Electronic Supplementary Material (ESI) for RSC Advances.

A novel poly (p-styrenesulfonic acid) grafted carbon nanotube/graphene oxide architecture with enhanced catalytic performance on synthesis of benzoate esters and fatty acid alkyl esters

Gang Bian,[a] Pingping Jiang,*[a] Weijie Zhang,[a] Kelei Jiang,[b]
Ling Hu,[a] Zhang Jian,[c] Yirui Shen,[a] and Pingbo Zhang[a]

*E-mail addresses: ppjiang@jiangnan.edu.cn (P. Jiang).

Tel / Fax: 86-13506196132/86-0510-85913617

[a]The Key Laboratory of Food Colloids and Biotechnology, School of Chemical and Material Engineering, Jiangnan University, Wuxi 214122, P.R. China. E-mail: ppjiang@jiangnan.edu.cn

[b]Wuxi WeiFu Lida Catalytic Converter CO., LTD, Wuxi 214177, P.R. China.

[c]School of Chemistry and Environmental Science, Lanzhou City University, Lanzhou 730000, P.R. China.

1. Characterization of GO

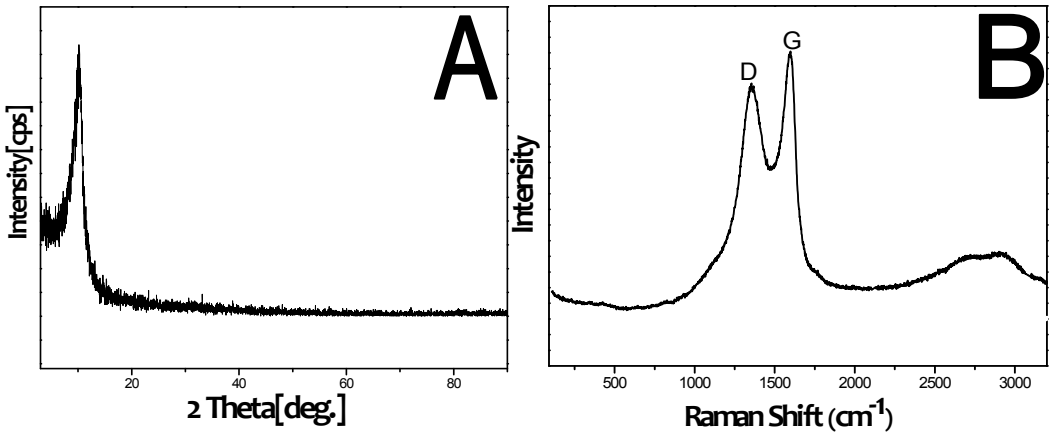

Fig.S1.(A) XRD patterns of the freezing dryed GO.
(B) Raman curves of the freezing dryed GO.

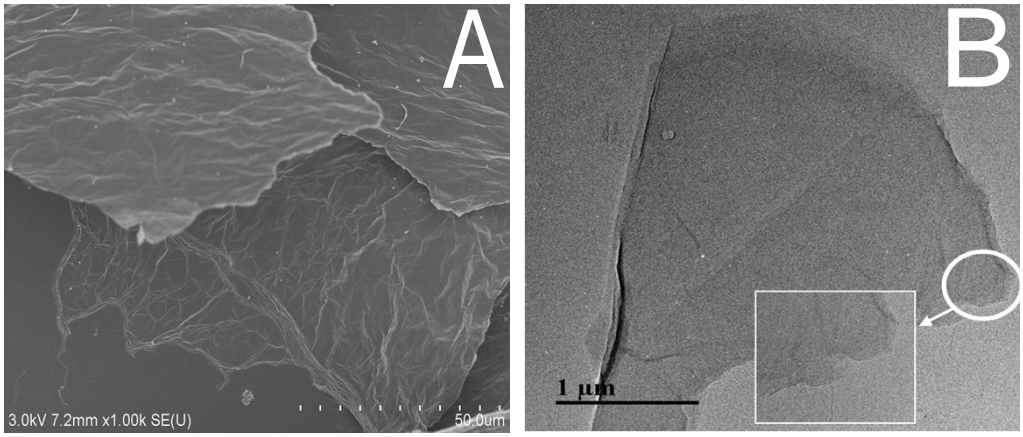

Fig.S2. SEM (A) and TEM (B) images of self-prapared GO

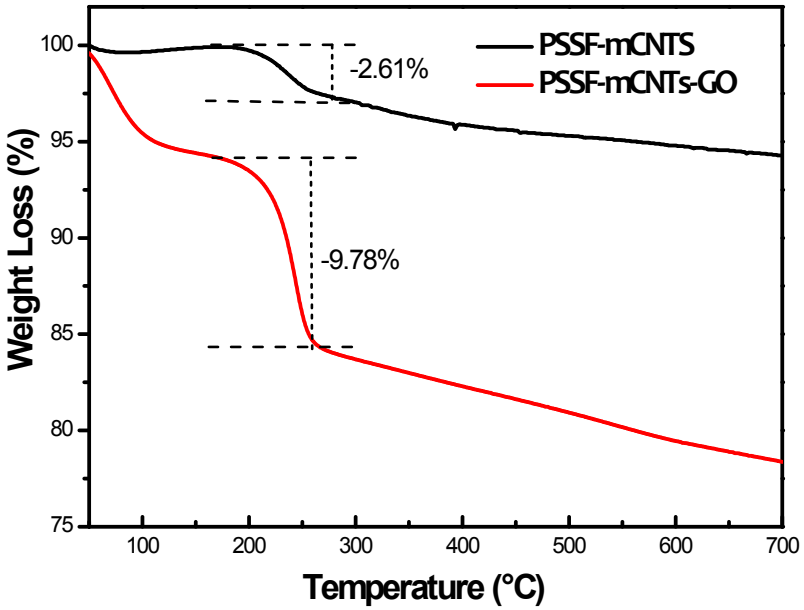

Fig. S4 TG curves for PSSF-mCNTs and PSSF-mCNTs-GO

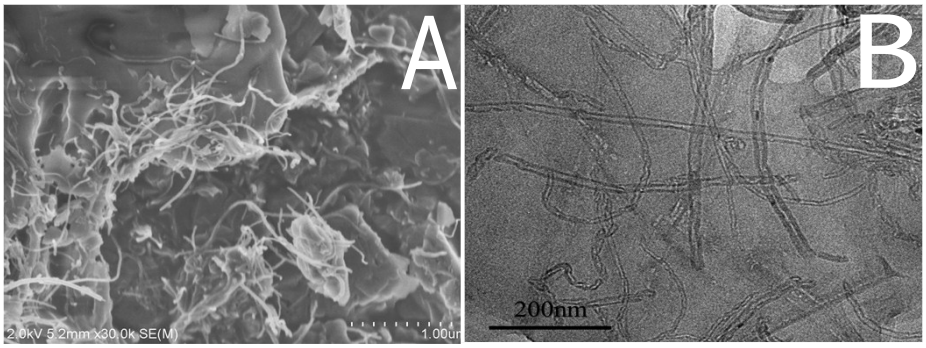

Fig. S5 (A) SEM image of PSSF-mCNTs-GO (recycled);
(B) TEM image of PSSF-mCNTs-GO (recycled);

Table.S1 Esterification reaction of different acids with alcohols catalyzed by PSSF-mCNTs-GO and PSSF-mCNTs[a]

Entry	Substrate(alcohol)	Substrate(acid)	Catalyst	conversion
1	n-butyl alcohol	acetic acid	PSSF-mCNTs	55.58%
2			PSSF-mCNTs-GO	**70.15%**
3		lauric acid	PSSF-mCNTs	53.60%
4			PSSF-mCNTs-GO	**81.13%**
5		stearic acid	PSSF-mCNTs	**55.14%**
6			PSSF-mCNTs-GO	**83.15%**
7		benzoic acid	PSSF-mCNTs	**40.68%**
8			PSSF-mCNTs-GO	**90.27%**
9	sec-butyl alcohol	acetic acid	PSSF-mCNTs	48.27%
10			PSSF-mCNTs-GO	65.16%
11		lauric acid	PSSF-mCNTs	57.16%
12			PSSF-mCNTs-GO	**70.38%**
13		stearic acid	PSSF-mCNTs	62.37%
14			PSSF-mCNTs-GO	**75.17%**
15		benzoic acid	PSSF-mCNTs	72.18%
16			PSSF-mCNTs-GO	41.69%
17	tert-butyl alcohol	acetic acid	PSSF-mCNTs	56.63%
18			PSSF-mCNTs-GO	60.28%
19		lauric acid	PSSF-mCNTs	78.34%
20			PSSF-mCNTs-GO	**80.16%**
21		stearic acid	PSSF-mCNTs	**80.16%**
22			PSSF-mCNTs-GO	**84..10%**
23		benzoic acid	PSSF-mCNTs	37.37%
24			PSSF-mCNTs-GO	68.27%
25	1-octyl alcohol	acetic acid	PSSF-mCNTs	56.39%
26			PSSF-mCNTs-GO	82.58%
27		lauric acid	PSSF-mCNTs	55.77%
28			PSSF-mCNTs-GO	90.25%
29		stearic acid	PSSF-mCNTs	58.39%
30			PSSF-mCNTs-GO	**95.63%**
31		benzoic acid	PSSF-mCNTs	49.26%
32			PSSF-mCNTs-GO	91.53%
33	benzyl alcohol	acetic acid	PSSF-mCNTs	55.27%
34			PSSF-mCNTs-GO	75.38%
35		lauric acid	PSSF-mCNTs	**40.26%**
36			PSSF-mCNTs-GO	**82.93%**
37		stearic acid	PSSF-mCNTs	**47.28%**
38			PSSF-mCNTs-GO	**92.16%**
39		benzoic acid	PSSF-mCNTs	13.78%
40			PSSF-mCNTs-GO	43.67%

[a] Reaction conditions: temperature(120℃), acid: alcohol (mol, 1:4), catalyst amount (2 wt%), reaction time(10h).

Table.S2 ICP analysis of fresh and recycled PSSF-mCNTs-GO

Element / Catalyst	C (%)	O (%)	S (%)	H (%)
PSSF-mCNTs-GO (fresh)	74.52	17.26	7.13	0.87
PSSF-mCNTs-GO (recycled)	73.97	18.02	7.05	0.75