

Environmentally Friendly Biological Activated Carbon Derived from Sugarcane Waste as a Promising Carbon Source for Efficient and Robust Rechargeable Zinc–Air Battery

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Table S1 the detailed parameters of NAC/BCF-0.5, BAC/BCF-0.5, BAC/BCF-2, BAC/BCF-3, and CAC/BCF-2.

air electrode inks	Raw material	Mass ratio
NAC/BCF-0.5	Non-activated carbon $\text{BaCo}_{0.5}\text{Fe}_{0.5}\text{O}_{3-\delta}$	1:2
BAC/BCF-0.5	biological activated carbon $\text{BaCo}_{0.5}\text{Fe}_{0.5}\text{O}_{3-\delta}$	1:2
BAC/BCF-2	biological activated carbon $\text{BaCo}_{0.5}\text{Fe}_{0.5}\text{O}_{3-\delta}$	2:1
BAC/BCF-3	biological activated carbon $\text{BaCo}_{0.5}\text{Fe}_{0.5}\text{O}_{3-\delta}$	3:1
CAC/BCF-2	Commercial activated carbon $\text{BaCo}_{0.5}\text{Fe}_{0.5}\text{O}_{3-\delta}$	2:1

NAC/BCF-0.5 composite ink is prepared by mixing NAC and BCF catalyst at 1:2 ratio, adding 100uL 5% Nafion solution, 100μL PTFE and 4ml ethanol ultrasonic mixing for 1h. Then, BAC and BCF catalyst is mixed in 1:2, 2:1, 3:1 ratio and the same amount of the above solution is added and ultrasonically mixed for 1h to prepare BAC/BCF-0.5, BAC/BCF-2 and BAC/BCF-3 composite inks. Finally, CAC and BCF catalyst are mixed at 2:1 ratio to prepare CAC/BCF-2 composite inks.

Table S2. Comparison of electrochemical performance of zinc-air batteries with different cathodes

Cathode	Peak power density (Pmax) (mW cm ⁻²)	Reference
BAC-BCF-2	96	This work
CAC-BCF-2	101	This work
BaCo _{0.5} Fe _{0.5} O _{3-δ}	132	[1]
CeO ₂ @CoSe ₂ -nanocubes	153	[2]
La _{1.7} Sr _{0.3} Co _{0.5} Ni _{0.5} O _{4+δ}	60	[3]
Pr _{0.5} Ba _{0.5} CoO _{3-δ}	175	[4]
Sr ₂ Fe _{1.5} Mo _{0.5} O _{6-δ}	107.9	[5]
PrBa _{0.8} Ca _{0.2} Co ₂ O _{5+δ}	113	[6]
Ba ₂ Co ₉ O ₁₄	120	[8]
Co ₃ O ₄ /Ni form	35.7	[9]

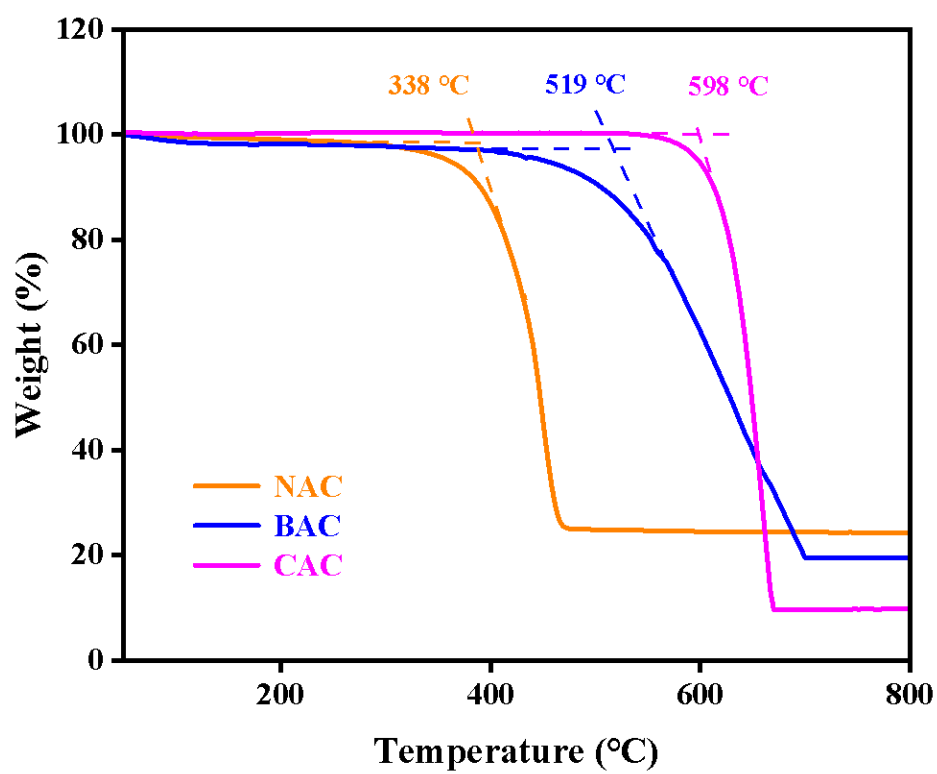


Figure S1 TGA curves of the NAC, BAC and CAC in air.



Figure S2 The measured OCV for the ZAB based on BAC/BCF-2 air electrode.

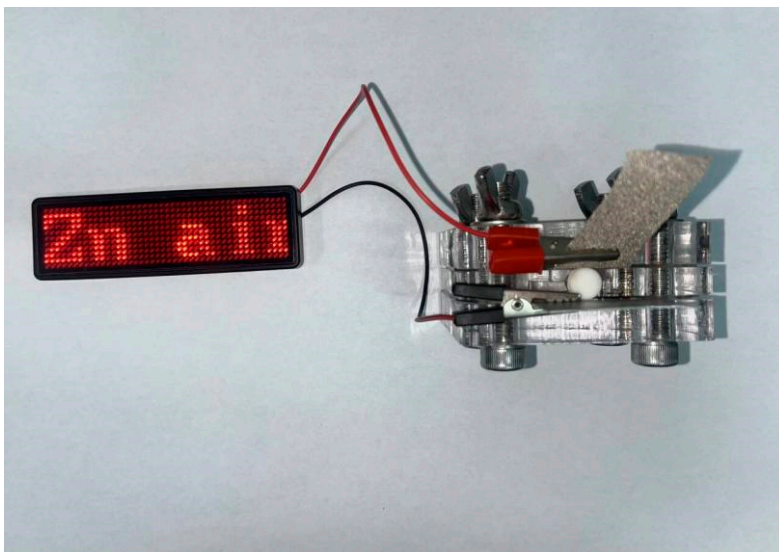


Figure S3 Photograph of a light-emitting diode (LED) with the "Zn air" logo, powered by the ZAB based on BAC/BCF-2 air electrode.

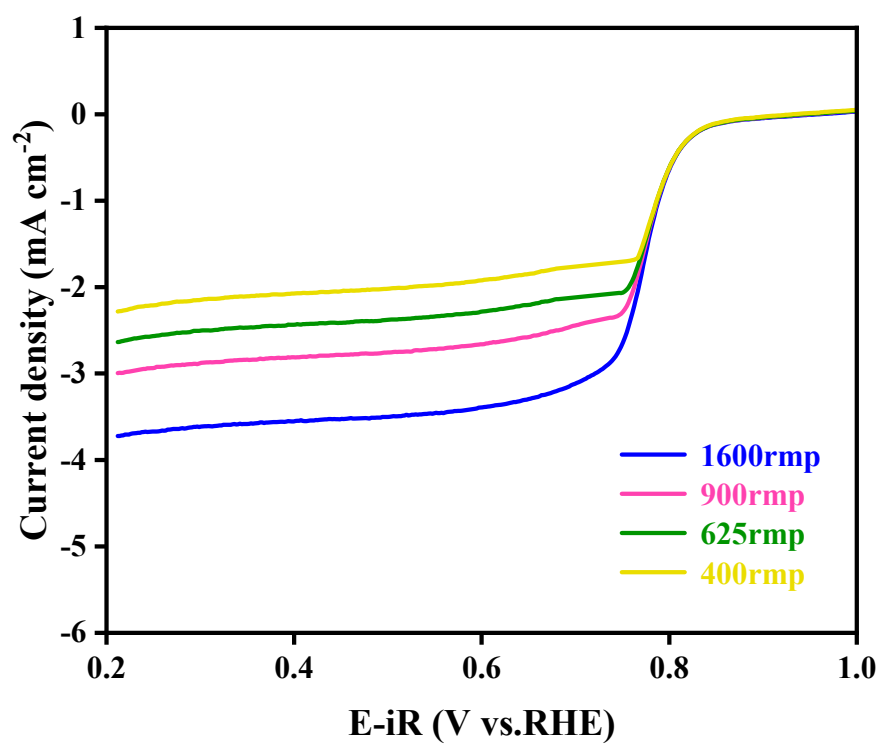


Figure S4 ORR performance: LSV curves of BAC/BCF-2 at different rotating rates.

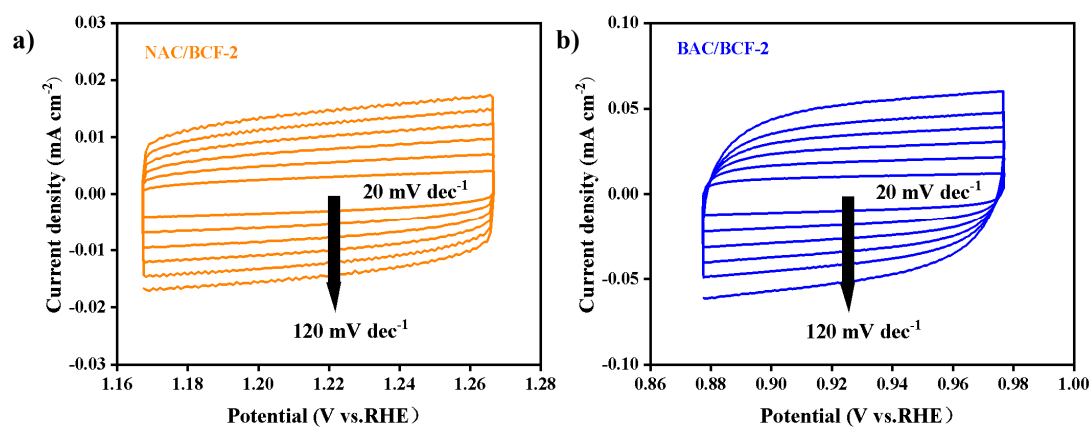


Figure S5 CV curves of (a) NAC/BCF-2, and (b) BAC/BCF-2.

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