

Supplementary Materials: Catalytic Performance of Calcium Titanate for Catalytic Decomposition of Waste Polypropylene to Carbon Nanotubes in a Single-Stage CVD Reactor

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Table S1. Particle size (nm) distribution of NMC412 catalyst.

6,087	13,749	4,703	3,715	3,505
11,178	12,787	6,27	6,97	3,074
8,442	5,669	5,089	8,363	3,505
3,478	6,225	6,149	13,589	2,174
2,75	3,889	6,27	8,272	3,889
4,782	6,636	8,203	6,956	2,535
5,089	11,437	7,378	3,478	3,135
5,089	15,802	5,669	6,225	2,174
5,378	8,352	13,919	5,307	4,348
10,516	6,956	11,337	4,782	2,174
6,149	7,741	7,131	4,782	4,125
5,652	20,248	6,04	3,715	5,669
7,404	20,248	9,722	5,217	3,074
8,695	7,288	7,605	6,791	3,074
11,337	4,434	3,043	4,348	2,609
6,521	12,366	3,043	5,849	3,043
10,084	6,579	3,505	6,521	4,861
7,704	9,722	3,505	5,652	6,102
8,963	5,217	3,478	3,937	4,861
9,223	4,125	3,478	10,15	5,652
4,348	8,564	3,689	4,008	4,782
9,13	4,919	3,478	6,225	2,535
8,249	9,171	2,645	5,253	3,074
8,442	3,913	4,008	6,27	4,782

9,223	6,225	3,165	4,348	3,889
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Table S2. Particle size (nm) distribution of NMC414 catalyst.

12,257	8,271
7,379	17,94
19,55	12,064
21,18	29,168
7,867	9,467
29,699	12,439
12,691	11,261
9,355	40,171
16,276	38,432
10,073	16,163
7,285	14,91
10,321	22,171
10,761	22,171
16,389	7,931
16,026	20,339
9,467	15,13
30,194	12,945
10,414	25,727
16,31	10,321
14,712	16,186
15,949	16,809
22,303	40,512
7,074	12,121
12,785	14,126
27,056	21,683
12,557	

Table S3: Elemental compositions of NMC412 and NMC414 catalysts obtained by EDXS analysis.

Element	NMC412		NMC414	
	Weight %	Atomic %	Weight %	Atomic %
Ca K	12.95	10.63	20.12	19.15
Ti K	10.41	10.15	19.84	19.09
Ni K	30.02	22.24	30.02	22.09
Mo L	9.34	3.20	9.32	3.30
O	37.28	53.78	20.70	36.37
Total	100.00	100.00	100.00	100.00

Table S4: Outer diameter (nm) of CNTs deposited over NMC412 catalyst.

15,044	13,155	10,656	33,264
12,326	13,155	10,358	21,385
15,681	15,07	10,766	21,766
14,296	11,504	12,036	20,978
10,946	7,915	8,715	14,405
11,193	8,715	10,358	18,917
11,193	13,155	8,159	16,317
7,915	12,67	6,381	13,155
7,079	10,802	10,012	15,122
10,09	13,155	8,849	
11,538	33,217	6,442	
9,894	33,639	5,16	
11,905	10,09	13,155	
12,036	11,088	10,012	
12,036	11,088	9,734	
9,894	19	14,405	
13,274	33,882	15,454	
13,274	21,766	13,823	
11,905	10,09	19,144	
13,274	8,159	11,538	
14,296	9,572	12,515	
12,036	10,32	14,834	
15,656	18,157	10,09	
16,317	16,317	13,155	
13,274	8,159	14,648	

Table S5: Outer diameter (nm) distribution of CNTs deposited over NMC414 catalyst.

16,361	13,512	35,367	15,425
16,386	17,365	23,997	13,42
15,452	14,908	18,738	15,452
14,372	16,686	20,017	16,76
20,182	16,462	15,874	18,65
13,42	16,686	33,631	16,711
16,711	19,109	18,539	16,76
14,227	18,292	20,182	16,386
13,845	18,539	16,76	17,27
27,479	31,826	16,711	16,26
14,908	17,648	17,484	18,202
20,747	18,111	16,462	14,198
15,479	15,691		

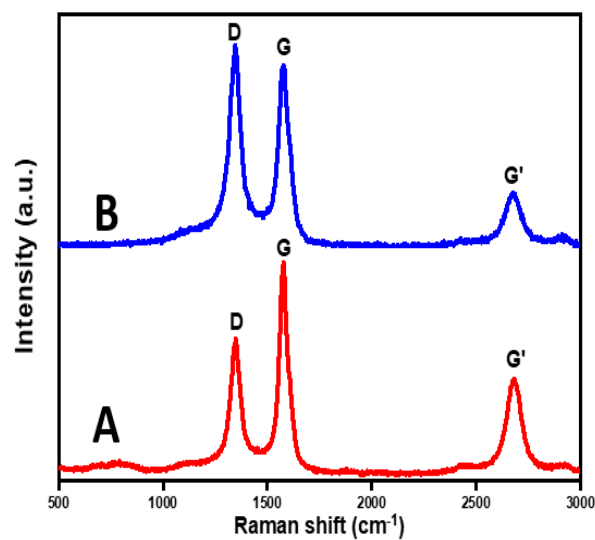
**Figure S1.** Raman spectra of as-synthesized CNTs over NiMo/CaTiO₃ catalysts with different CaTiO₃ content: (A) NMC412 and (B) NMC414.

Table S6: Outer diameter (nm) distribution of CNTs obtained over NMC412 calcined at 600 °C.

15,519	26,548	32,502
13,157	25,316	33,286
14,937	16,103	53,363
13,73	32,632	53,363
14,466	36,642	16,48
14,704	15,789	12,405
14,704	12,186	31,626
11,537	14,279	31,309
34,933	42,331	16,689
43,124	38,635	28,124
27,192	38,635	24,701
27,192	30,6	24,81
13,869	15,091	28,192
14,279	14,466	29,158
14,279	17,739	27,022
28,946	56,255	15,617
56,145	58,253	38,754
43,061	59,55	29,486
14,912	44,077	16,007
28,96	43,124	14,937
		30,029

Table S7: Outer diameter (nm) distribution of CNTs obtained over NMC412 calcined at 700 °C.

15,044	14,296	19	6,442
12,326	12,036	33,882	5,16
15,681	15,656	21,766	13,155
14,296	16,317	10,09	10,012
10,946	13,274	8,159	9,734
11,193	13,155	9,572	14,405
11,193	13,155	10,32	15,454
7,915	15,07	18,157	13,823
7,079	11,504	16,317	19,144
10,09	7,915	8,159	11,538
11,538	8,715	10,656	12,515
9,894	13,155	10,358	14,834
11,905	12,67	10,766	10,09
12,036	10,802	12,036	13,155
12,036	13,155	8,715	14,648
9,894	33,217	10,358	33,264
13,274	33,639	8,159	21,385
13,274	10,09	6,381	21,766
11,905	11,088	10,012	20,978
13,274	11,088	8,849	14,405
15,122	16,317	13,155	18,917

Table S8: Outer diameter (nm) distribution of CNTs obtained over NMC412 calcined at 800 °C.

23,49	16,506	25,015
22,037	18,376	31,642
16,007	18,904	28,116
16,007	15,522	14,621
17,745	25,485	21,987
18,376	16,991	17,137
19,109	17,851	17,816
16,239	17,886	18,24
20,026	15,492	17,99
20,142	17,851	20,251
18,444	19,553	21,059
20,76	18,904	18,671
15,532	18,596	16,769
14,308	19,743	23,767
15,742	19,617	22,802
20,992	16,506	19,987
16,806	15,771	17,255
18,604	19,617	15,742
16,806	19,799	19,545
17,453	19,109	15,562
20,026	16,007	17,666
23,55	25,282	20,992
23,497	22,248	24,255
14,749	24,255	

Table S9: TGA data of as-deposited CNTs over NiMo/CaTiO₃ catalyst calcined at different temperatures.

Calcination Temperature (°C)	On-set Temperature (°C)	Inflection Temperature (°C)	Offset Temperature (°C)
600	479	634	672
700	540	653	695
800	526	637	686