

List of Supplementary Table

Table S1. GC-MS concentration (wt %) of the deoxygenated liquid product

Table S2. GC-MS concentration (wt %) of the deoxygenated product catalysed by Ni₁₀-Mg₁₅/MWCNT and Ni₁₀-Mn₅/MWCNT

Table S1. GC-MS concentration (wt.%) of the deoxygenated liquid product

Catalyst	Compound group	Compound name	Concentration (%)	
MWCNT	Carboxylic acid	n-Hexadecanoic acid	1.278	
		Trifluoroacetic acid, pentadecyl ester	0.367	
	Ketone	2-Nonadecanone	0.909	
	Alcohol	n-Tetracosanol-1	1.205	
		1-Heptacosanol	2.635	
		9-Octadecanol, (E)-	0.168	
		9-Hexadecanol, (E)-	0.212	
	Cyclic Hydrocarbon (C ₈ -C ₂₀)	Cyclopropane	3.769	
		n-Nonylcyclohexane	1.454	
		Cyclohexene	0.586	
		Cyclopentane	0.592	
		Bicyclohexyl	0.324	
		Cyclohexane	0.221	
	Hydrocarbon (C ₈ -C ₂₀)	<u>Saturated Hydrocarbon</u>		
		Nonane	3.845	
		Undecane	2.046	
		Dodecane	2.376	
		Tridecane	4.806	
		Tetradecane	5.294	
		Pentadecane	31.508	
Hexadecane		1.927		
Heptadecane		0.269		
<u>Unsaturated Hydrocarbon</u>				
1-Nonene				
1-Decene		0.726		
1-Undecene		0.661		
1-Tridecene		0.996		
1-Tetradecene		1.389		
7-Tetradecene		1.901		
9-Octadecene, (E)-				
1-Pentadecene		2.061		
5-Eicosene, (E)-		1.362		
3-Heptadecene, (Z)-		0.247		
1-Octadecene	6.895			
7-Heptadecene	0.283			
9-Eicosene, (E)-	0.269			
	2.094			
Heavy Hydrocarbon	Hexacosane	0.380		
	9-Tricosene, (Z)-	1.707		

	(C ₂₁ -C ₂₄)		
Ni ₁₀ / MWCNT	Carboxylic acid	Trifluoroacetic acid, pentadecyl ester	1.284
	Alcohol	1-Undecanol	3.782
	Cyclic Hydrocarbon (C ₈ -C ₂₀)	Cyclopropane Benzene, pentyl- Cyclopentane Cyclododecene, (Z)- Benzene, (1-methyldecyl)- n-cyclohexane	2.272 1.939 1.069 0.614 1.413 1.540
Ni ₁₀ -Mn ₁₀ / MWCNT	Hydrocarbon (C ₈ -C ₂₀)	<u>Saturated Hydrocarbon</u>	
		Octane	1.056
		Nonane	3.206
		Undecane	2.815
		Dodecane	3.001
		Tetradecane	8.395
		Hexadecane	7.963
		Heptadecane	14.109
		<u>Unsaturated Hydrocarbon</u>	
		1-Nonene	0.696
		1-Decene	0.951
		1-Undecene	1.797
		3-Dodecene, (E)-	1.997
		1-Tridecene	1.366
		1-Tetradecene	0.955
		7-Tetradecene	7.419
		1-Heptadecene	4.512
9-Octadecene, (E)-	0.861		
3-Heptadecene, (Z)-	15.028		
5-Heptadecene	0.675		
Ni ₁₀ -Mn ₁₀ / MWCNT	Ketone	2-Nonadecanone	0.748
	Alcohol	1-Undecanol	3.536
		n-Tridecan-ol	1.915
	Cyclic Hydrocarbon (C ₈ -C ₂₀)	Cyclopentene,	2.35
		Benzene, pentyl-	1.507
Cyclopropane		1.024	
n-Nonylcyclohexane		0.948	
Cyclopentane		0.702	
Cyclododecanemethanol	0.474		
Hydrocarbon (C ₈ -C ₂₀)	<u>Saturated Hydrocarbon</u>		
	Nonane	1.005	
	Undecane	2.165	
	Dodecane	1.639	
	Tetradecane	5.180	
	Hexadecane	35.07	
Heptadecane	9.032		

		<u>Unsaturated Hydrocarbon</u> 1-Decene Trans-3-Decene 1-Undecene 3-Dodecene, (E)- 1-Tridecene 1-Tetradecene 9-Octadecene, (E)- 1-Pentadecene 3-Heptadecene, (Z)- 5-Heptadecene 9-Eicosene, (E)-	0.857 0.747 1.560 0.440 0.750 0.651 2.625 1.961 10.807 0.829 0.150
Ni ₁₀ -Mg ₁₀ / MWCNT	Carboxylic acid	Dichloroacetic acid Trifluoroacetic acid	0.918 0.370
	Ketone	9-Octadecanone 2-Pentadecanone 3-Octadecanone 8-Octadecanone 9-Heptadecanone 10-Nonadecanone	0.319 1.716 0.387 0.452 0.508 0.318
	Alcohol	1-Undecanol 1-Dodecanol Octacosanol 1-Heptacosanol	1.792 0.800 0.557 1.405
	Cyclic Hydrocarbon (C ₈ -C ₂₀)	Cyclopropane n-Nonylcyclohexane Cyclohexene Cyclopentane Cyclohexane Cyclohexadecane	0.952 1.455 0.474 1.136 0.894 11.490
	Hydrocarbon (C ₈ -C ₂₀)	<u>Saturated Hydrocarbon</u> Nonane Undecane Dodecane Tetradecane Hexadecane Heptadecane <u>Unsaturated Hydrocarbon</u> 1-Decene 1-Undecene 1-Tridecene 1-Tetradecene 7-Tetradecene 9-Octadecene, (E)- 1-Pentadecene 9-Eicosene, (E)-	1.121 1.122 1.742 4.641 35.348 11.490 0.370 0.802 0.810 0.810 1.371 2.807 0.587 1.037

		5-Eicosene, (E)- 3-Heptadecene, (Z)- 5-Eicosyne	0.126 10.466 0.279
	Heavy Hydrocarbon (C ₂₁ -C ₂₄)	9-Tricosene, (Z)-	1.005
Ni ₁₀ -Ce ₁₀ / MWCNT	Carboxylic acid	Malonic acid	0.617
	Ketone	2-Nonadecanone	0.612
	Alcohol	1-Undecanol	2.205
		1-Dodecanol	0.814
		n-Pentadecanol	4.810
		n-Tetracosanol	0.516
Cyclic Hydrocarbon (C ₈ -C ₂₀)	Cyclopropane	0.771	
	Heptane, 1,1-dicyclohexyl	0.450	
	n-Nonylcyclohexane	1.143	
	Cyclopentane	1.25	
Hydrocarbon (C ₈ -C ₂₀)	<u>Saturated Hydrocarbon</u>		
	Octane	2.255	
	Nonane	6.671	
	Undecane	2.466	
	Dodecane	1.423	
	Tetradecane	4.373	
	Hexadecane	35.564	
	Heptadecane	10.995	
	<u>Unsaturated Hydrocarbon</u>		
	1-Nonene	1.196	
	1-Decene	0.761	
	2-Decene	0.526	
	1-Undecene	0.950	
	1-Tetradecene	0.631	
	7-Tetradecene	1.278	
	9-Octadecene, (E)-	2.269	
	1-Pentadecene	2.568	
	5-Octadecene, (E)-	0.436	
	3-Heptadecene, (Z)-	3.780	
	5-Heptadecene	0.463	
Ni ₁₀ -Cu ₁₀ / MWCNT	Carboxylic acid	Nonanoic acid	0.046
	Ketone	2-Nonadecanone	0.462
	Alcohol	1-Undecanol	2.189
1-Dodecanol		0.993	
n-Heptadecanol		2.958	

Cyclic Hydrocarbon (C ₈ -C ₂₀)	Cyclopentene Benzene Cyclopropane Cyclopentane n-Pentadecyclohexane Cyclohexene Cyclopentane Cyclohexane	1.240 1.113 0.786 0.588 1.017 0.227 0.631 0.441
Hydrocarbon (C ₈ -C ₂₀)	<u>Saturated Hydrocarbon</u> Octane Nonane Undecane Dodecane Tridecane Tetradecane Hexadecane <u>Unsaturated Hydrocarbon</u> 1-Octene 1-Nonene 2-Nonene, (E)- 1-Decene 2-Decene, (E)- 1-Undecene 1-Tridecene 7-Tetradecene 9-Octadecene, (E)- 1-Pentadecene 9-Eicosene, (E)- 3-Heptadecene, (Z)-	0.505 10.177 6.03 2.125 4.547 3.431 29.845 0.505 1.686 0.861 0.976 0.617 1.112 1.031 0.294 1.367 1.901 0.972 0.972
Heavy Hydrocarbon (C ₂₁ -C ₂₄)	Tetracosane 9-Tricosene,(Z)- Heneicosane	0.706 0.656 0.630

Table S2. GC-MS concentration (wt.%) of the deoxygenated product catalysed by Ni₁₀-Mg₁₅/MWCNT and Ni₁₀-Mn₅/MWCNT

Catalyst	Compound group	Compound name	Concentration (%)
Ni ₁₀ -Mg ₁₅ /MWCNT	Ketone	2-Pentadecanone	3.215
		3-Octadecanone	0.692
		2-Nonadecanone	0.714
		9-Heptadecanone	0.498
		10-Nonadecanone	0.241
	Alcohol	n-Pentadecanol	10.040
		Oleyl alcohol	1.575
		Z-(13,14-Epoxy)tetradec-11-en-1-ol acetate	0.745
		1-Heneicosanol	0.069
		Octacosanol	0.780
	Cyclic Hydrocarbon (C ₈ -C ₂₀)	Cyclopropane	4.267
		n-Nonylcyclohexane	1.498
		Cyclohexene	0.511
		Cyclopentane	1.146
		Cyclohexane	0.567
	Hydrocarbon (C ₈ -C ₂₀)	<u>Saturated Hydrocarbon</u>	
		Nonane	1.840
		Undecane	3.944
		Dodecane	1.927
		Tridecane	5.862
		Tetradecane	3.865
		Hexadecane	9.222
		Heptadecane	16.427
		Octadecane	0.751
		<u>Unsaturated Hydrocarbon</u>	
		1-Nonene	0.461
		1-Decene	0.550
		1-Undecene	1.008
		1-Tridecene	1.603
		1-Tetradecene	1.060
		7-Tetradecene	2.347
		9-Octadecene, (E)-	5.638
		1-Pentadecene	2.539
		5-Eicosene, (E)-	0.326
		3-Heptadecene, (Z)-	10.368
		5-Octadecene, (E)-	0.346
		5-Heptadecene	0.412
9-Eicosene, (E)-	0.287		
Ni ₁₀ -Mn ₅ /	Carboxylic acid	Malanoic acid, 2-heptyl tetradecyl ester	0.761

MWCNT	Ketone	2-Pentadecanone	2.950
		3-Octadecanone	0.515
		2-Nonadecanone	0.609
		8-Pentadecanone	0.318
		9-Heptadecanone	0.324
		10-Nonadecanone	0.183
	Alcohol	n-Pentadecanol	8.836
		n-Nonadecanol-1	0.413
		1-Heneicosanol	0.156
		Octacosanol	0.452
	Cyclic Hydrocarbon (C ₈ -C ₂₀)	Furan, 2-butyltetrahydro-	1.352
		Cyclopropane	4.473
		n-Nonylcyclohexane	1.396
		Cyclohexene	0.463
		Bicyclohexyl	0.472
		Cyclohexane	0.592
		Benzene, (1-methyldecyl)-	1.255
	Hydrocarbon (C ₈ -C ₂₀)	<u>Saturated Hydrocarbon</u>	
		Octane	1.031
		Nonane	2.797
		Undecane	4.516
		Dodecane	1.917
		Tridecane	5.500
		Tetradecane	3.080
		Hexadecane	11.149
		Heptadecane	15.967
		Nonadecane	0.645
		<u>Unsaturated Hydrocarbon</u>	
		1-Nonene	0.690
		1-Decene	0.725
		2-Decene, (E)-	0.494
		1-Undecene	1.082
		1-Tridecene	0.826
		1-Tetradecene	0.956
		9-Octadecene, (E)-	6.071
		1-Pentadecene	4.342
		5-Octadecene, (E)-	0.634
		5-Eicosene, (E)-	1.102
		3-Heptadecene, (Z)-	8.544
		5-Octadecene, (E)-	0.402
		5-Heptadecene	0.712
		9-Octadecene, (E)-	0.243
	Heavy	1-Docosene	0.203

	Hydrocarbon (C ₂₁ -C ₂₄)		
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List of Supplementary Data

Fig. S1. TGA profile for the MWCNT and MWCNT supported catalysts.

Fig. S2. (a) TPD-NH₃ analysis and (b) TPD-CO₂ profile for the MWCNT and MWCNT supported catalysts.

Fig. S3. X-ray diffraction for (a) Ni-Mg_n/MWCNT (b) Ni-Mn_n/MWCNT with different Mg and Mn concentration (n=5-20 wt %).

Fig. S4. TPD-NH₃ analysis of (a) Ni-Mg_n/MWCNT (b) Ni-Mn_n/MWCNT and TPD-CO₂ (c) Ni-Mg_n/MWCNT (d) Ni-Mn_n/MWCNT with different Mg and Mn concentration (n=5-20 wt %).

Fig. S5. TGA for fresh and spent (a) Ni₁₀-Mg₁₅/MWCNT and (b) Ni₁₀-Mn₅/MWCNT catalysts.

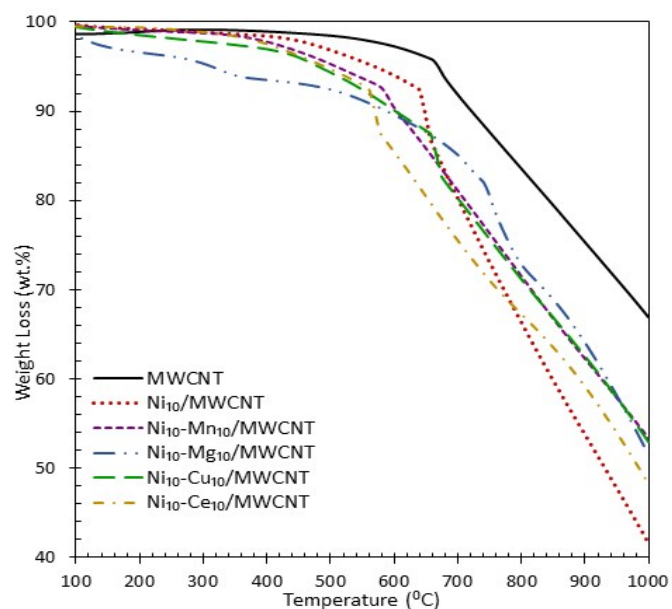


Fig. S1. TGA profile for the MWCNT and MWCNT supported catalysts.

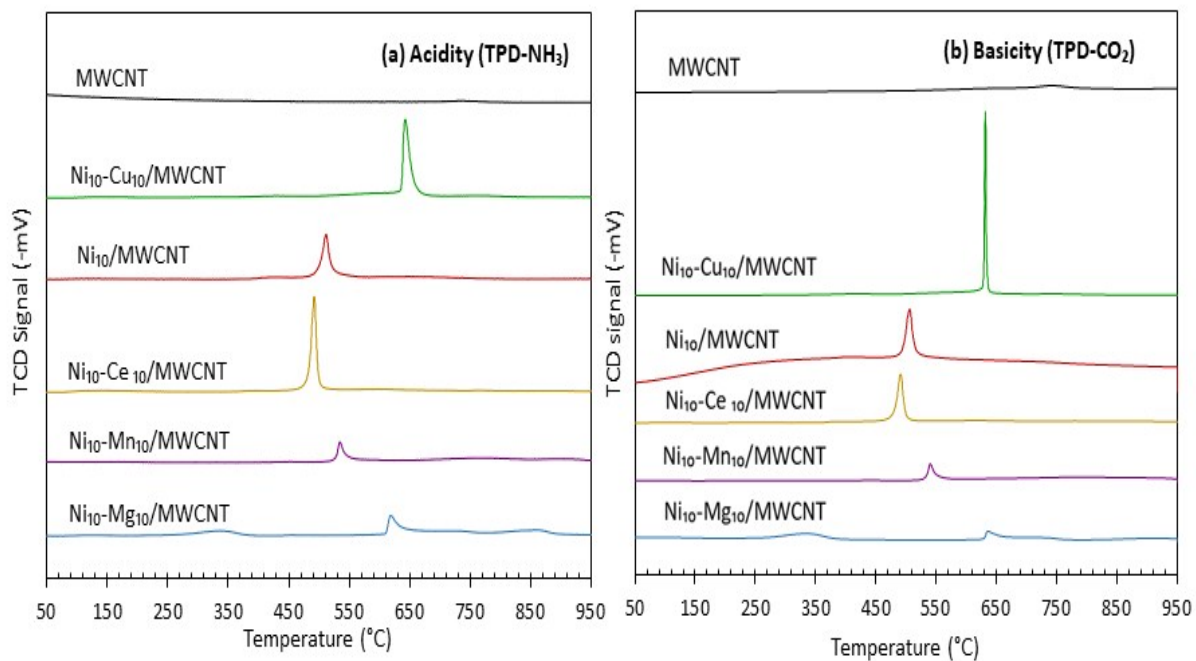


Fig. S2. (a) TPD-NH₃ analysis and (b) TPD-CO₂ profile for the MWCNT and MWCNT supported catalysts.

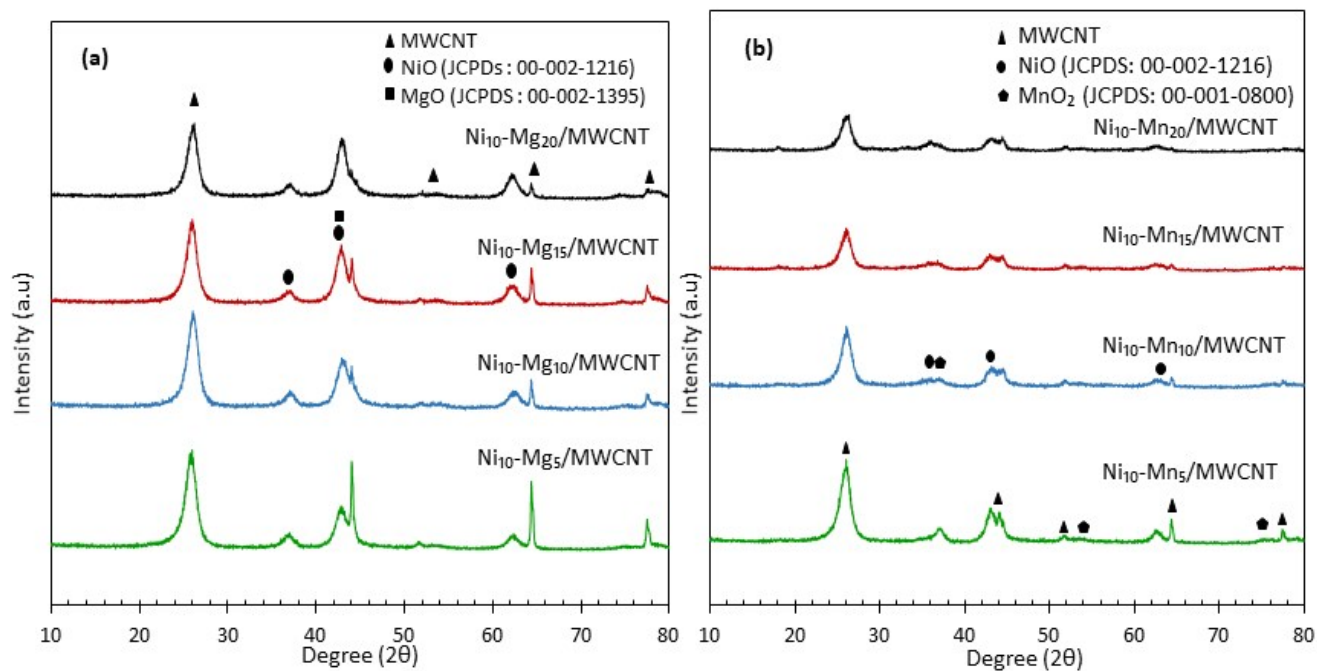


Fig. S3. X-ray diffraction for (a) Ni-Mg_n/MWCNT (b) Ni-Mn_n/MWCNT with different Mg and Mn concentration (n=5-20 wt %).

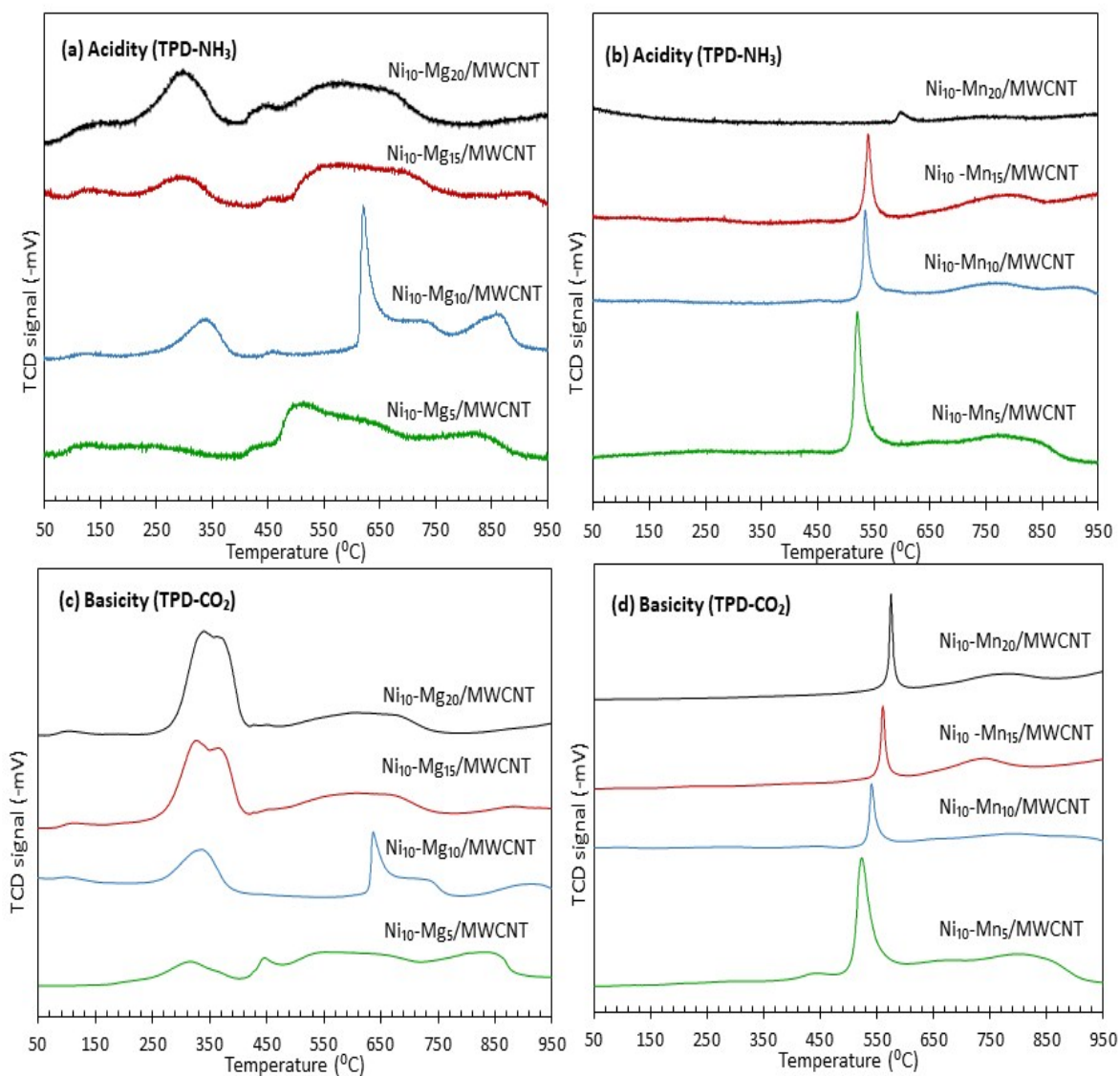


Fig. S4 .TPD-NH₃ analysis of (a) Ni-Mg_n/MWCNT (b) Ni-Mn_n/MWCNT and TPD-CO₂ (c) Ni-Mg_n/MWCNT (d) Ni-Mn_n/MWCNT with different Mg and Mn concentration (n=5-20 wt %).

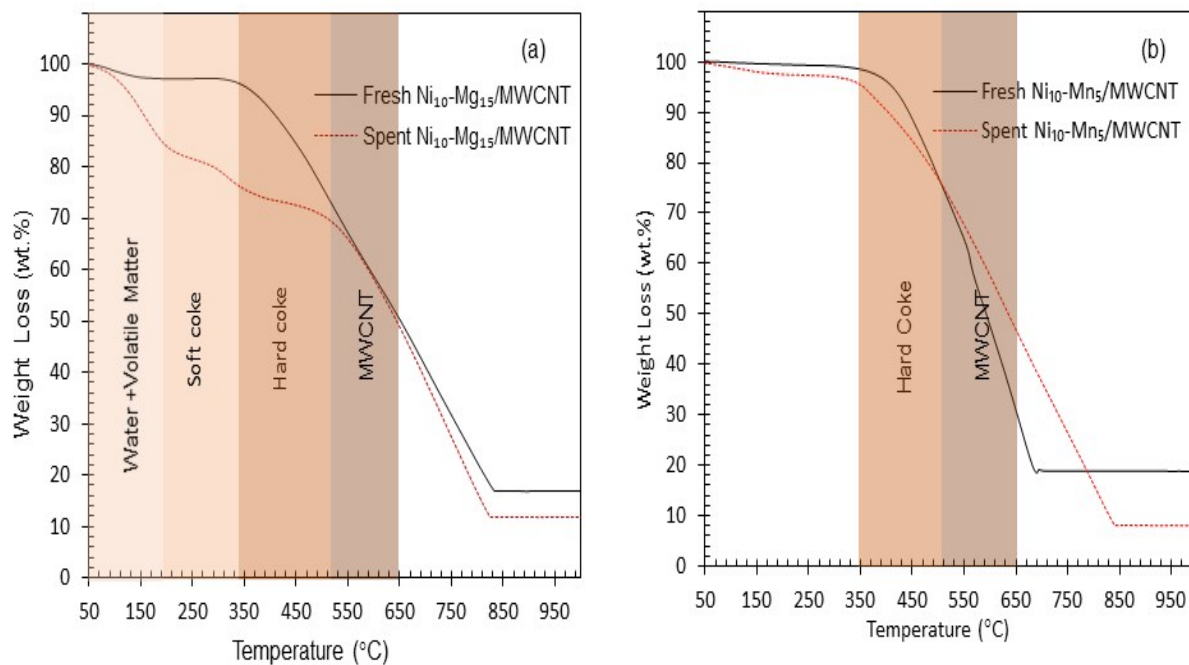


Fig S5. TGA for fresh and spent (a) Ni₁₀-Mg₁₅/MWCNT and (b) Ni₁₀-Mn₅/MWCNT catalysts.