

Electronic Supplementary Information (ESI)

Morphology, size, and defect engineering in CeOHCO_3 hierarchical structures for ultra-wide band microwave absorption

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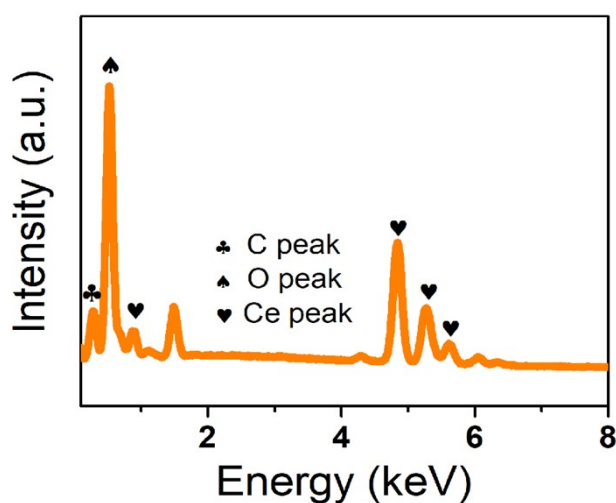


Figure S1. EDX spectrum of the cerium-based compounds formed under $b = 4:1$, $T = 160\text{ }^\circ\text{C}$.

Table S1. Physical parameters and synthesis conditions of CeOHCO₃ specimens

No.	Morphology	Internal stress/%	Crystallite sizes/nm	[Ce ³⁺]/mmo l ⁻¹	β	T /°C
S0	2-fold butterfly-shaped hierarchical structure	0.138	78.1	1.800	2.5:1	160
S1	2-fold butterfly-shaped hierarchical structure	0.086	110.1	1.800	1.5:1	160
S2	2-fold butterfly-shaped hierarchical structure	0.111	98.3	1.800	2:1	160
S3	2-fold butterfly-shaped hierarchical structure	0.140	62.2	1.800	3:1	160
S4	dodecahedron	0.176	53.7	1.800	4:1	160
S5	fusiform microrods	0.198	48.1	1.800	2.5:1	120
S6	fusiform microrods	0.177	53.9	1.800	2.5:1	140
S7	2-fold butterfly-shaped hierarchical structure	0.206	76.7	1.800	2.5:1	180

Table S2. EMWAP summarization of the CeOHCO₃ specimens with other absorption materials [2,13,45–56].

Absorbers	Filling mass fraction (%)	Optimal R_L value (dB)	f (GHz) (optimal R_L)	d_w (mm) ($R_L < -10$ dB)	Bandwidth (GHz) ($R_L < -10$ dB)	Ref.
Core-shell structured CeO ₂ @Fe	80	-23.88	9.6	1.10	4.24	[2]
CeO ₂ /MWCNT	70	-34.64	16.25	5	2.88	[13]
Zn modified CeO ₂ microspheres	70	-35	14	2	Approx.0.5	[45]
CeO ₂ -rGO	50	-45.9	13.28	2.0	4.5	[46]
rGO/ α -Fe ₂ O ₃ hydrogel	82	-33.5	7.12	5.0	3.2	[47]
Fe ₃ O ₄ nanorings	50	-41.59	5.84	4.3	2.5	[48]
NixFe _{3-x} O ₄ nanospheres	60	-36.6	14.56	2.5	3.4	[49]
Spongy porous Fe ₃ O ₄ polyhedra	50	-28.2	6.2	4.0	2.9	[50]
RGO/Fe ₃ O ₄	50	-44.6	6.6	3.9	4.3	[51]
Fe ₃ O ₄ particles	90	-17.8	16.80	1.0	2.0	[52]
Fe-C	50	-36.0	4.2	3.0	1.2	[53]
Core-shell Co@CoO	70	-30.4	16.1	1.5	4.6	[54]
Co flower	66.7	-25	5.6	2.0	3	[55]
BaTiO ₃	70	-29.6	12	4.0	0.8	[56]
Co@N-doped carbon nanocages	10	-60.6	9.8	2.4	5.1	[57]
Flower-like core@shell MoSe ₂ -based nanocomposites	40	-59.87	11	3.10	6.00	[58]
Non-magnetic bimetallic MOF-derived porous carbon-wrapped TiO ₂ /ZrTiO ₄	/	-67.8	13.0	2.16	5.9	[59]
Three-dimensional flower-like ZnFe ₂ O ₄ @MoS ₂	20	-61.8	9.5	2	5.8	[60]
CeOHCO ₃ S0	60	-44.44	17.84	2.0	6.24	This work
CeOHCO ₃ S1	60	-34.91	17.04	2.6	6.08	This work
CeOHCO ₃ S2	60	-44.95	9.76	3.4	9.52	This work
CeOHCO ₃ S3	60	-51.77	9.60	3.5	8.56	This work
CeOHCO ₃ S4	60	-42.71	9.12	2.9	6.40	This work
CeOHCO ₃ S5	60	-42.25	16.32	2.8	7.92	This work
CeOHCO ₃ S6	60	-47.35	11.12	3.0	8.72	This work

CeOHCO ₃ S7	60	-43.12	17.04	3.4	8.80	This work
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