Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Effect of Size and Oxidation State of Platinum Nanoparticle on Electrocatalytic Performance of Graphene-Nanoparticle Composite

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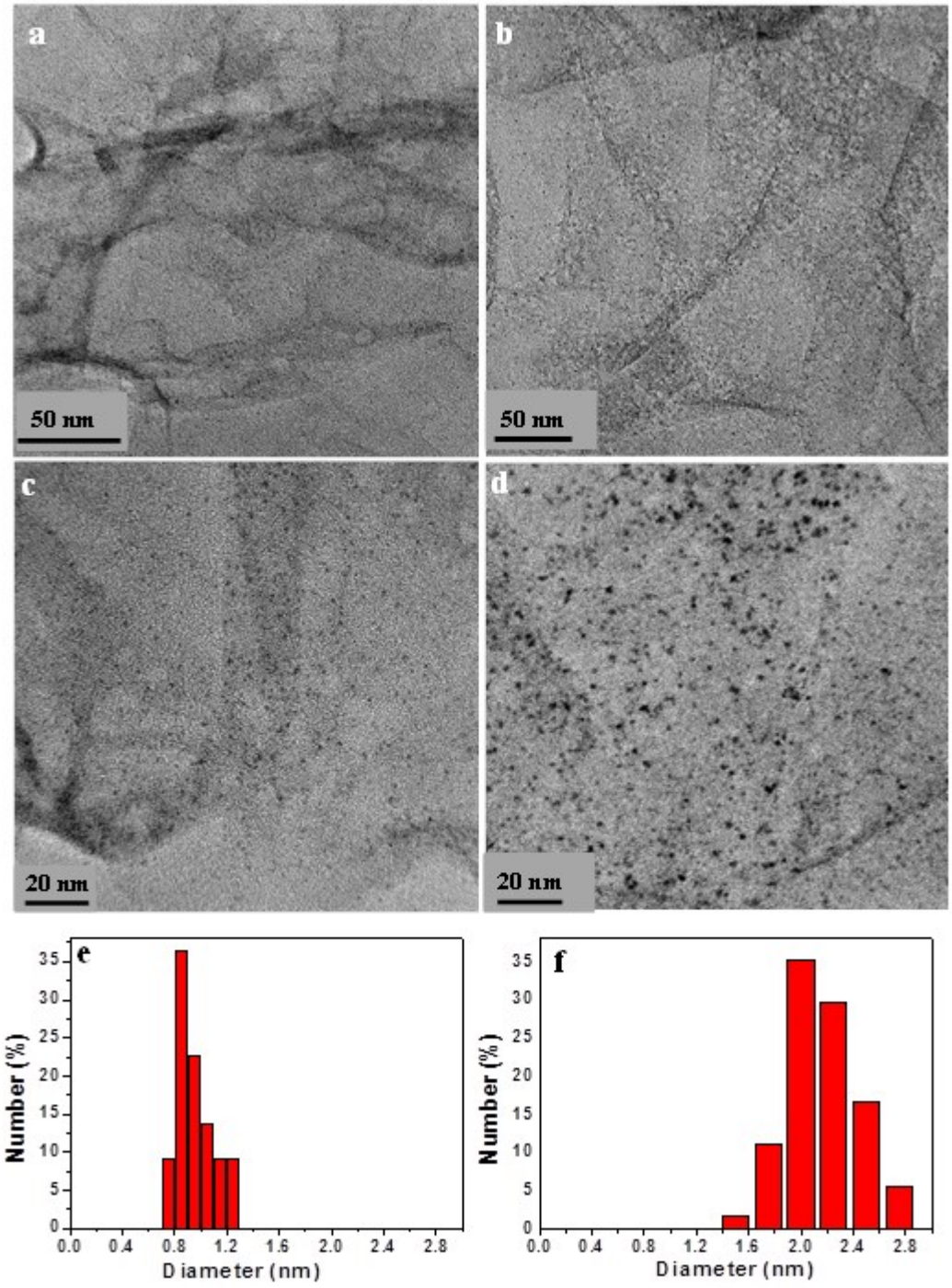

Figure S1. TEM image and corresponding size distribution histograms of Pt nanoparticles present in PtGN composites (prepared under conditions similar to PtGN-1) which are prepared by 12 hrs reaction (a,c,e) and 24 hrs reaction (b,d,f) with average size of 0.95 nm and 2 nm, respectively.

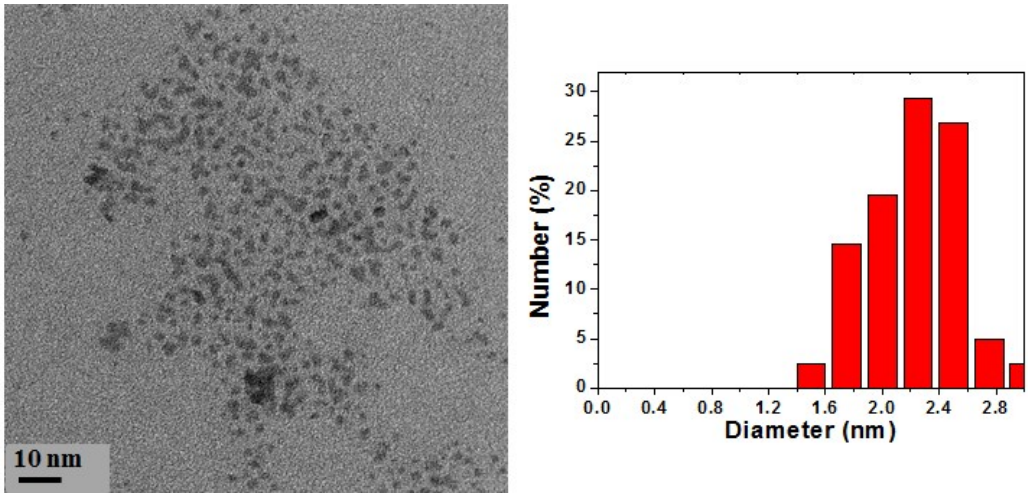

Figure S2. TEM image and size distribution histogram of platinum oxide nanocrystal of average size 2.2 nm that is used for preparation of PtGN-2.

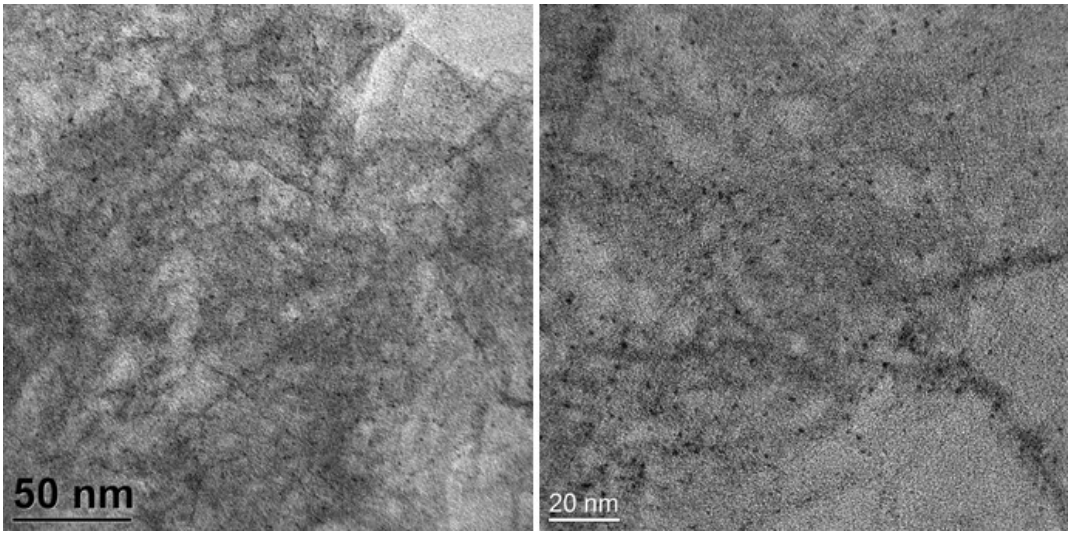

Figure S3. Additional TEM image of PtGN-1 at different magnifications.

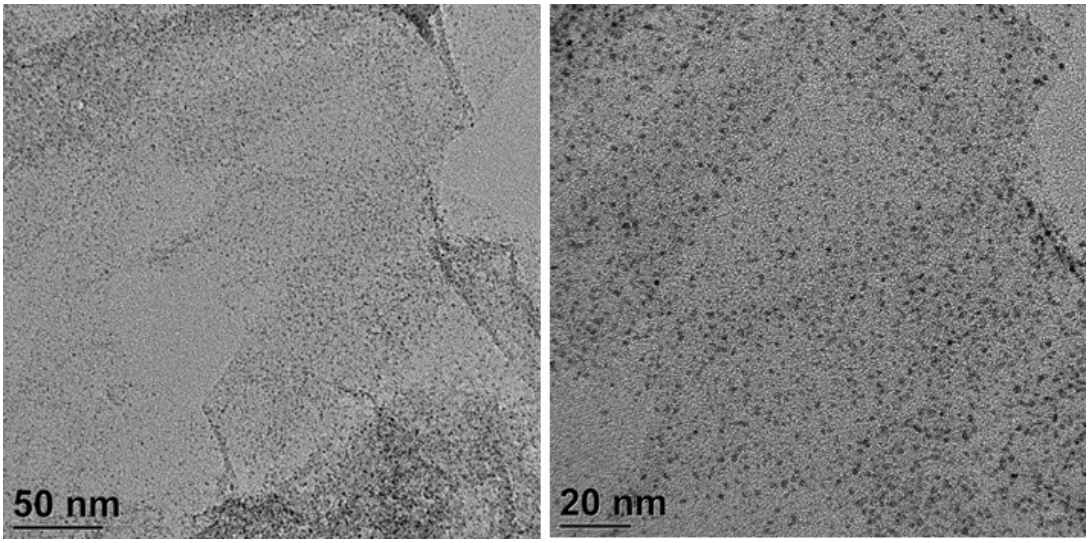

Figure S4. Additional TEM image of PtGN-2 at different magnifications.

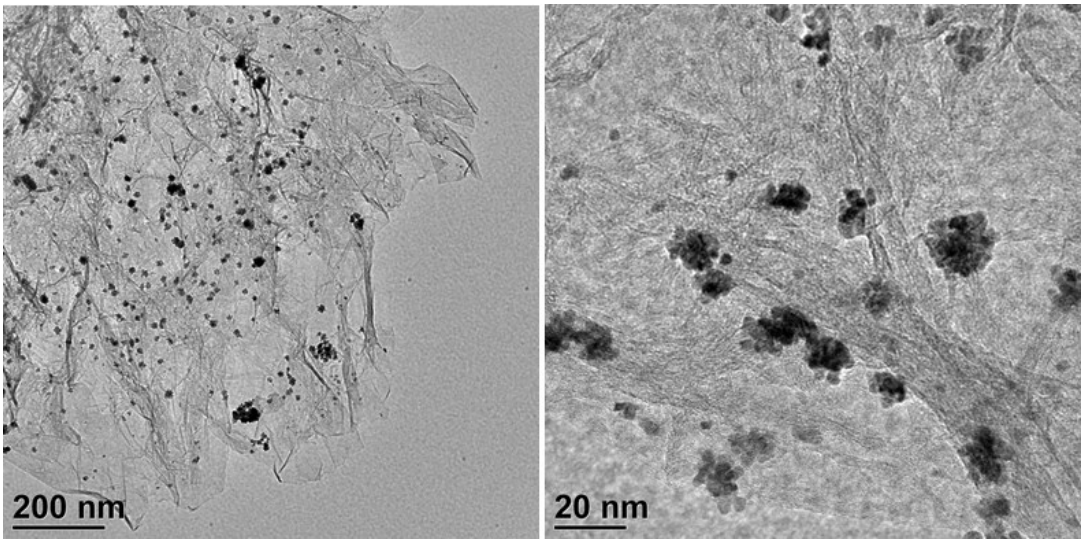

Figure S5. Additional TEM image of PtGN-3 at different magnifications.

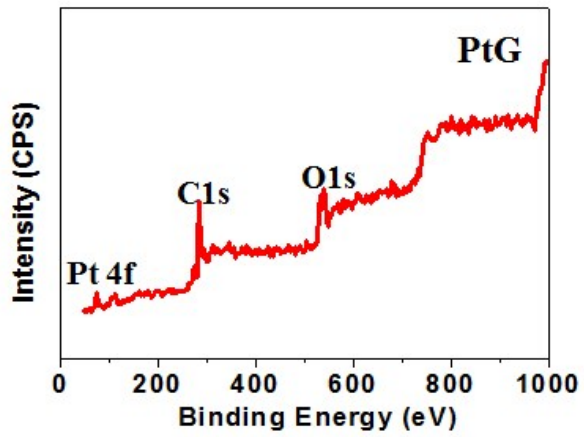

Figure S6. The full raw XPS spectra of PtGN-1 showing position of different elements in terms of binding energy.

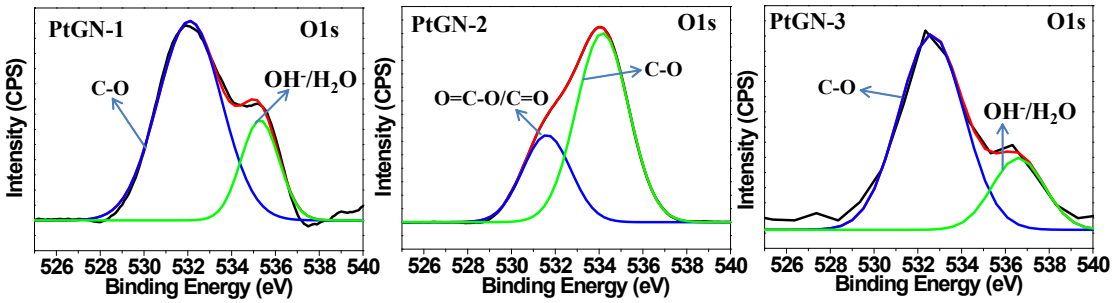

Figure S7. The deconvoluted XPS characterization of O1s spectra of PtGN-1, PtGN-2 and PtGN-3 showing position of different nature of O present in terms of binding energy.

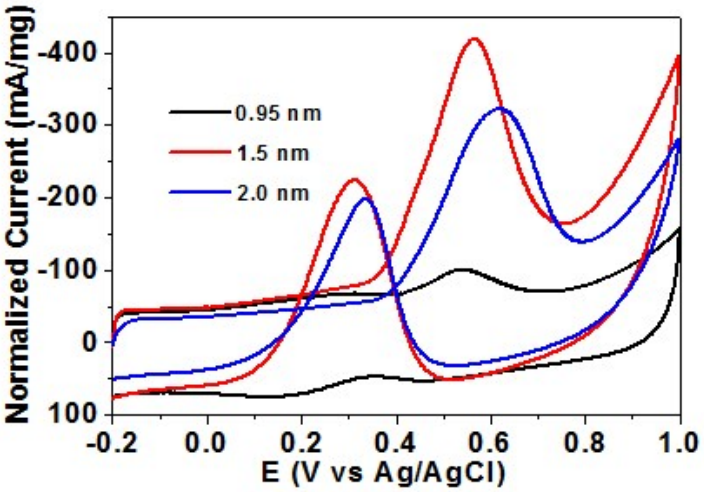

Figure S8. Electrocatalytic oxidation of methanol by PtGN nanocomposites with Pt size of 0.95 nm, 1.5 nm and 2.0 nm. In each case glassy carbon electrode is modified with nanocomposites and then oxidation of 1 M methanol in 0.5 M H_2SO_4 is performed at a scan rate of 50 mV/s. The current density shown in the CVs are normalized by the respective mass of Pt loading.

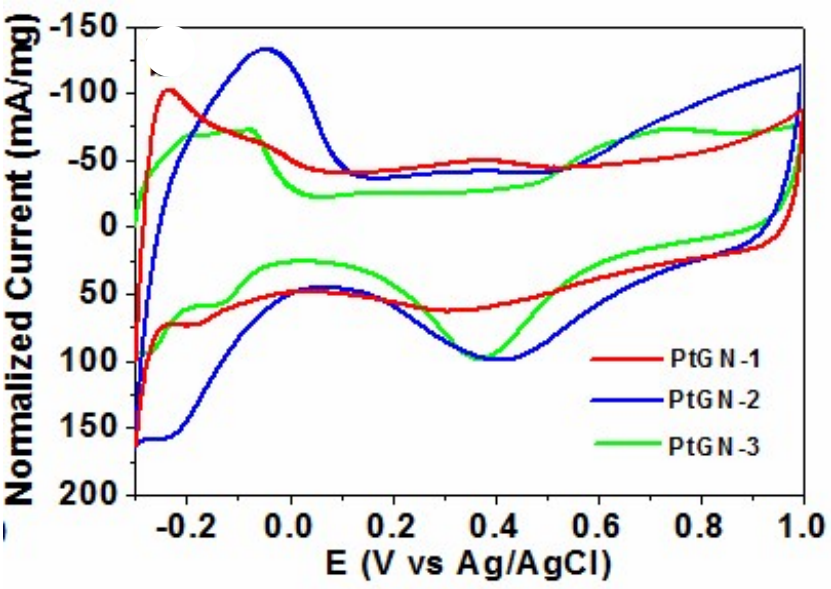

Figure S9. Electrochemically active surface area (ECSA) measurement for three nanocomposites. It is measured at 0.5 M H_2SO_4 with 50 mVs^{-1}scan rate in between the potential range of 0.1 V to-0.3 V (vs Ag/AgCl). The potential range considered for PtGN-1, PtGN-2 and PtGN-3 are -0.3 V to 0.07 V, -0.3 V to 0.142 V and -0.3 V to 0.44 V, respectively.