Supporting Information For

Polymer Brush Stabilized Amorphous MnO_2 on Graphene Oxide Sheets for as Novel Electrode Materials for High Performance Supercapacitor

Bowen Zhang, Bo Yu, Feng Zhou*, Weimin Liu*

[a]State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou 730000, China

Graduate School, Chinese Academy of Sciences, Beijing 100039, China

Table of contents

Part Ⅰ: More structure characterizations for GOPM

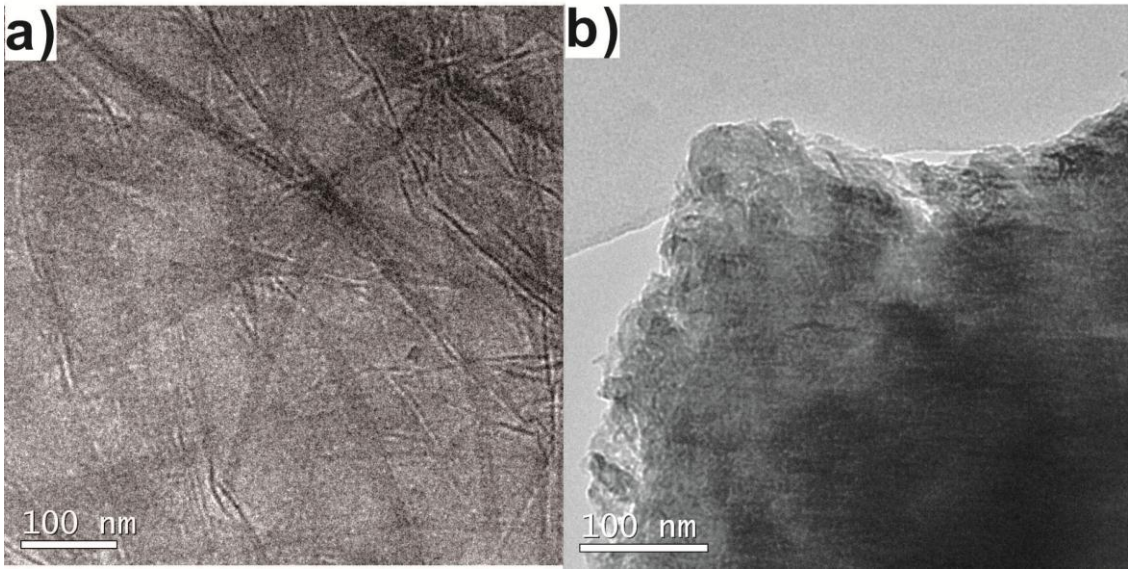

Figure S1. TEM image of the as-obtained a) GOP and b) GP.

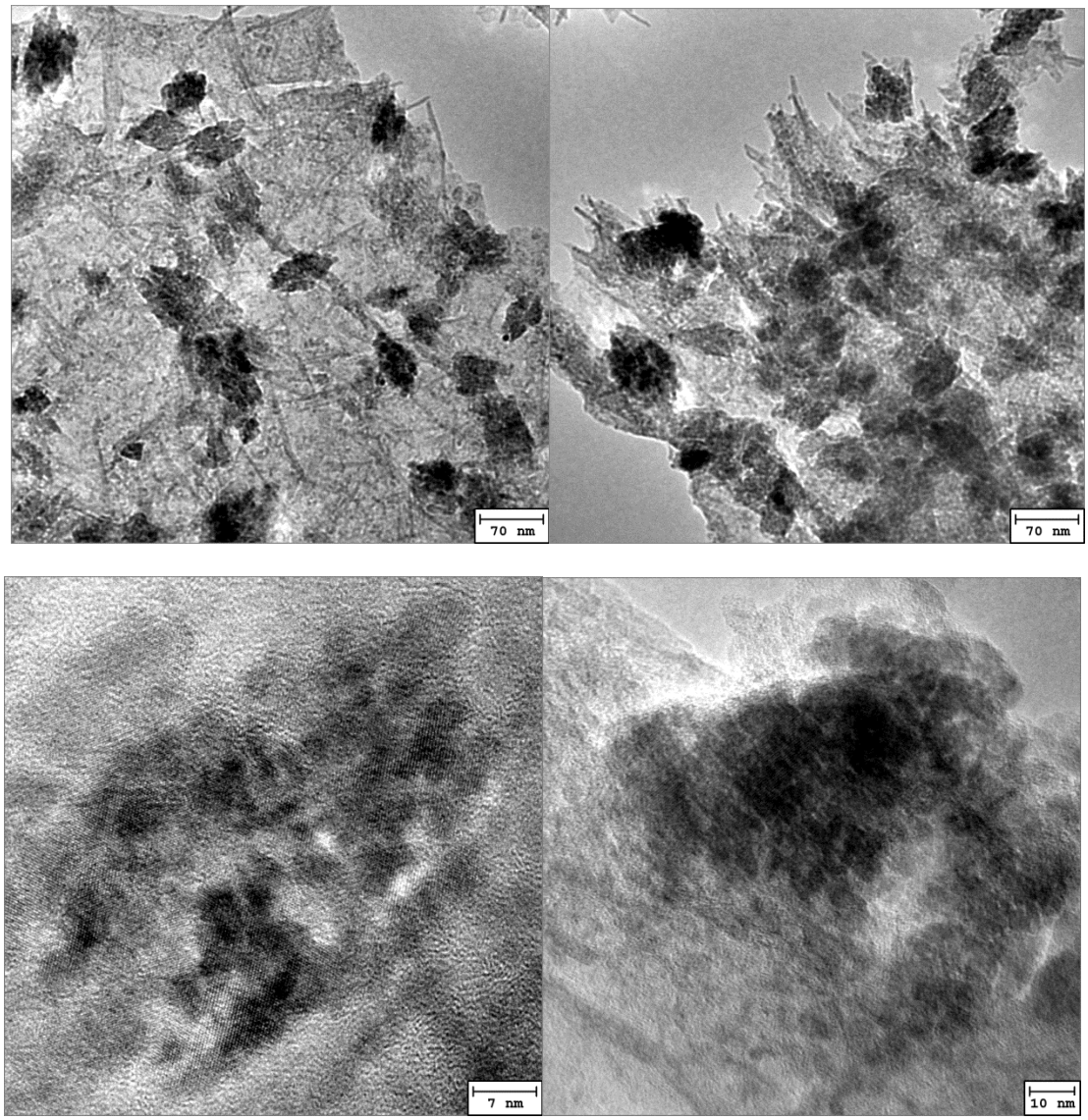

Figure S2. Enlarged TEM image of the as-obtained GOPM.

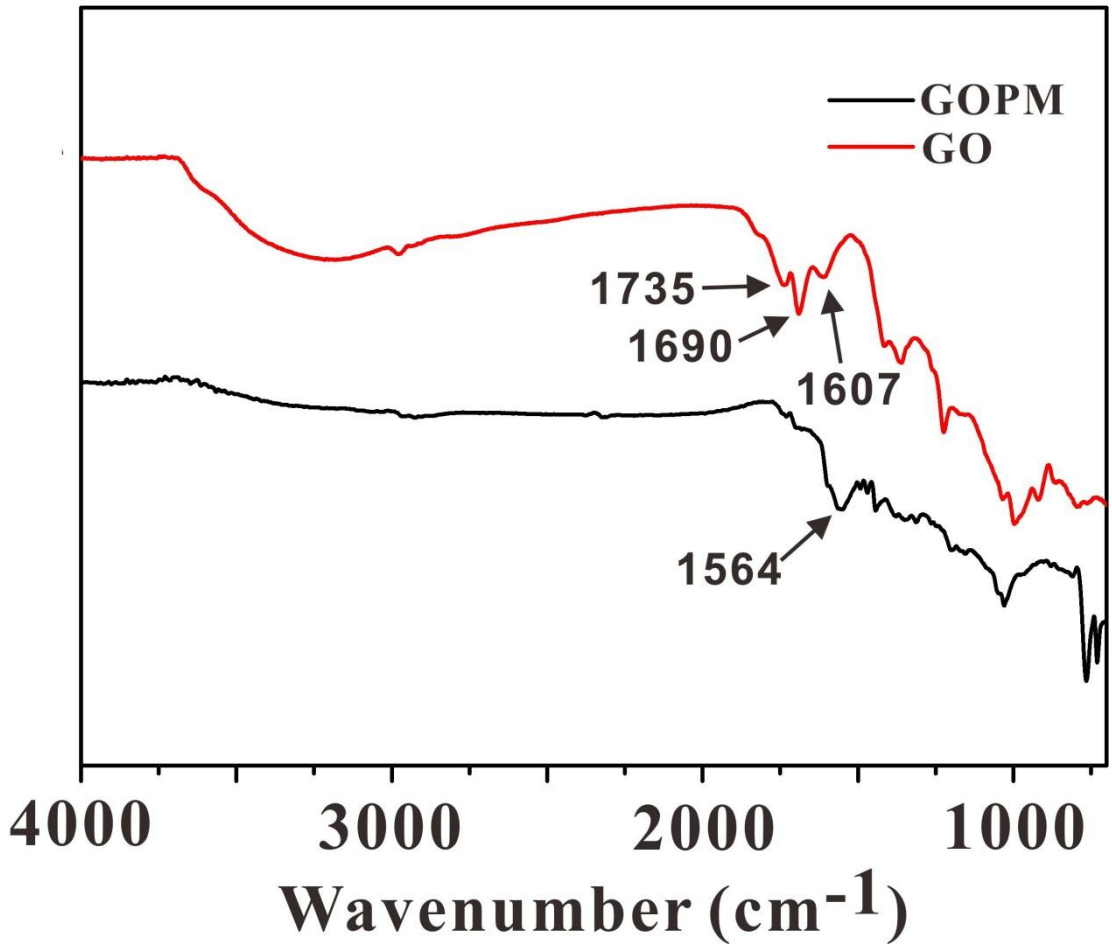

Figure S3.FTIR spectra of GO (a) and GOPM composite (b).

The FTIR spectra were employed to further confirm the polymer coatings. For the original GO sheet, as shown in **Figure S2(a)**, a wide band at 3000-3700cm^{-1} is attributed to the hydroxyl stretching vibration of the edge carboxyl groups and basal plane hydroxyls on GO sheets as well as the adsorbed water[1]; the band at 1735cm^{-1} and 1690cm^{-1} are attributed to the C=O stretch of the carboxyl and/or carbonyl group on GO sheet[1] and the peak at 1607cm^{-1} is attributed to aromatic C=C double bond stretching vibration[2].After modification with PMANa, the adsorption peaks of the carboxyl and carbonyl groups on GO disappeared due to the presence of PMANa chains. FTIR spectra of the GOPM[**Figure S2(b)**] exhibits absorption peak at 1564cm^{-1} which were assigned to the asymmetric vibration of the carboxylate groups[3] in GOPM.

	Mn2p (Atom %)	O1s (Atom %)	C1s (Atom %)
GPM	0.83	25.06	74.11
GOPM	9.8	29.86	60.34

Table S1 Element content of GPM and GOPM

Part Ⅱ: More information about calculate

To get more information about the potential of as-synthesized GOPM nanocomposites as electrode materials for supercapacitors, galvanostatic charge/discharge measurements were carried out in 1 M Li_2SO_4 between -0.2 and 0.6 V at a current density of 0.5A g^{-1}. During the charging and discharging steps, the charge curve of GOPM is almost symmetric to its corresponding discharge counterpart with a slight curvature, indicating the pseudocapacitive contribution along with the double layer contribution. The Cs values of GOPM, nano-MnO_2 and GO are 378, 196, and 15.6 F g^{-1}, respectively. These values are mainly consistent with the order indicated by the CVs.

Thermogravimetric analyses (TGA) was employed to determine actual content of each component in GOPM (Figure 2a). The experiments were performed from 50 to 700 ℃ at a heating rate of 10 ℃ min^{-1} in air flow; The modified GO sheets were burned up while MnO_2 was turned into Mn_2O_3. The weight loss of GOP, GP, nano-MnO_2, GOPM, and GPM is found to be 99%, 99%, 12%, 51%, and 2% respectively.

The corresponding mass percentage of nano-MnO_2 (χ) in GOPM is calculated by the following equation:

$0.01(1-\chi) + 0.88\chi = 0.49$

$\chi = 0.55$

So, the corresponding mass percentage of nano-MnO_2 (χ) in GOPM is 55%.

The corresponding mass percentage of nano-MnO_2 (χ') in GPM is calculated by the following equation:

$0.01(1-\chi') + 0.88\chi' = 0.02$

$\chi' = 0.012$

So, the corresponding mass percentage of nano-MnO_2 (χ') in GOPM is 1.2%.