

*Supporting information for*

**Knitting an oxygenated network-coat on carbon nanotubes from  
biomass and their applications in catalysis**

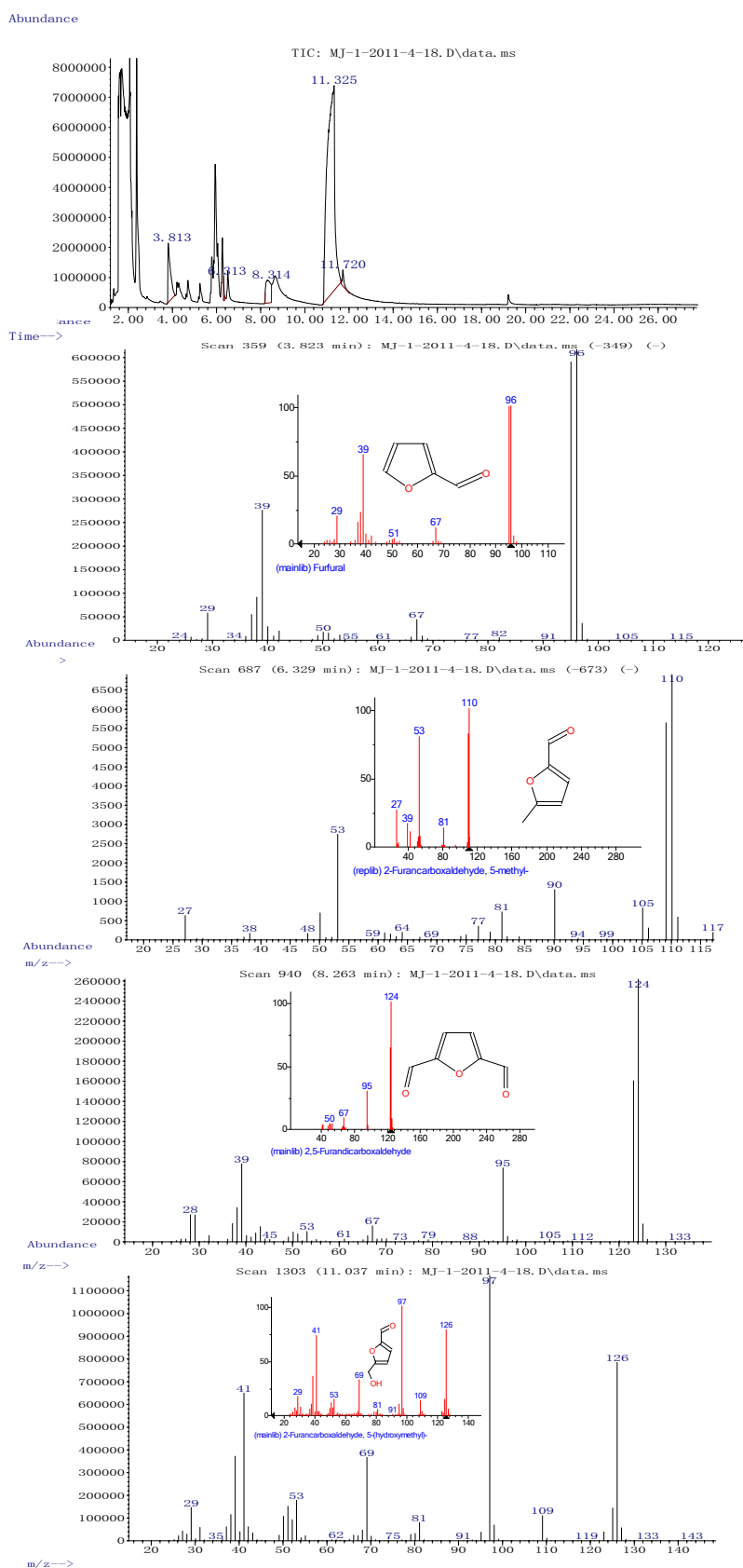
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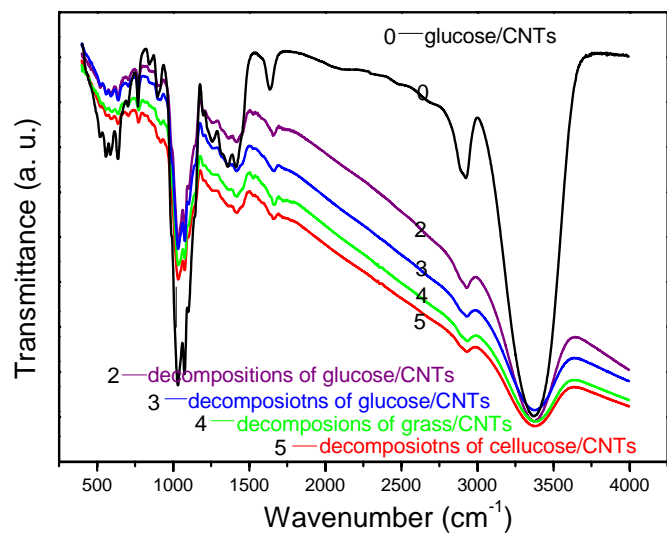
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**Fig. S1** GC-MS analysis of bio-chemicals derived from hydrothermal treatment of biomass. Some quoted furfural aromatic compounds were well characterized.



**Fig. S2** FTIR spectra of biomass/CNTs and (decompositions of biomass)/CNTs. The number of curve corresponds to the curve in text, including the experimental conditions.

**Table S1** Comparison of the catalytic activity of Ru catalysts in selective hydrogenation of citral.

Catalyst	Time (h)	Conv. (%)	TOF (h <sup>-1</sup> ) <sup>[a]</sup>	Selectivity (%)				
				CAL	COL	G&N	DCOL	others
1.5 wt% Ru/f-CNTs	1.5	89	400	5	21	74	0	0
Recycle 1#	1.5	85	382	7	18	75	0	0
Recycle 2#	1.5	84	377	4	20	76	0	0
<sup>[b]</sup> Recycle 3#	1.5	81	364	8	19	73	0	0
1.2 wt% Ru/CNTs	1.5	52	292	23	15	62	0	0
Recycle 1#	1.5	49	275	21	19	60	0	0
Recycle 2#	1.5	47	264	19	23	58	0	0
<sup>[b]</sup> Recycle 3#	1.5	43	241	17	23	60	0	0
<sup>[c]</sup> CNTs	1.5	0	0	0	0	0	0	0
<sup>[c]</sup> f-CNTs	1.5	0	0	0	0	0	0	0
5 wt% Ru/C (commercial)	2	82	83	1	32	37	20	11

[a] TOF = (moles of citral conversion)/(total moles of Ru)/time. Reaction conditions: citral 2 mmol, water 5 mL, catalysts 20 mg, temperature 80 °C, H<sub>2</sub> 4 MPa.

[b] The results of ICP-AES confirm that no metal was leached from the support of f-CNTs or CNTs even the catalyst experienced four times recycle reaction.

[c] The catalysts of blank CNTs and f-CNTs have no catalytic activity in the hydrogenation of citral.