

Supplementary materials for the manuscript

Binary Ce-Mn oxides confined in carbon nanotube as efficient catalysts for ethylbenzene dehydrogenation in the presence of carbon dioxide

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Index:

Figure S1. TEM images of the raw CNTs (A, A'), CNTs treated by HNO₃ (68%) (B, B') and CNTs treated by diluted HNO₃ (37.5%) (C, C')

Figure S2. TEM images of Ce-in-CNTs (A), Mn-in-CNTs (B) and CeMn-in-CNTs-0.375 (C)

Figure S3. EDS spectrum of CeMn-in-CNTs-0.375

Table S1. Composition analysis of prepared samples

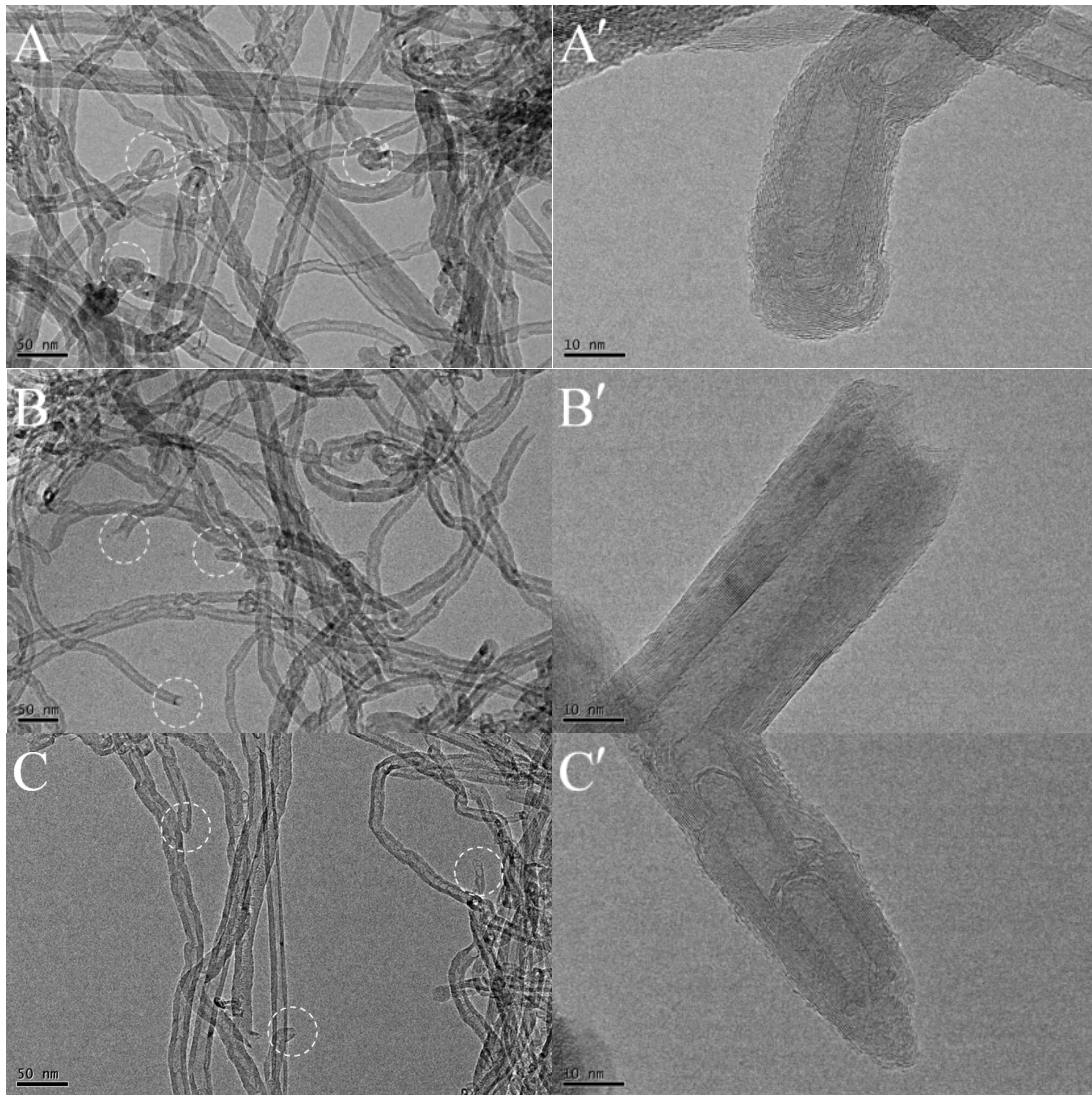


Figure S1. TEM images of the raw CNTs (A, A'), CNTs treated by HNO₃ (68%) (B, B') and CNTs treated by diluted HNO₃ (37.5%) (C, C'). The ends of the CNTs are indicated by dotted circle.

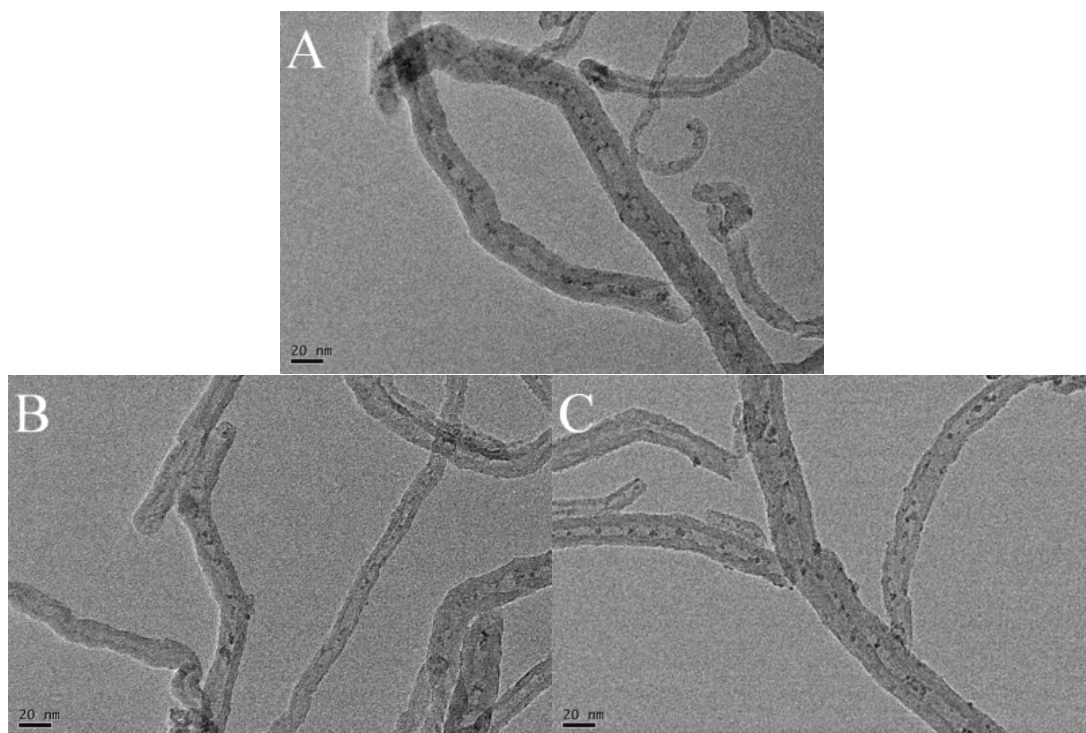


Figure S2. TEM images of Ce-in-CNTs (A), Mn-in-CNTs (B) and CeMn-in-CNTs-0.375 (C)

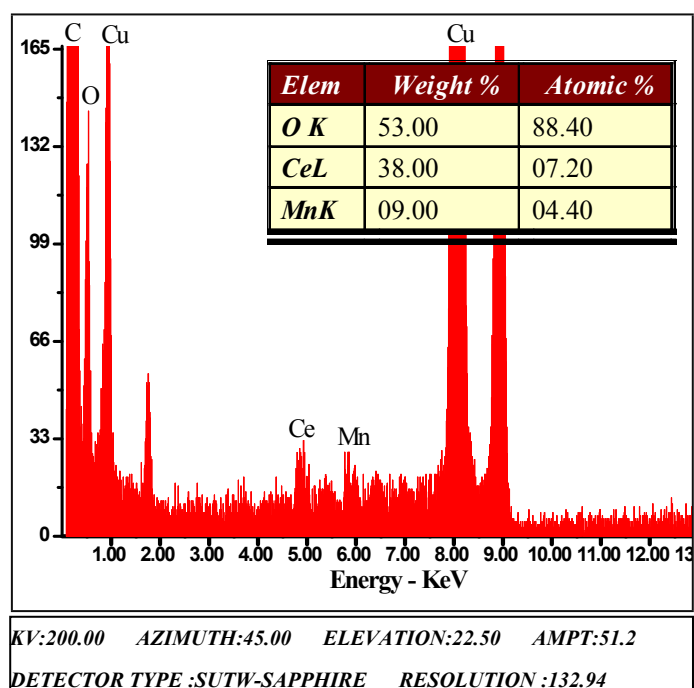


Figure S3. EDS spectrum of CeMn-in-CNTs-0.375. The inset shows the weight and atom percent of the various elements.

Table S1. Composition analysis of prepared samples

Samples	Ce loading (wt.%) ^b	Mn loading (wt.%)	Atom ratio of Mn/(Ce+Mn)
(7%) ^a Ce-in-CNTs	7.1	—	—
(5%) CeMn-in-CNTs-0.375	4.0	1.0	0.39
(7%) CeMn-in-CNTs-0.375	5.5	1.4	0.393 (0.378) ^c
(9%) CeMn-in-CNTs-0.375	7	1.7	0.383
(7%) Mn-in-CNTs	—	6.8	—

^a Total loading amount. ^b Mass fraction is analyzed by ICP-AES. ^c The ratio of Mn/Ce is analyzed by EDS.