

SUPPORTING INFORMATION

Size Control to a Sub-Nanometer Scale in

Platinum Catalysts on Graphene

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Figure 1S shows HRTEM images of GNS, where the graphene nanosheets (GNS) are imaged to consist of single or a few layers of GNS.

Figure 2S shows the TG/DTA thermograms for 10–70 wt % Pt/GNS and 20 and 40 wt % Pt/CB commercial catalysts. It indicates that all the Pt atoms in the catalyst precursors are included in the Pt/GNS catalysts.

Figure 3S shows TEM images and histograms of 10–70 wt % Pt/GNS. It indicates that larger Pt particles (> 10 nm) are present on 55–70 wt % Pt/GNS catalysts.

Figure 4S shows the average Pt particle size estimated by TEM as a function of the loading of Pt. It is clearly shown that the average particle size of Pt linearly increases with increasing amount of Pt.

Table 1S shows atomic ratio of 10–70 wt % Pt/GNS and 20 and 40 wt % Pt/CB commercial catalysts estimated by XPS measurement.

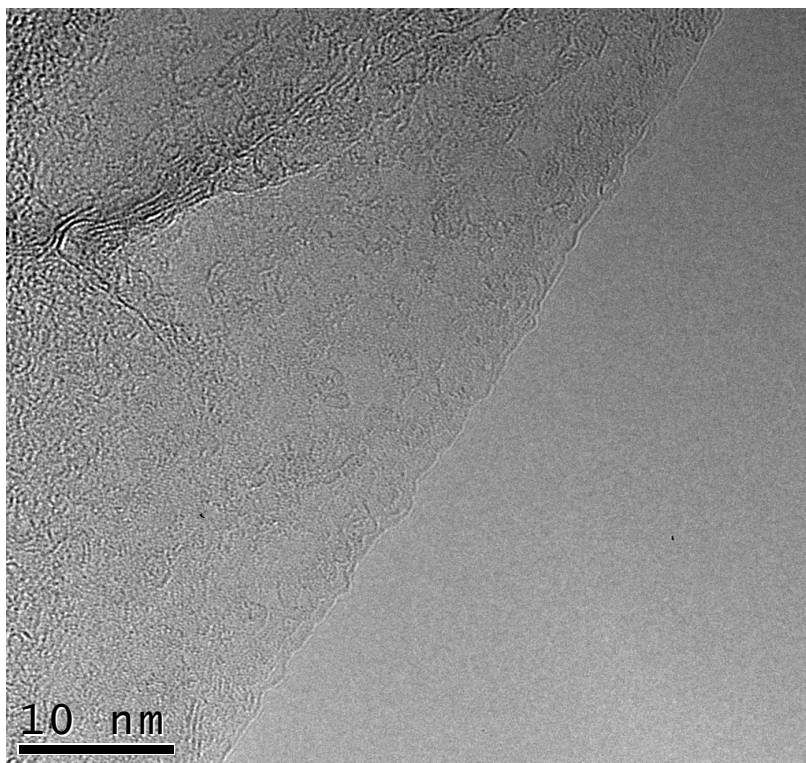
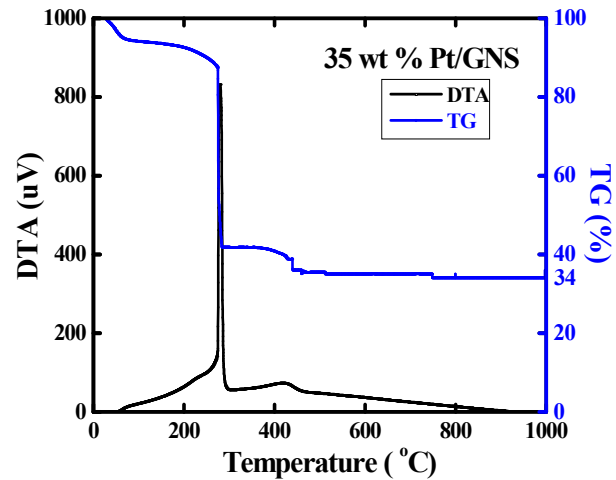
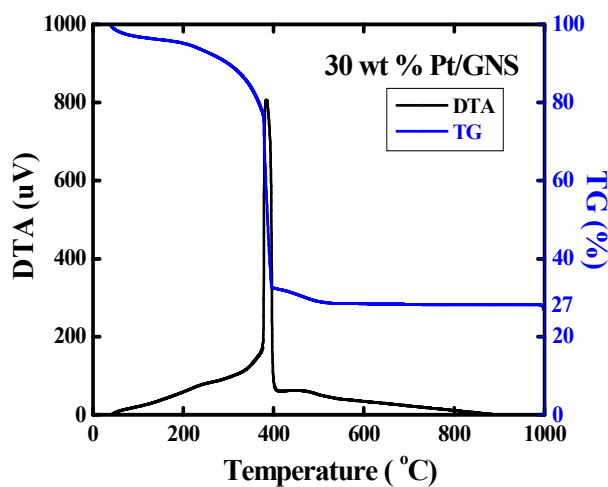
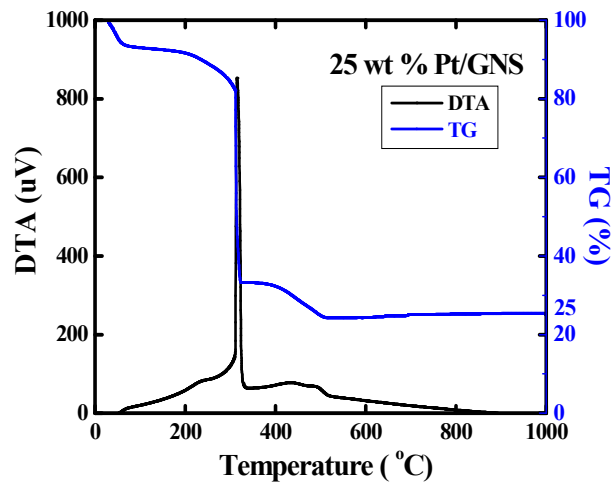
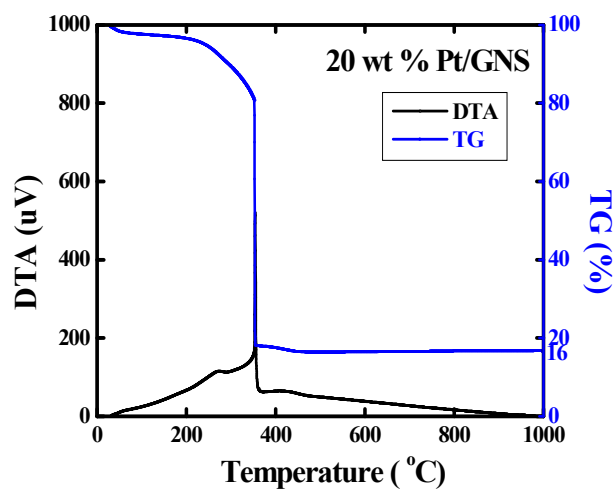
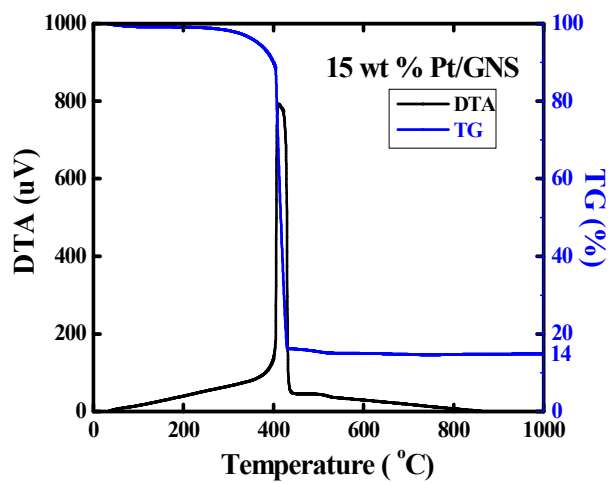
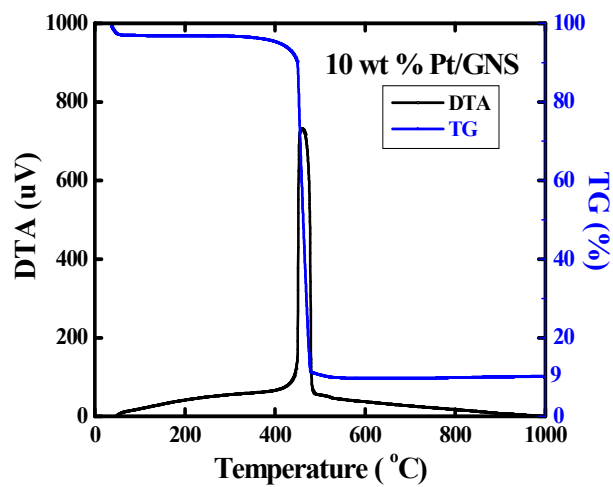
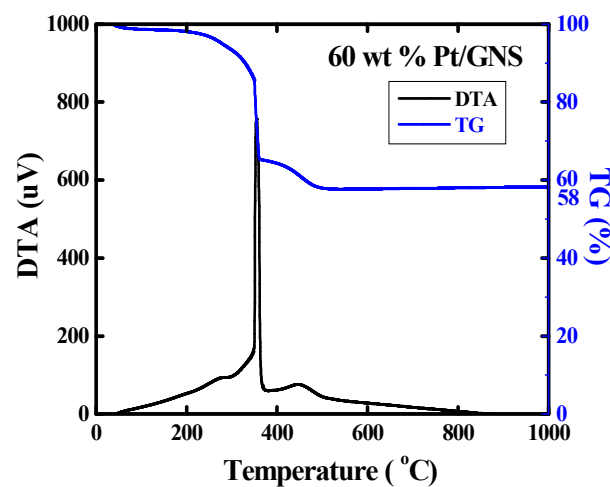
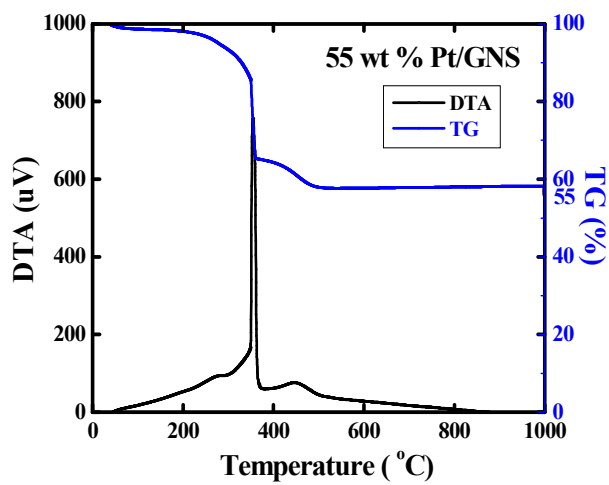
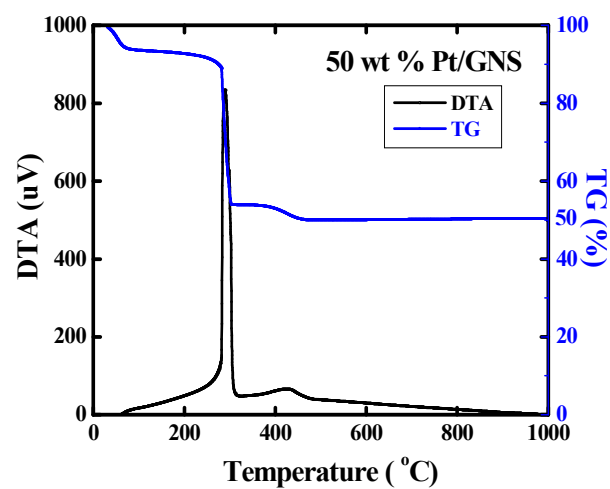
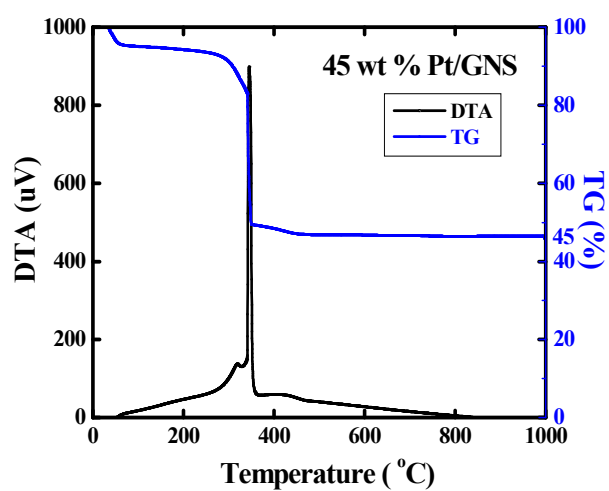
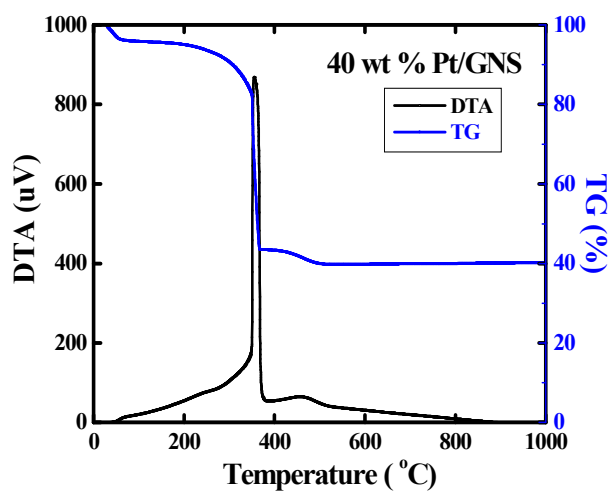


Figure 1S. HRTEM images of GNS.





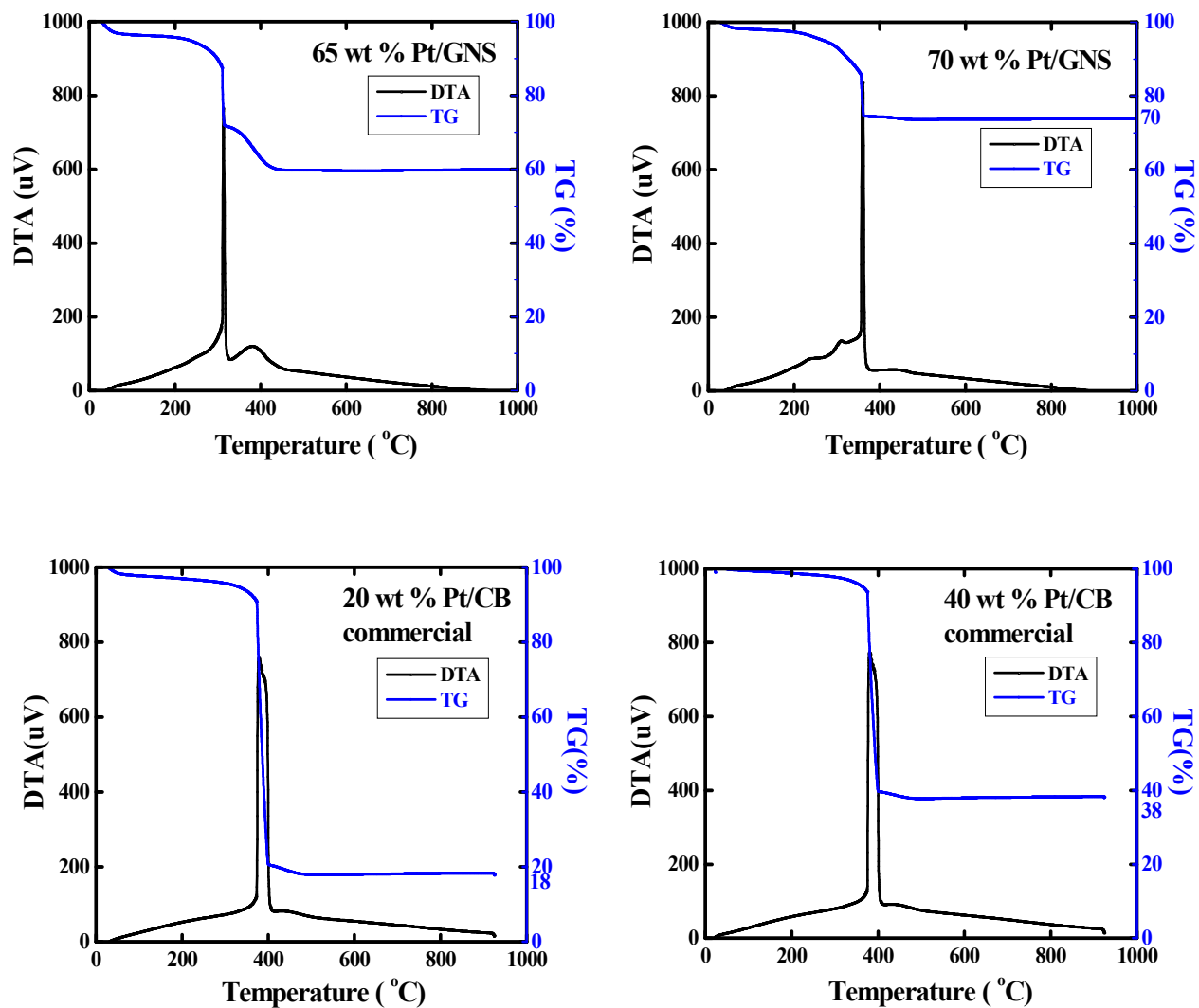


Figure 2S. TG/DTA thermograms for 10–70 wt % Pt/GNS and 20 and 40 wt % Pt/CB commercial catalysts.

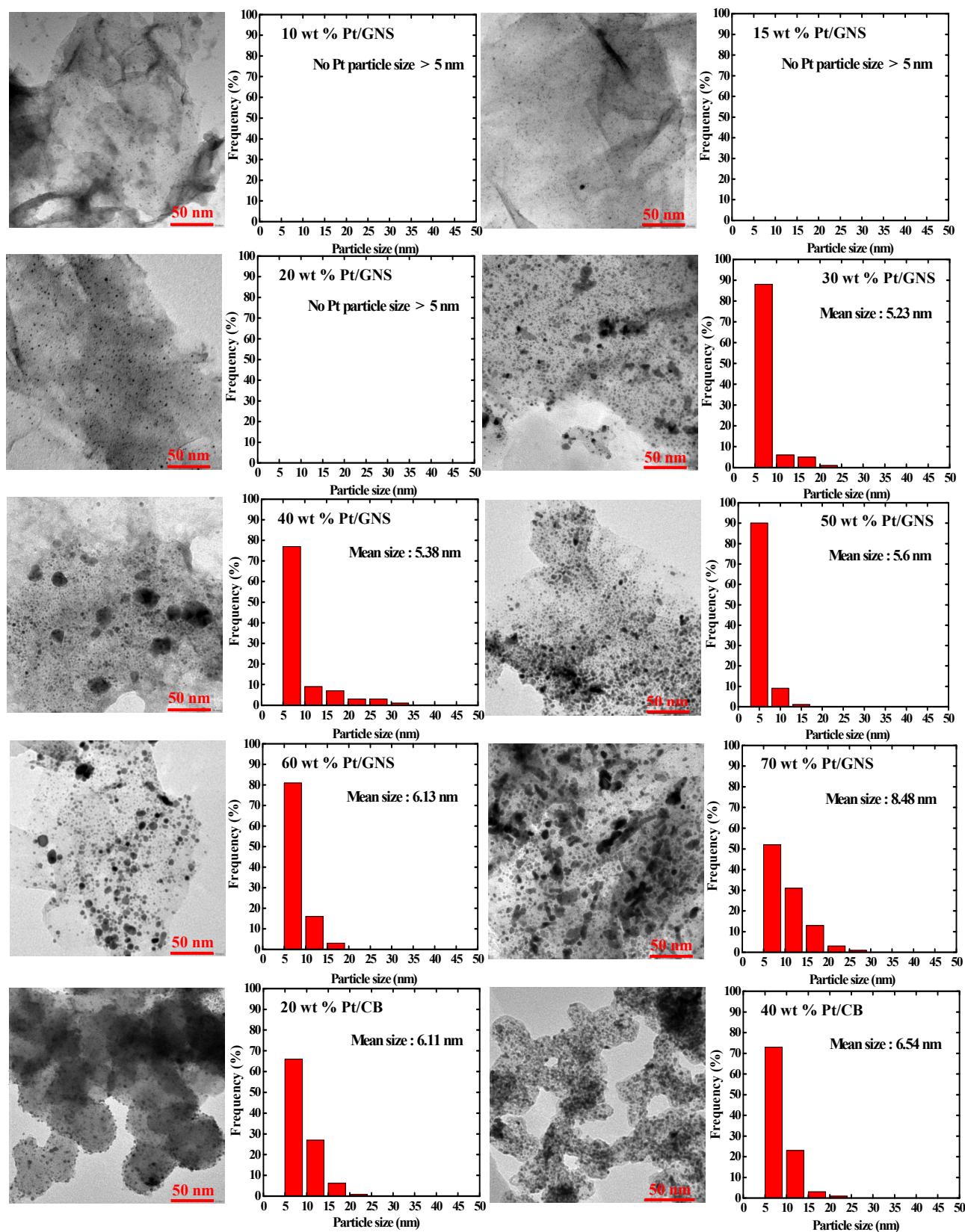


Figure 3S. TEM images and histograms of 10–70 wt % Pt/GNS. The results for 20 and 40 wt % Pt/CB commercial catalysts are also shown.

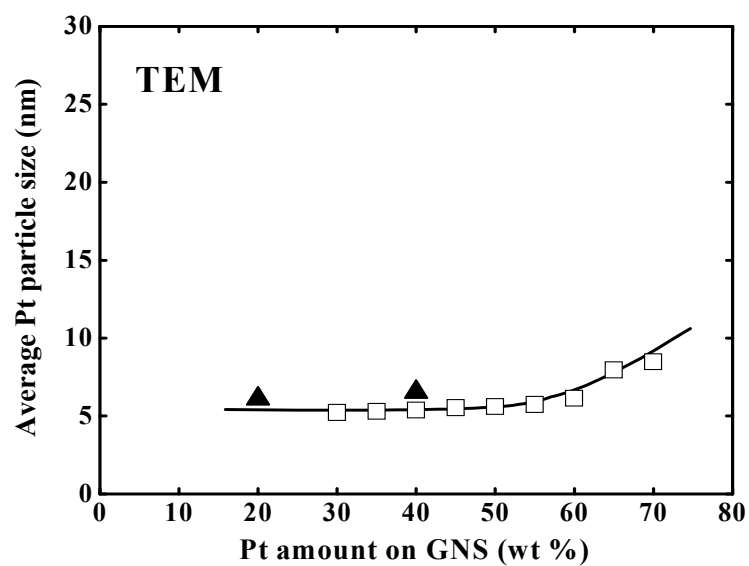


Figure 4S. Average Pt particle size (nm) estimated by TEM versus Pt amount on GNS (□). The results for 20 and 40 wt % Pt/CB commercial catalysts (▲) are also shown.

Table 1S. Atomic ratio of samples (XPS measurement)

Samples	C (%)	O (%)	Pt (%)	C/Pt	Pt/C
10 wt % Pt/GNS	62.9	33.6	2.4	26.2	0.04
15 wt % Pt/GNS	56.2	32.2	3.6	15.6	0.06
20 wt % Pt/GNS	55.5	32.6	3.9	14.2	0.07
25 wt % Pt/GNS	63.3	32.7	4.0	15.8	0.06
30 wt % Pt/GNS	59.6	35.8	4.6	12.9	0.08
35 wt % Pt/GNS	59.2	35.9	4.9	17.5	0.05
40 wt % Pt/GNS	59.2	35.8	4.9	12.1	0.08
45 wt % Pt/GNS	59.0	35.8	5.2	11.3	0.08
50 wt % Pt/GNS	53.1	34.5	5.4	9.8	0.10
55 wt % Pt/GNS	57.8	36.4	5.7	10.1	0.09
60 wt % Pt/GNS	57.5	36.4	6.1	9.4	0.11
65 wt % Pt/GNS	57.9	35.9	6.2	9.3	0.11
70 wt % Pt/GNS	56.8	36.5	6.7	8.5	0.12
20 wt % Pt/CB commercial	61.9	33.9	4.2	14.7	0.06
40 wt % Pt/CB commercial	60.2	35.0	4.8	12.5	0.08