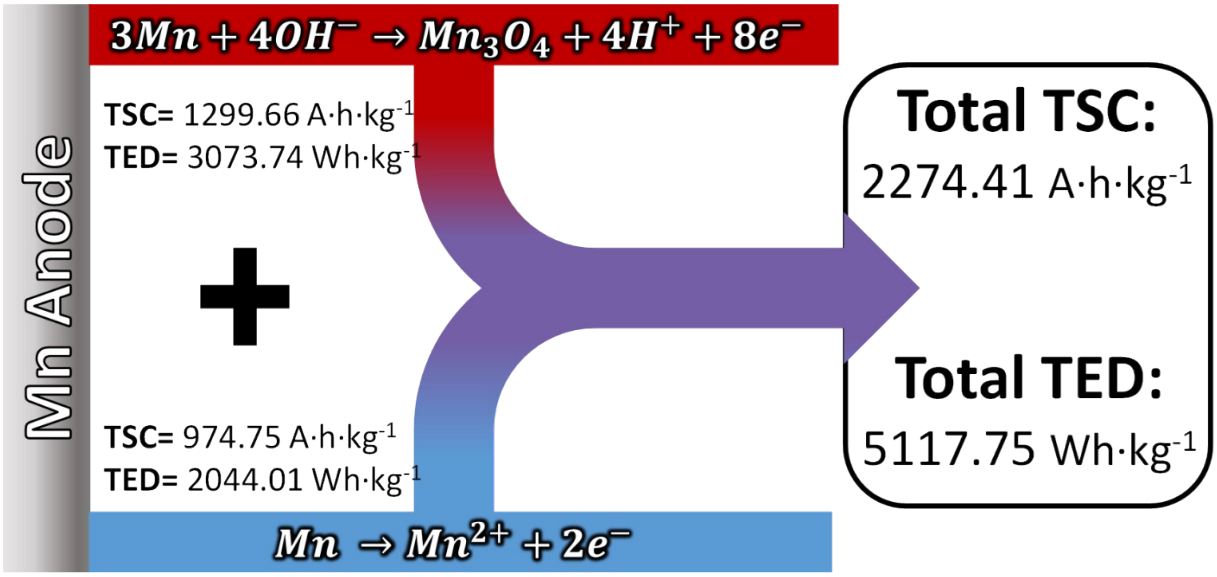

Fig. s6. Graphical representation of discharge mechanism and theoretical specific capacity (TSC) and energy density (TED) determination.

Table s3: Comparison of different MABs with MnAB and ZAB

Ref.	Type	Electrolyte	Discharge rate [$mA \cdot cm^{-2}$]	OCV [V]	Specific Capacity [$A \cdot h \cdot kg^{-1}$]
-	Primary Mn-Air	NaCl Based	0.5	1.55	1930
-	Primary Zn-Air	NaCl Based	0.5	1.01	748
16	Primary Zn-Air	Seawater based	25	-	724
49	Secondary Zn-Air	KOH based	10	1.405	801.2
50	Secondary Zn-Air	KOH based	5	1.52	817
51	Secondary Zn-Air	KOH based	10	1.45	788
17	Primary Al-Air	NaCl Based	10	0.85	1210
58	Flexible Al-Air	KOH based	2	2.20	2761
59	Primary Al-Air	NaOH Based	50	1.55	2777
60	Primary Al-Air	KOH based	5	1.60	220
61	Primary Al-Air	Gelled KOH based	4.4	1.31	426