

Supporting information

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Figure S1 SEM (a, b, d, e) and TEM (c, f) images of the low-carbon (a~c) and carbon-coated (d~f) reference samples. Both samples have microscale particles with the size of 8~10 μm . The low-carbon reference sample has smooth surface, but the carbon-coated reference sample has coarse surface, indicating their different surface properties.

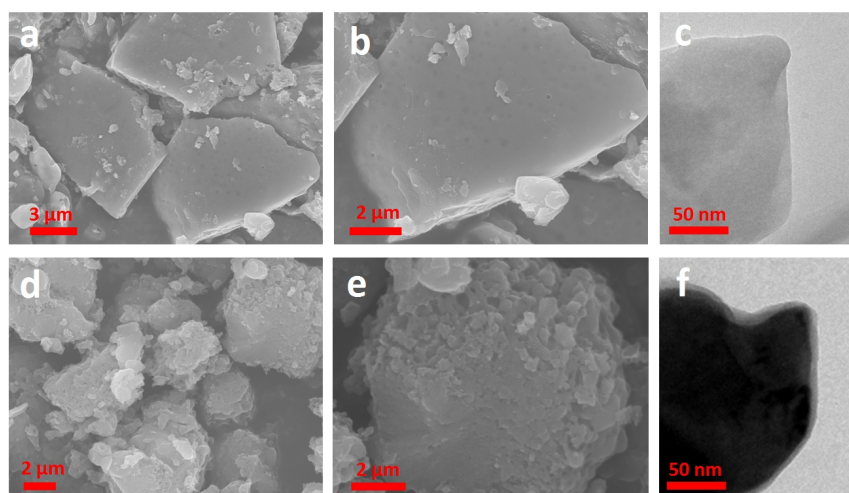
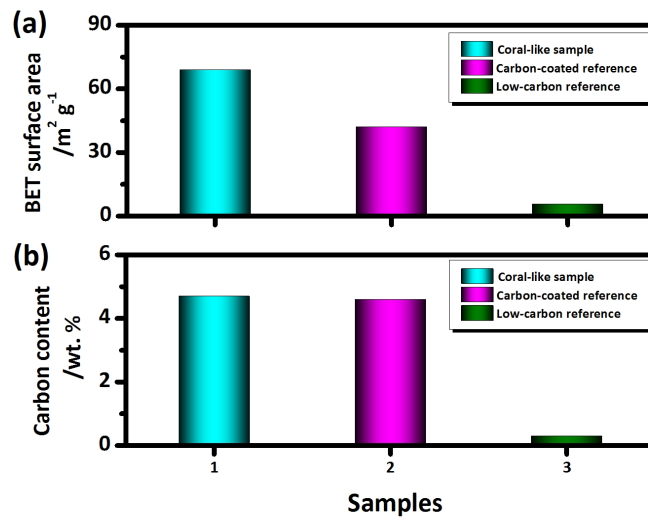


Figure S2 Comparison of the surface area (a) and carbon content (b) of the coral-like (1), low-carbon reference (2) and carbon-coated reference (3) samples. The carbon-coated reference sample and the coral-like sample have similar carbon content, and the low-carbon reference sample exhibits extreme low carbon content.



Section II. Supporting Tables

Table S1 Lattice parameters of the coral-like, low-carbon reference and carbon-coated reference samples.

Materials	$a/\text{\AA}$	$b/\text{\AA}$	$c/\text{\AA}$	$\alpha/^\circ$	$\beta/^\circ$	$\gamma/^\circ$
Coral-like sample	6.4167(4)	9.4126(5)	11.0000(5)	64.3766(1)	85.7942(5)	73.0810(0)
Carbon-coated reference	6.4148(4)	9.4321(6)	11.0199(7)	64.2732(5)	85.6715(3)	73.2013(1)
Low-carbon reference	6.4106(6)	9.4346(6)	11.0185(8)	64.2746(1)	85.6184(8)	73.1924(8)

Table S2 Atomic ratios of the coral-like, low-carbon reference and carbon-coated reference samples.

Atomic ratio	Coral-like sample	Carbon-coated reference	Low-carbon reference
$Na:Fe$	1.2791	1.2802	1.2898
Designed value	1.2787	1.2787	1.2787