Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Synthesis and multifaceted use of phosphorylated graphene oxide: growth of titanium dioxide clusters, interplay with gold nanoparticles and exfoliated sheets in bioplastics

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Table S1: Parameters used to synthesize phosphorylated graphene oxide

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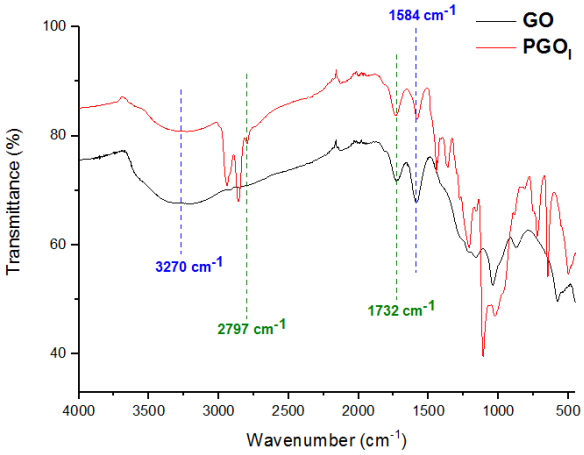
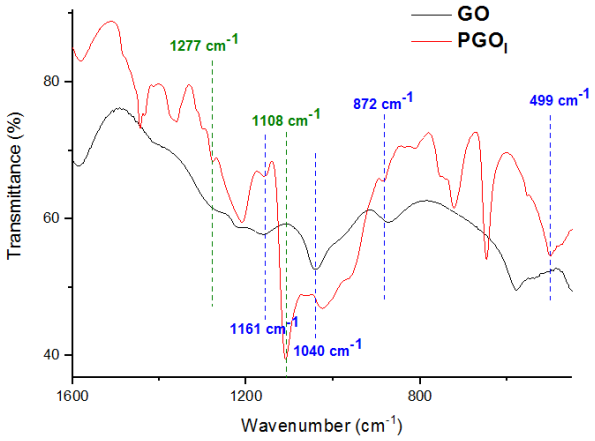
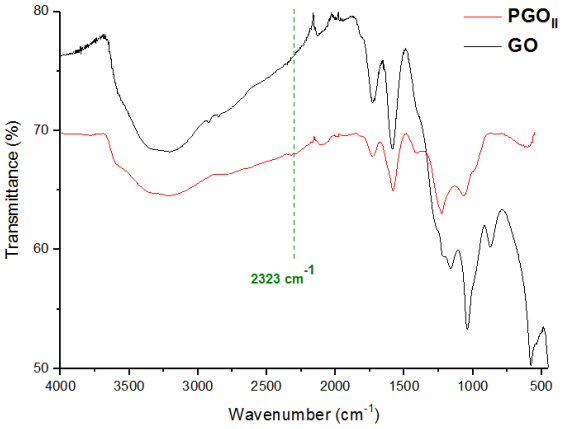
Table S1: Parameters used to synthesize phosphorylated graphene oxide

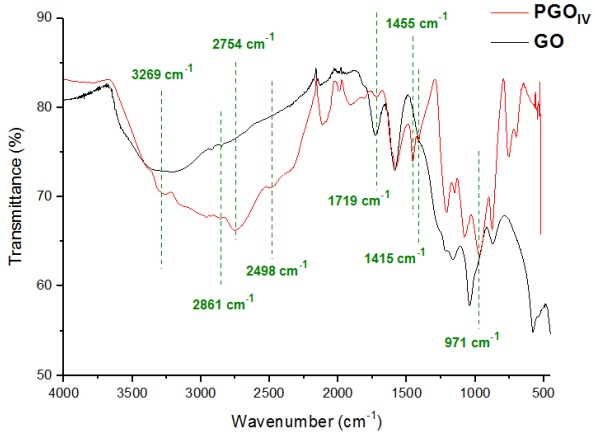
Sample	Phosphorylating agent	Base	Solvent	Time of the reaction	Temperature of the reaction
PGO_{I}	$POCl_3$	Cs_2CO_3	THF	4 days	RT
$PGO_{I\text{-}01}$	$POCl_3$	-	THF	48h	RT
$PGO_{I\text{-}02}$	$POCl_3$	K_2CO_3	THF	4 days	RT
$PGO_{I\text{-}03}$	$POCl_3$	Et_3N	THF	4 days	RT
$PGO_{I\text{-}04}$	$POCl_3$	Et_3N	THF	24h	Reflux
$PGO_{I\text{-}05}$	$POCl_3$	Et_3N	Toluene	24h	Reflux
PGO_{II}	$P(S)Cl_3$	-	THF	48h	RT
PGO_{III}	$C_2H_5P(O)Cl_2$	-	THF	48h	Reflux
PGO_{IV}	$PSCl(NMeNH_2)_2$	-	THF	48h	RT
PGO_{V}	$C_2H_5OPCl_2$	-	THF	48h	RT

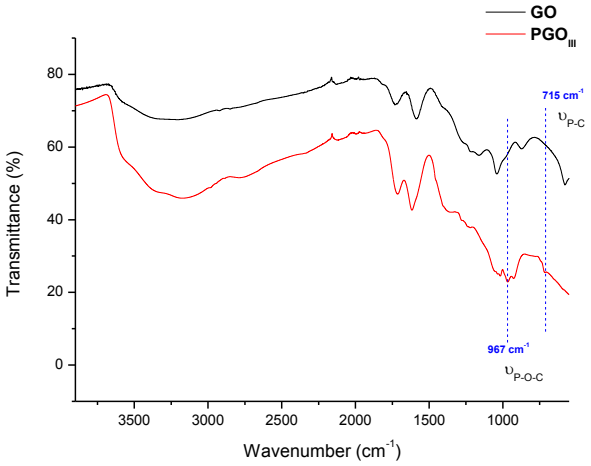
S1. DRIFT spectra of phosphorylated graphene oxide

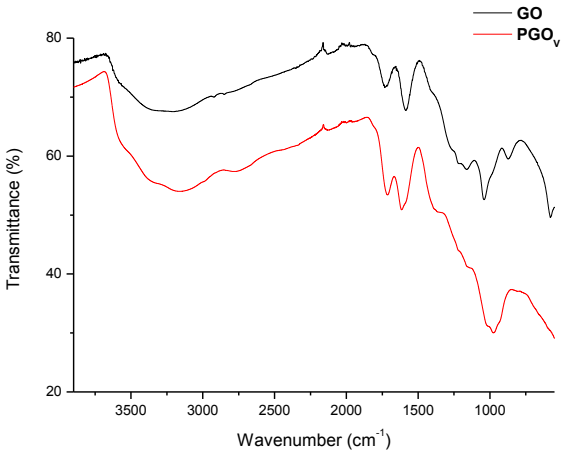






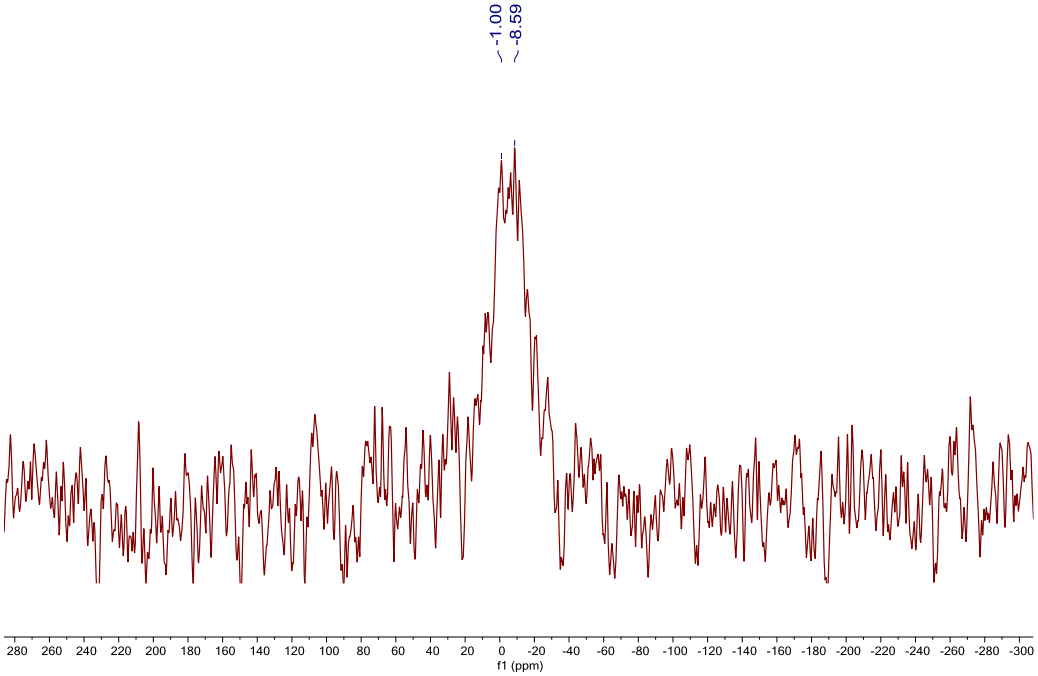


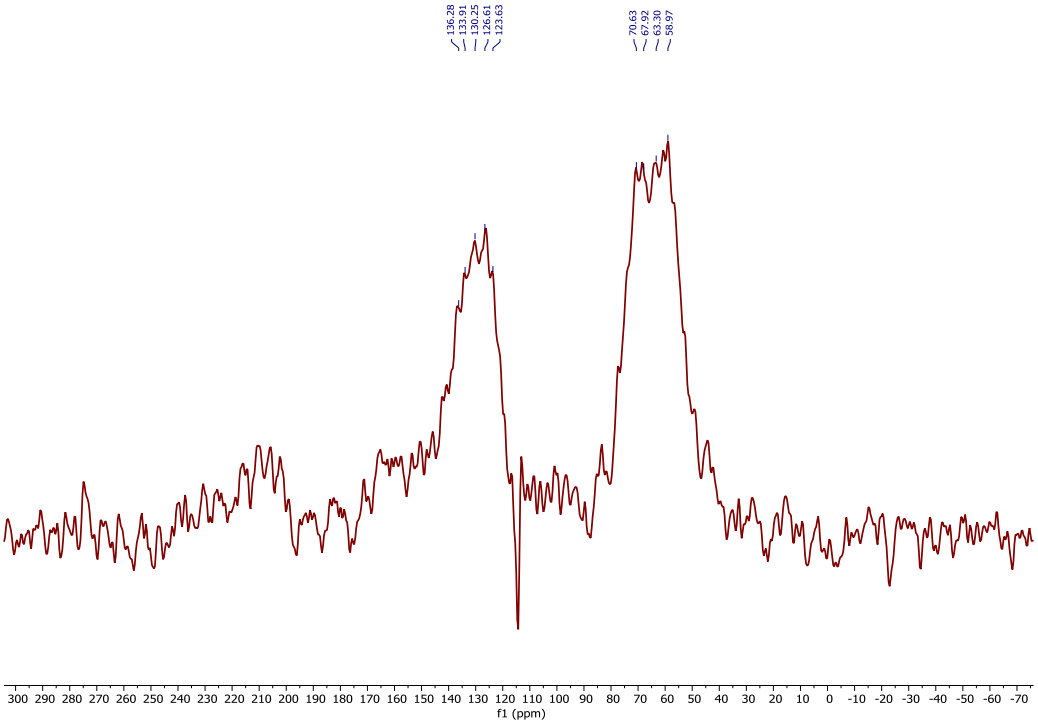




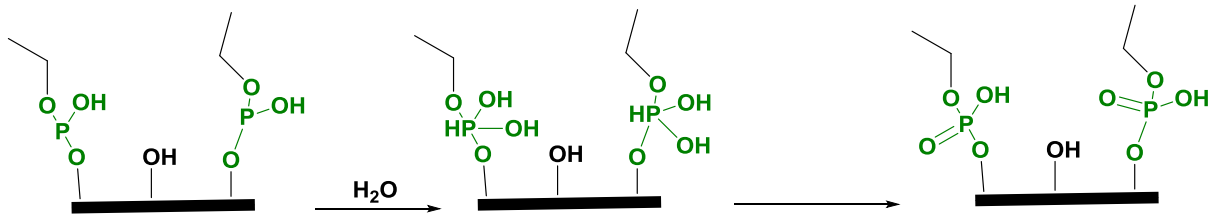
S2. ^{31}P and ^{13}C CP MAS NMR of PGO_{II} and PGO_{V}

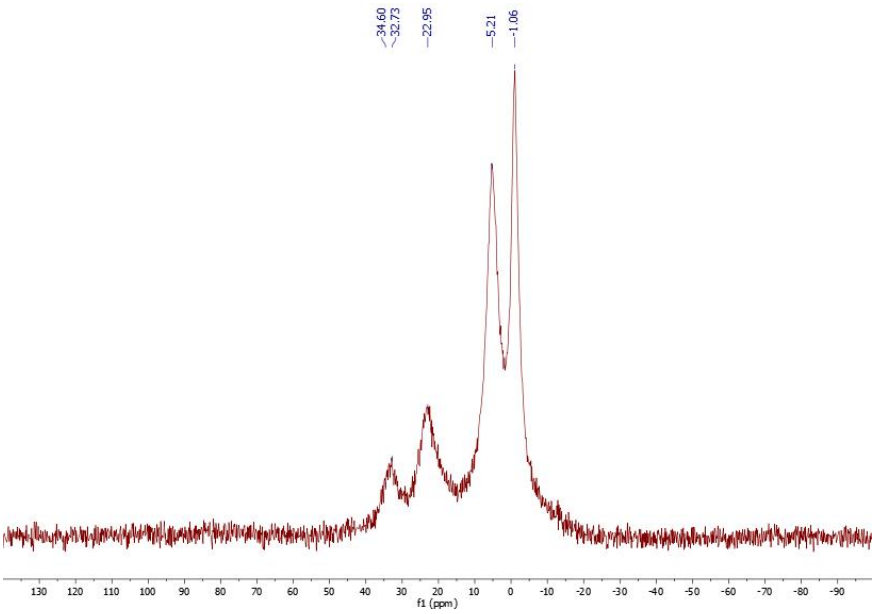
S2a. ^{31}P and ^{13}C CP MAS NMR of PGO_{II}

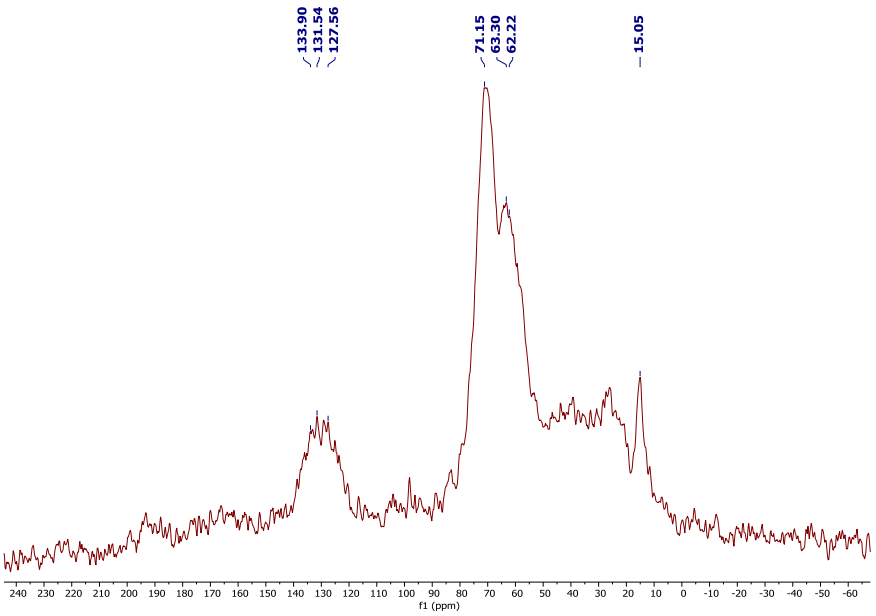




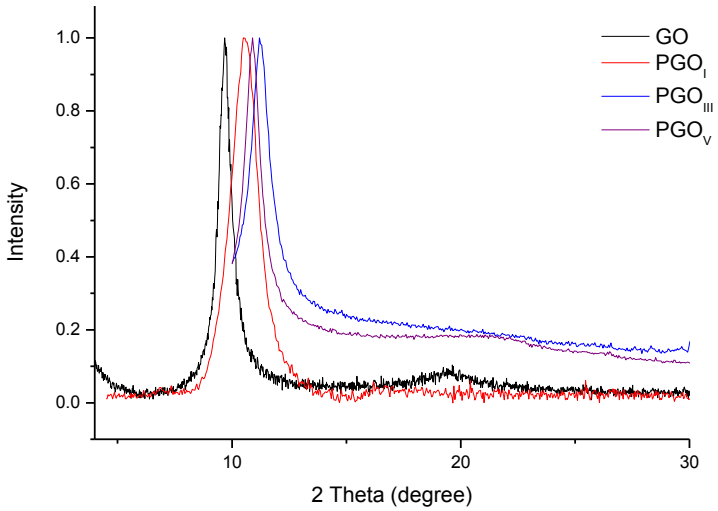
S2b. ^{31}P and ^{13}C CP MAS NMR of PGO_V







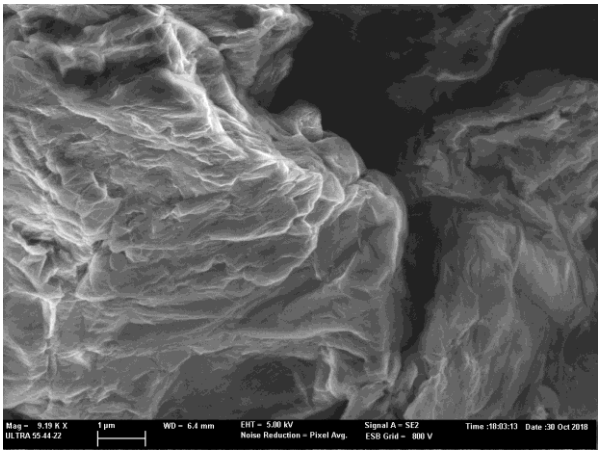
S3. XRD analysis of GO and PGO

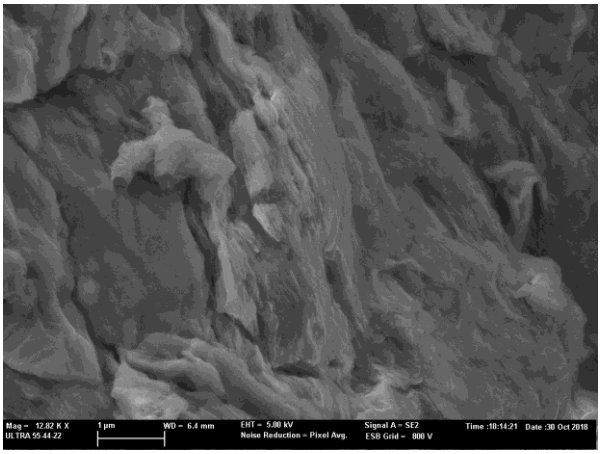


	2 ɵ (degree)	***d (nm)***
GO	**9.68**	**0.92**
PGO$_I$	**10.57**	**0.84**
PGO$_{III}$	**11.24**	**0.79**
PGO$_V$	**10.89**	**0.81**

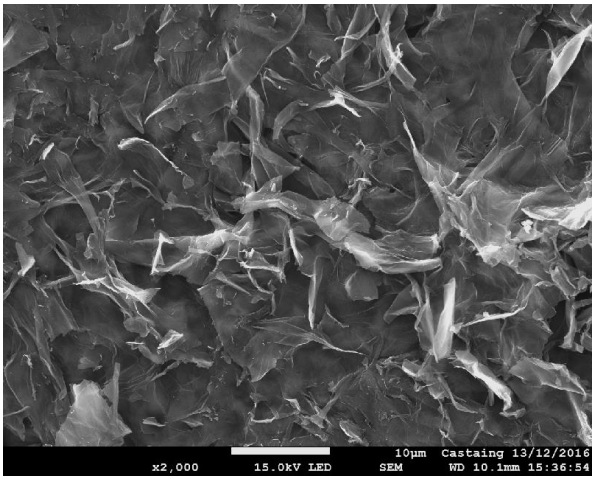
S4. SEM analysis of GO and PGO_l

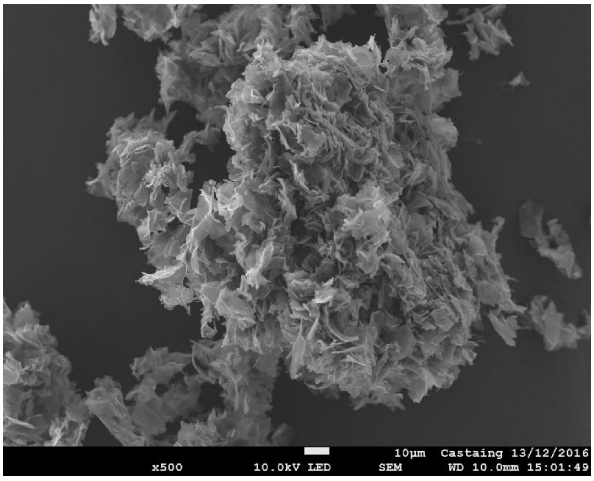
SEM analysis of GO

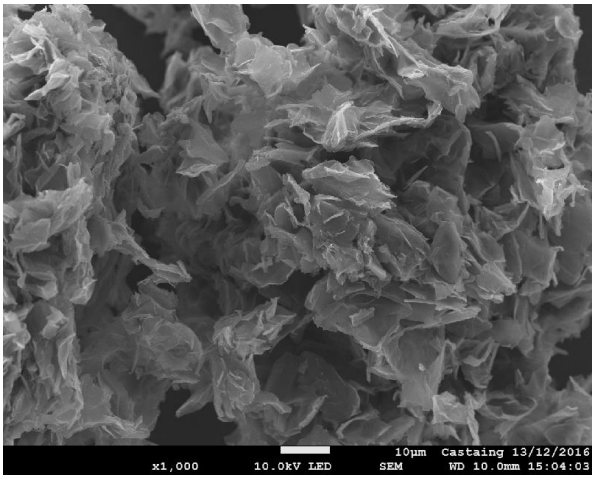


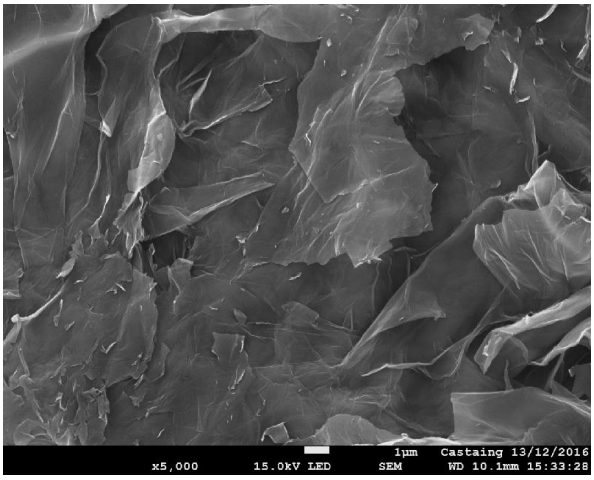


SEM analysis of PGO_l



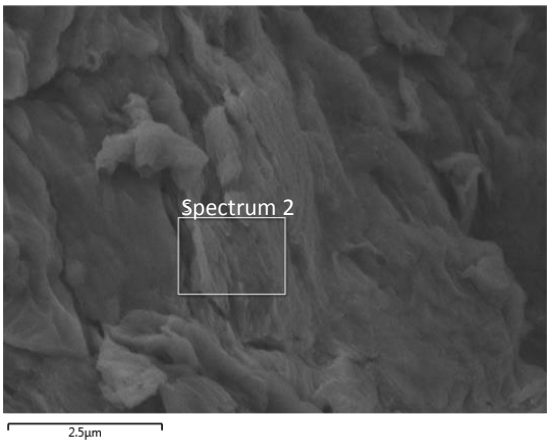


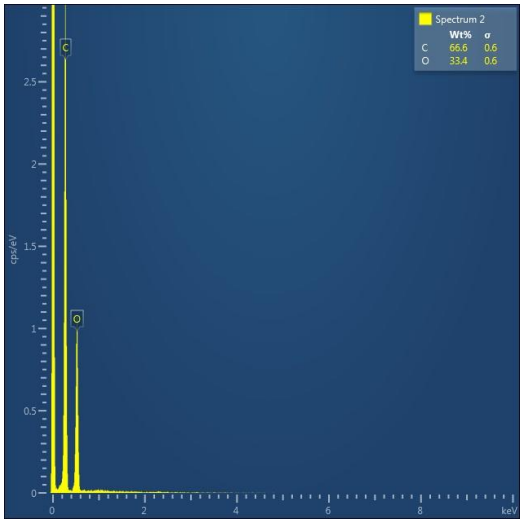




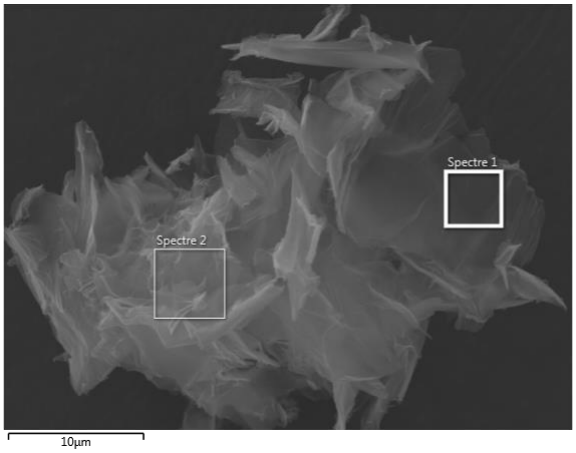
S5. EDX analysis of GO and PGO_I

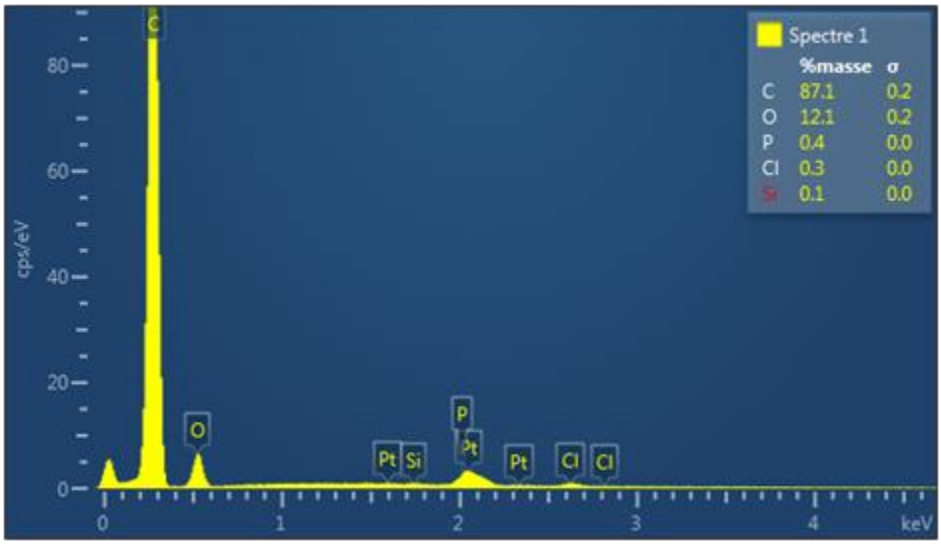
EDX analysis of GO

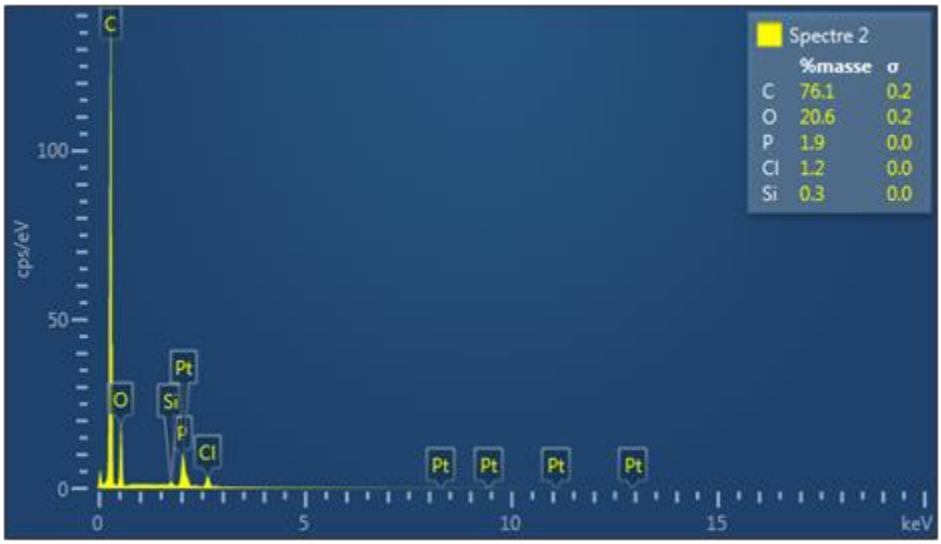




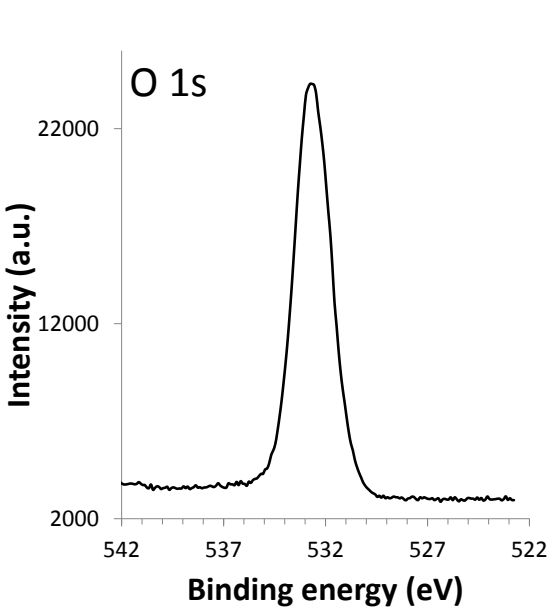
EDX analysis of PGO_I

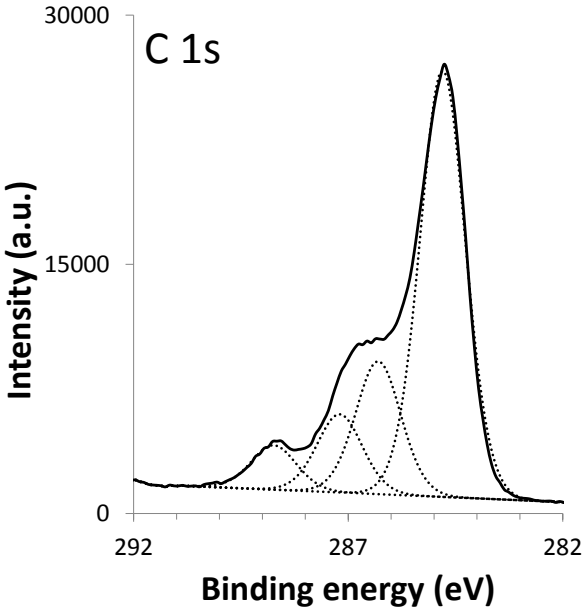




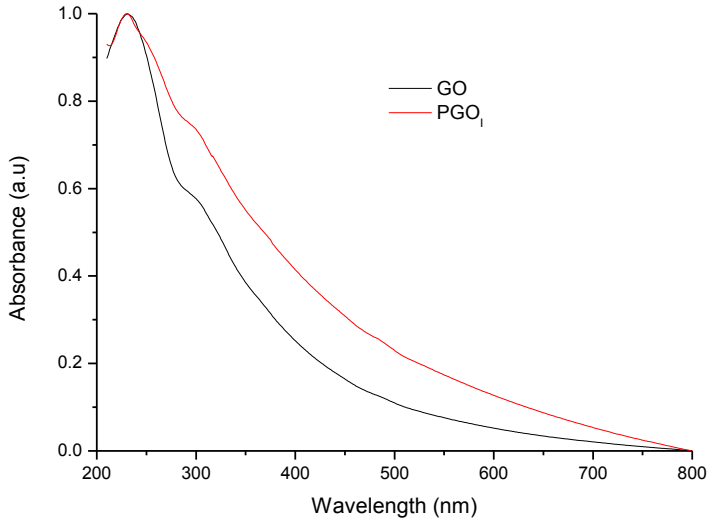

Spectre 2
%masse σ
C 76.1 0.2
O 20.6 0.2
P 1.9 0.0
Cl 1.2 0.0
Si 0.3 0.0
cps/eV
100
50
0
C
O
Si
P
Cl
Pt
Pt
Pt
Pt
Pt
0
5
10
15
keV

S6: XPS analysis of PGO_I

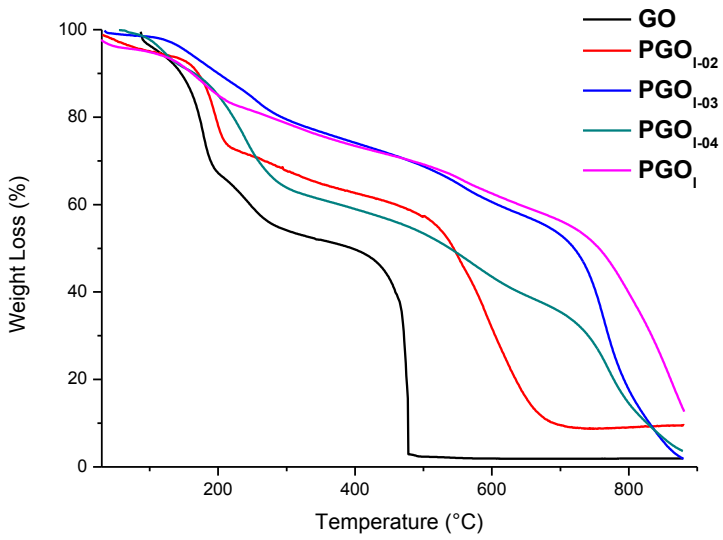




S7: UV spectra of GO and PGO_I

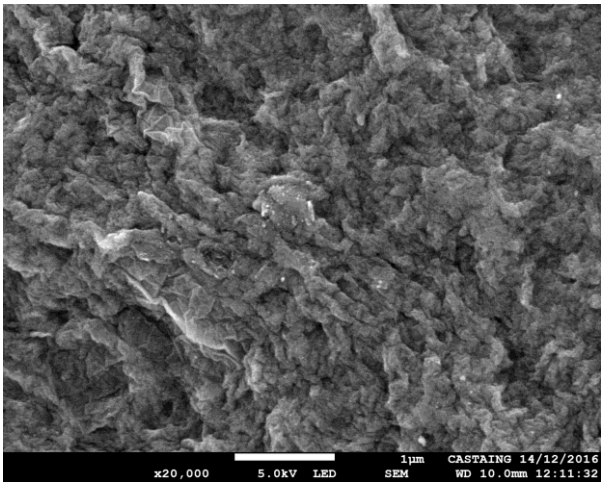


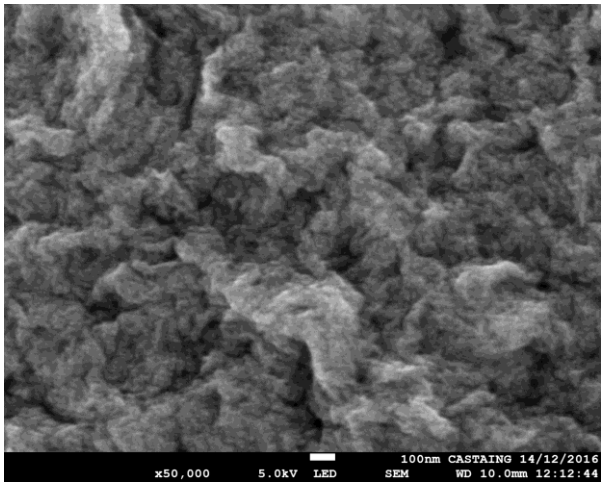
S8. TGA analysis of GO and PGO



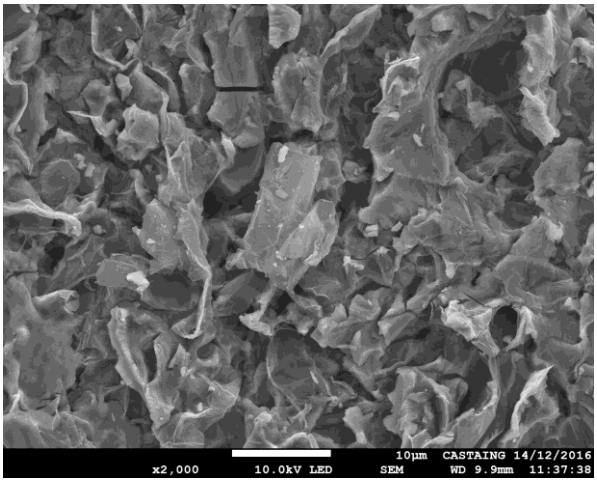
S9. SEM analysis of GO-TiO_2 and PGO_l-TiO_2

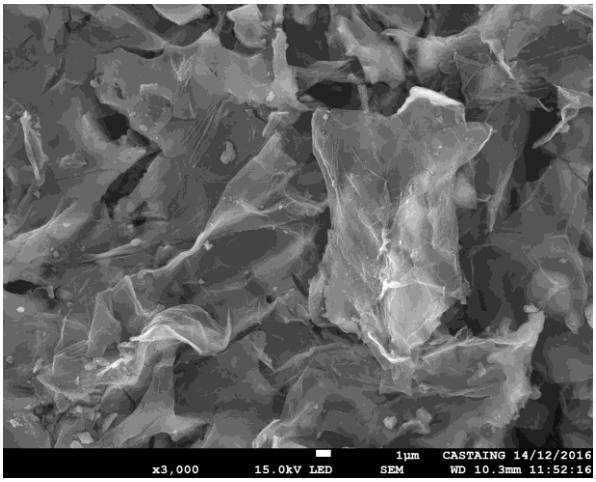
SEM analysis of GO-TiO_2





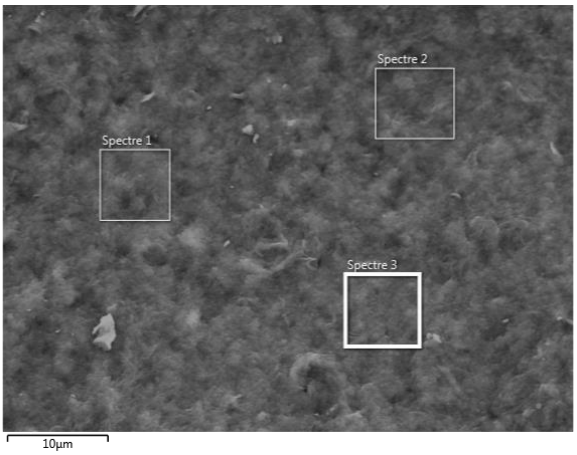
SEM analysis of PGO_l-TiO_2

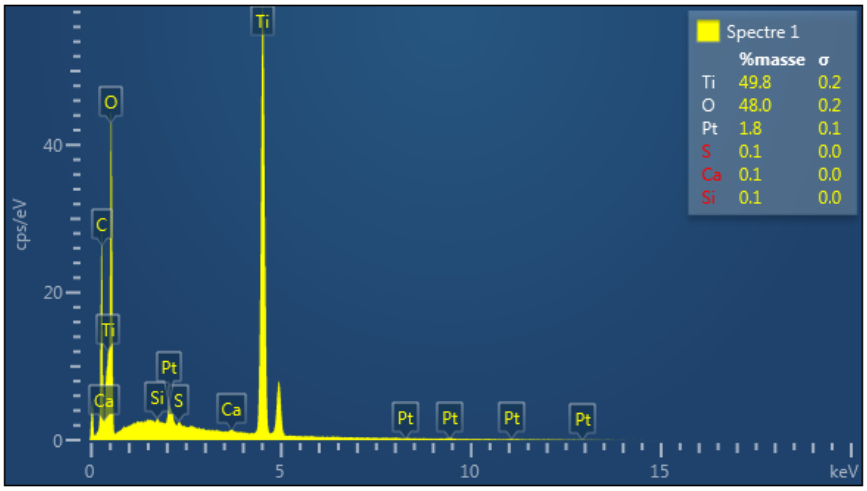


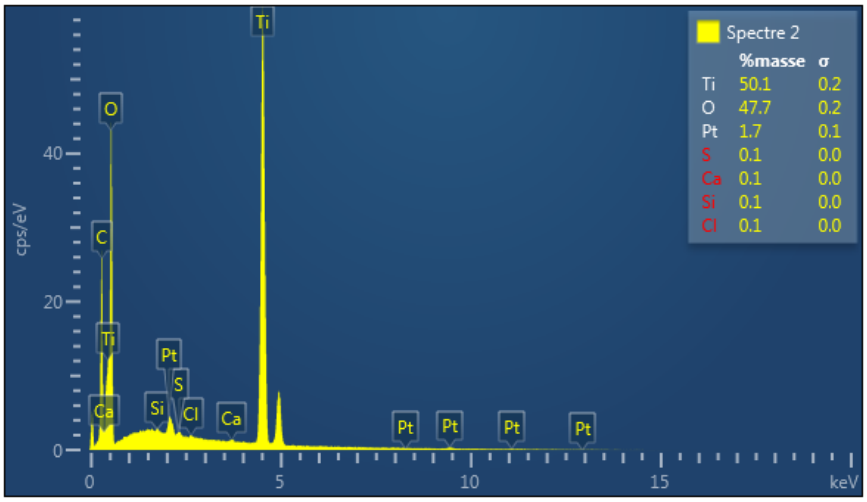


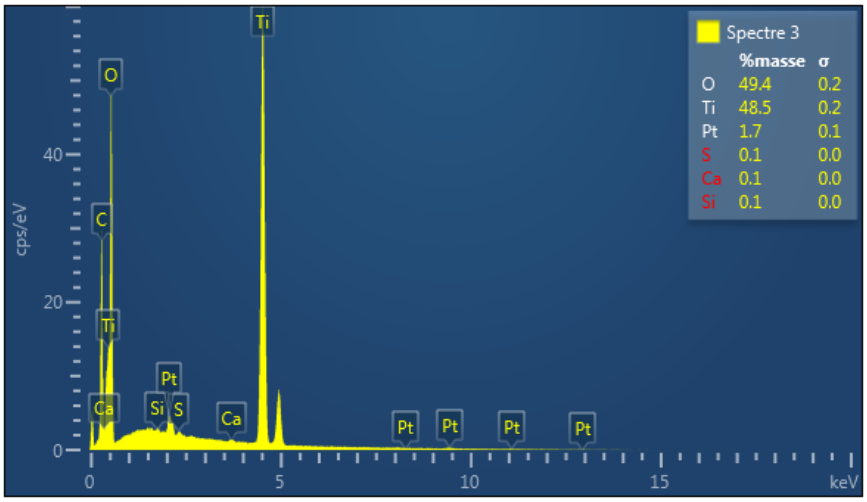
S10. EDX analysis of GO-TiO_2 and PGO_I-TiO_2

EDX analysis of GO-TiO_2

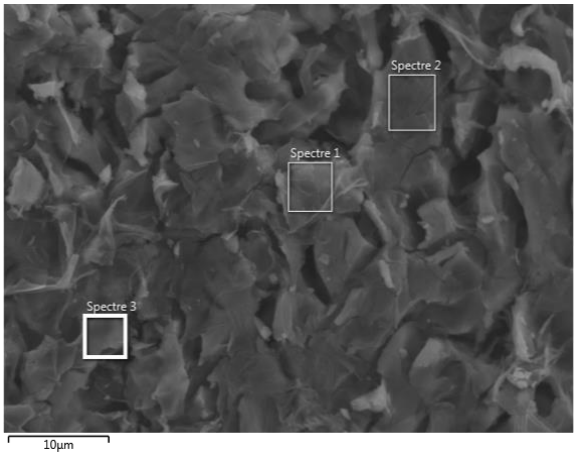


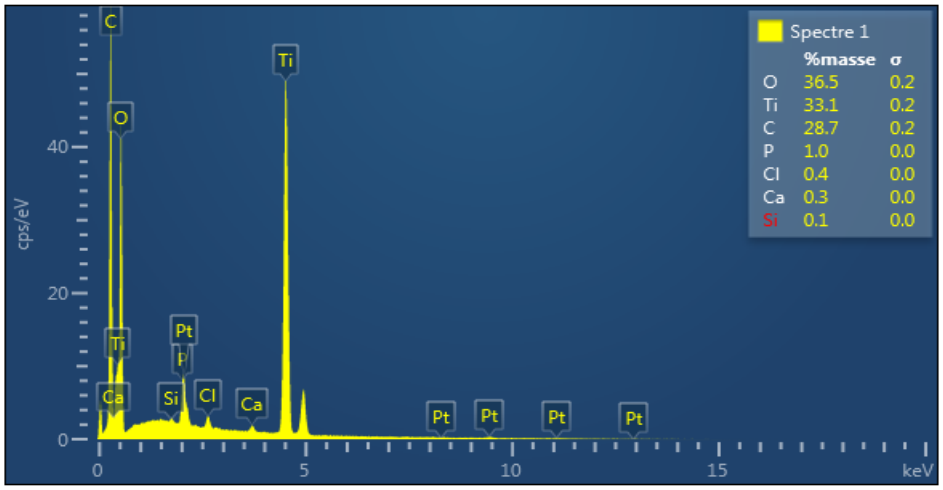


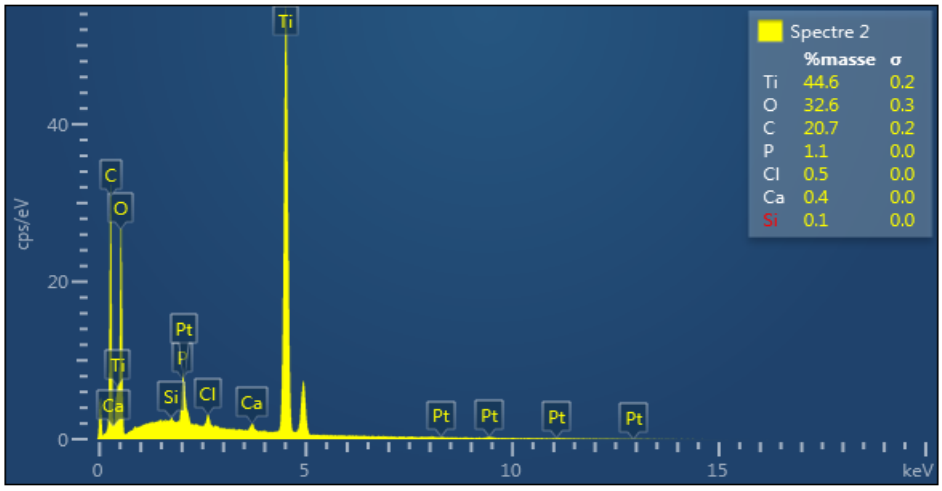


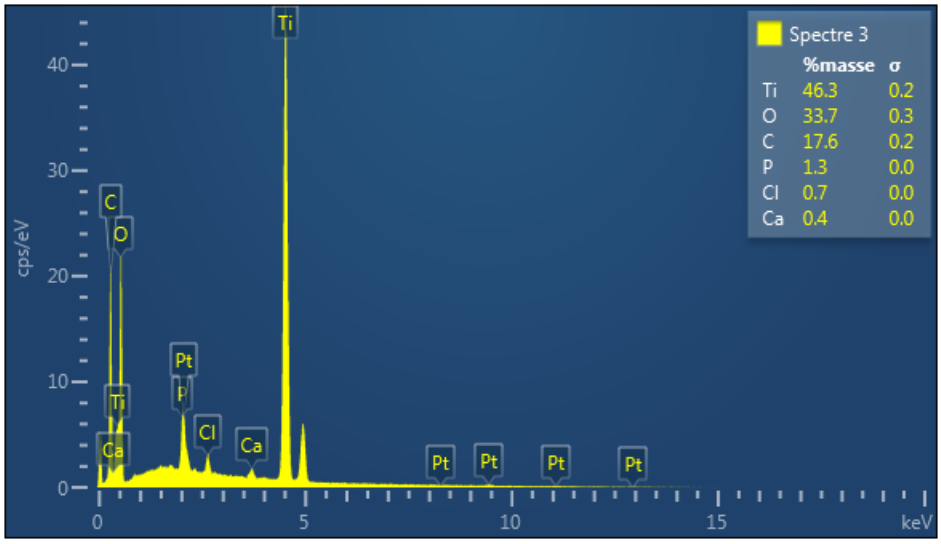


EDX analysis of PGO_I-TiO_2



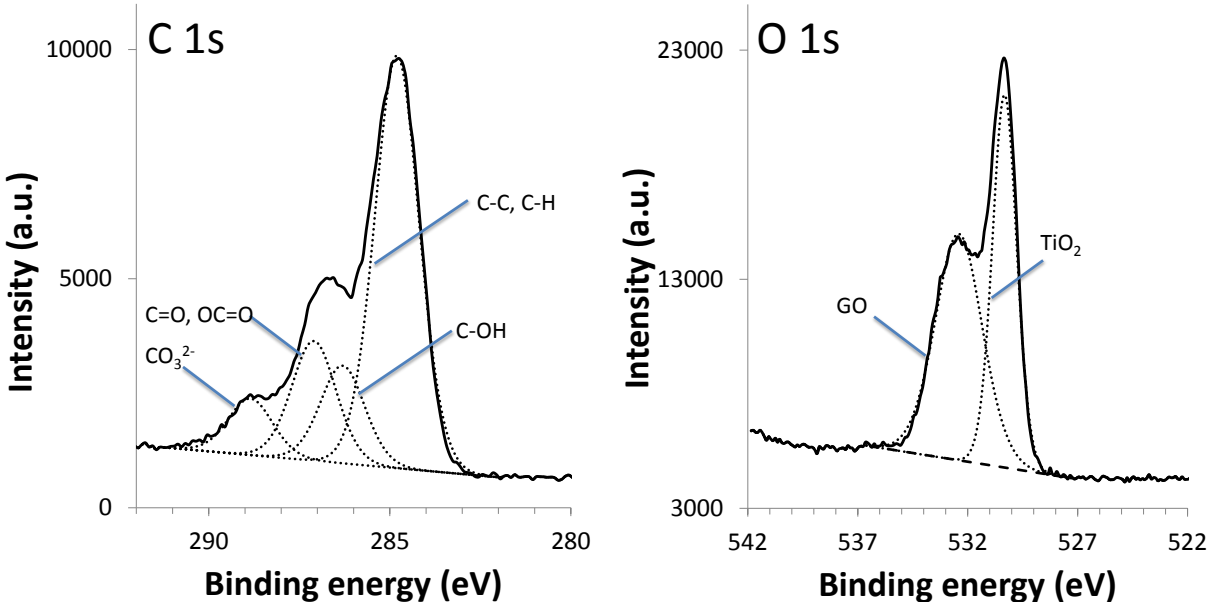


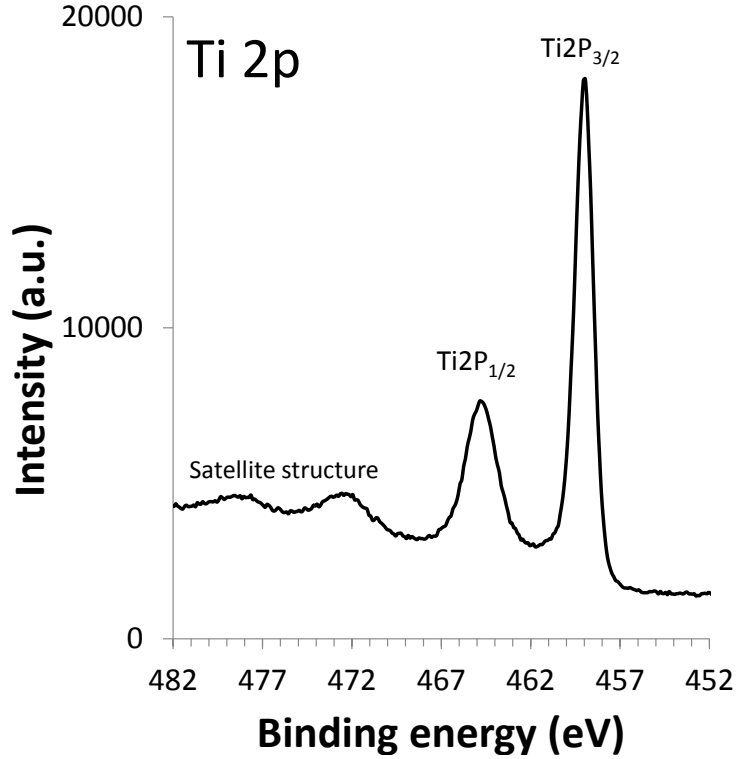

Spectre 2
%masse σ
Ti 44.6 0.2
O 32.6 0.3
C 20.7 0.2
P 1.1 0.0
Cl 0.5 0.0
Ca 0.4 0.0
Si 0.1 0.0
cps/eV
keV
Ti
C
O
Pt
P
Ti
Si
Cl
Ca
Ca
Pt
Pt
Pt
Pt


Spectre 3
%masse σ
Ti 46.3 0.2
O 33.7 0.3
C 17.6 0.2
P 1.3 0.0
Cl 0.7 0.0
Ca 0.4 0.0
cps/eV
keV
Ti
C
O
Pt
P
Ti
Cl
Ca
Ca
Pt
Pt
Pt
Pt

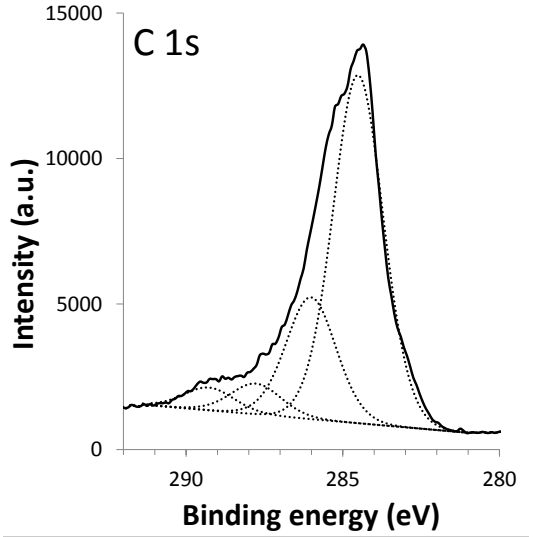
S11. XPS analysis of GO-TiO_2 and PGO_I-TiO_2

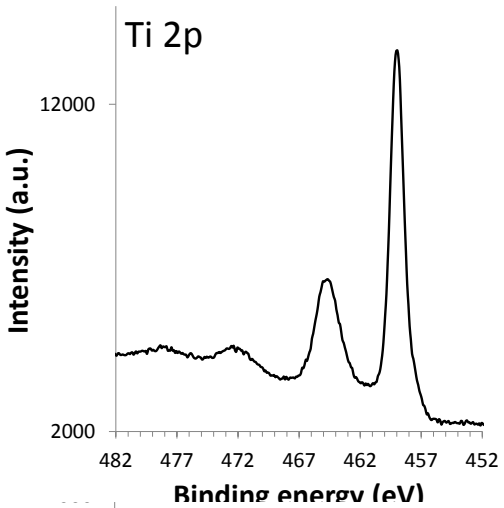
PXS analysis of GO-TiO_2

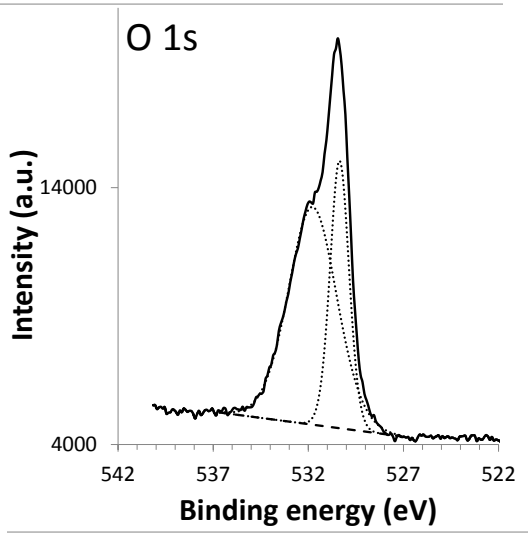


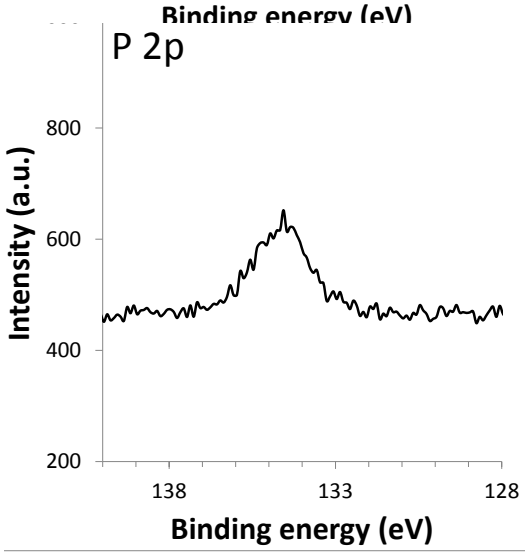


XPS analysis of PGO_I-TiO_2



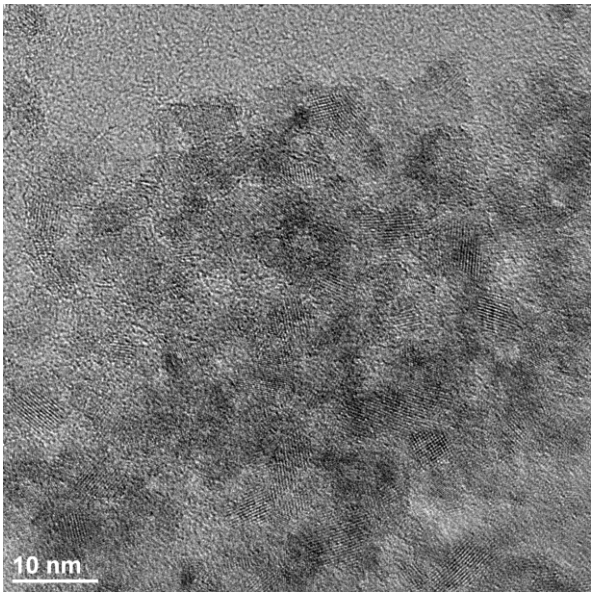


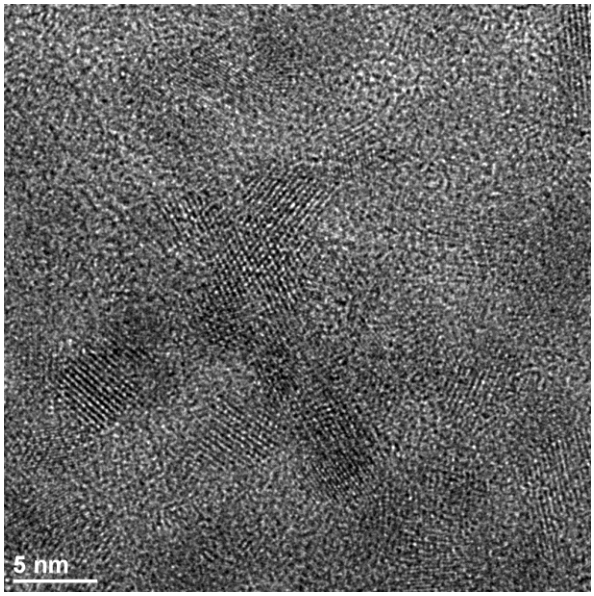




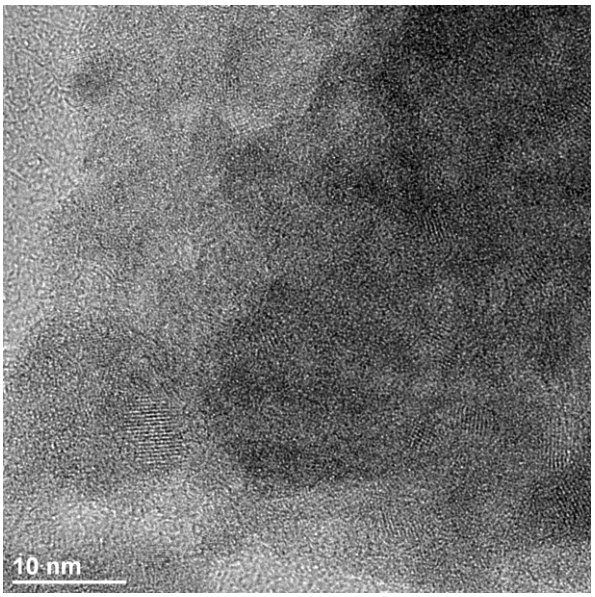
S12. TEM analysis of GO-TiO_2 and PGO_I-TiO_2

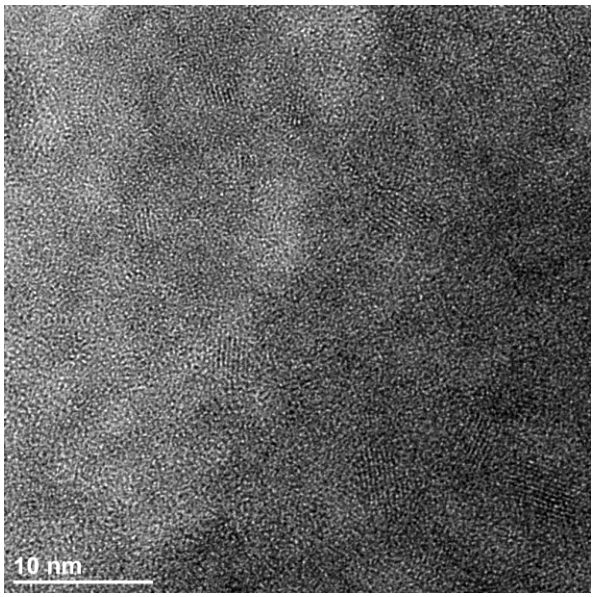
TEM analysis of GO-TiO_2



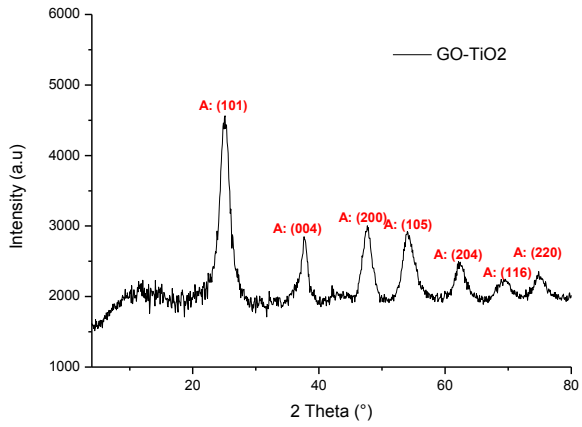


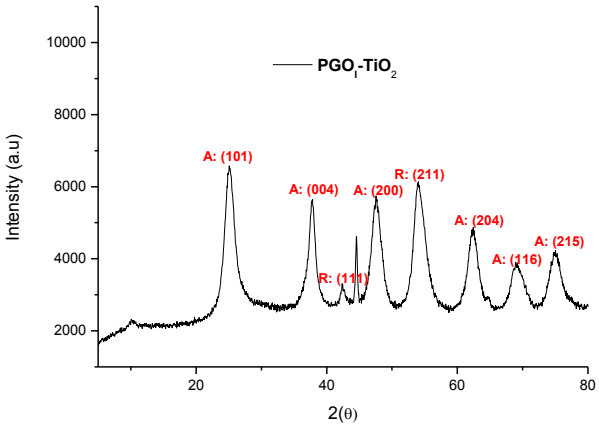
TEM analysis of PGO_I-TiO_2

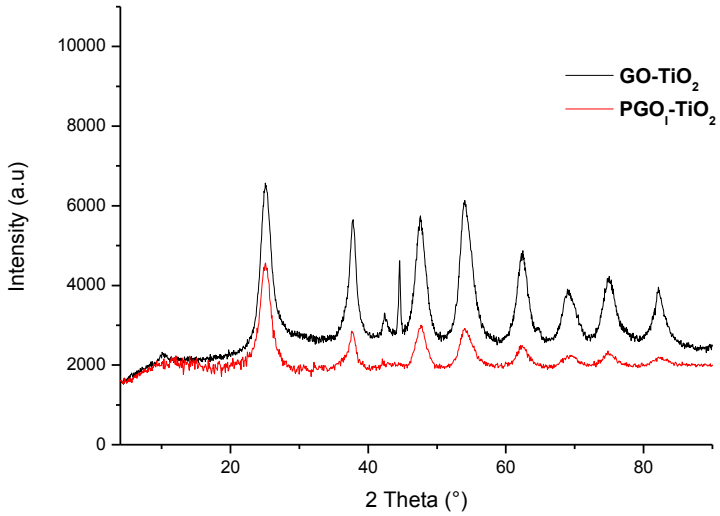




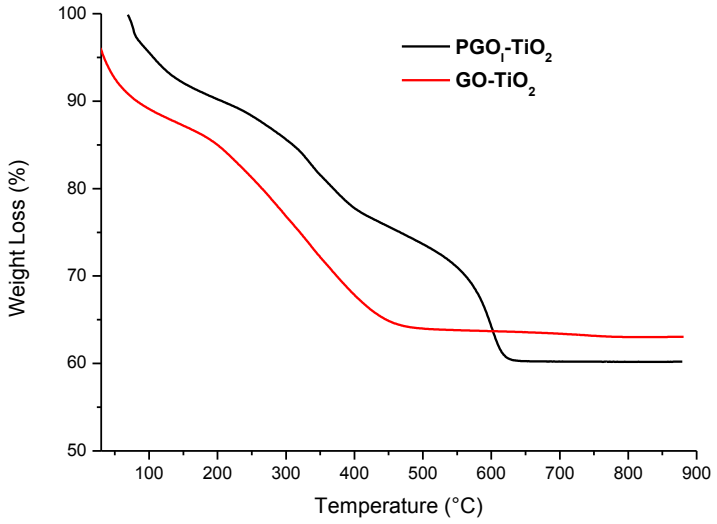
S13. XRD analysis of GO-TiO_2 and PGO_I-TiO_2



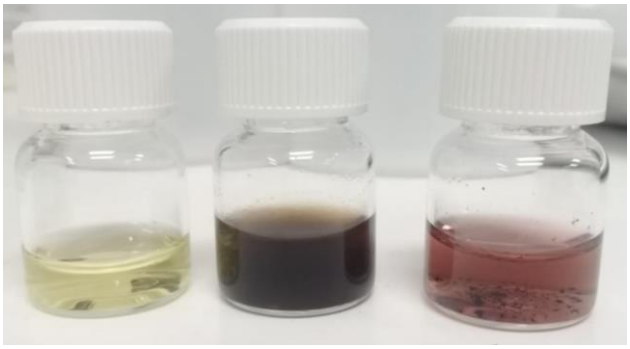




S14. TGA analysis of $GO\text{-}TiO_2$ and $PGO_I\text{-}TiO_2$

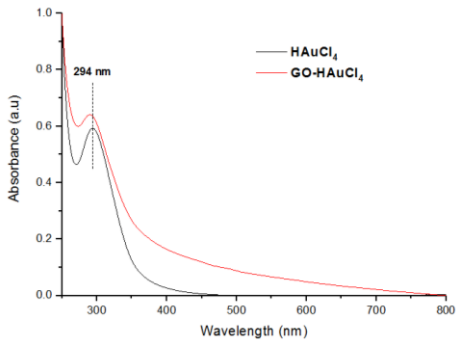


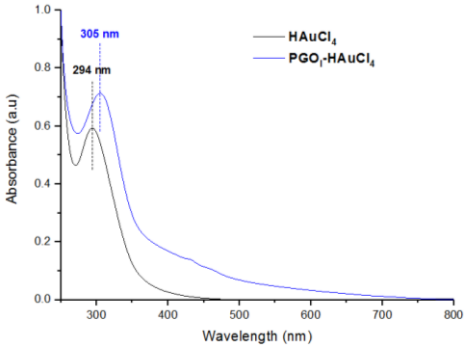
S15. UV spectra of $HAuCl_4$-GO and $HAuCl_4$-PGO_I

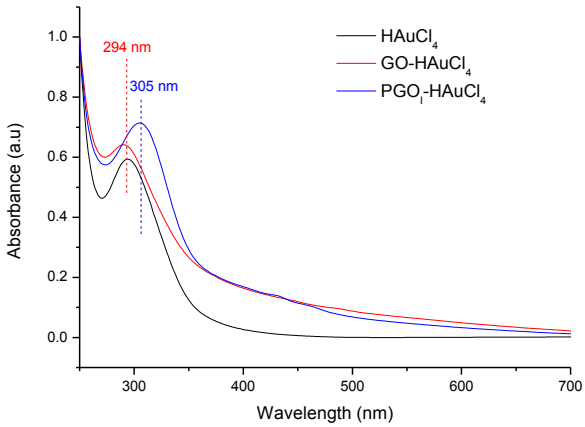


$HAuCl_4$ *GO-$HAuCl_4$* *GO-$HAuCl_4$-$NaBH_4$ (after 3 months)*

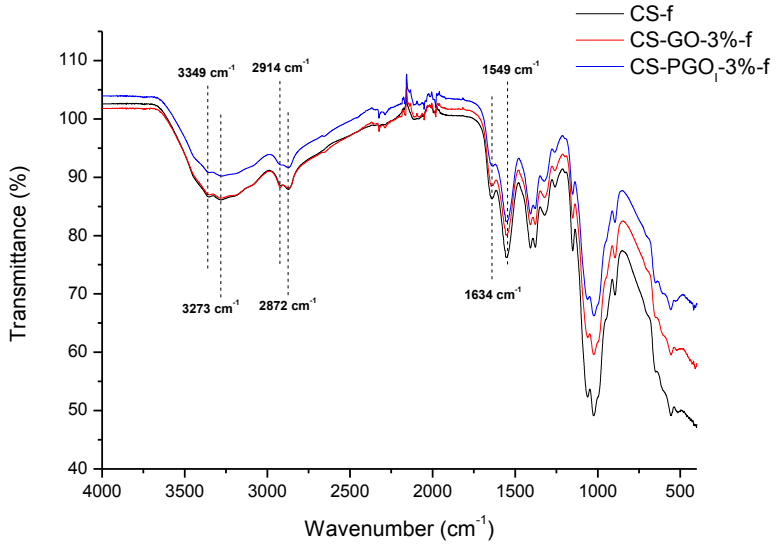
PGO_I-$HAuCl_4$ *PGO_I-$HAuCl_4$-$NaBH_4$* *PGO_I-$HAuCl_4$-$NaBH_4$ (after 3 months)*

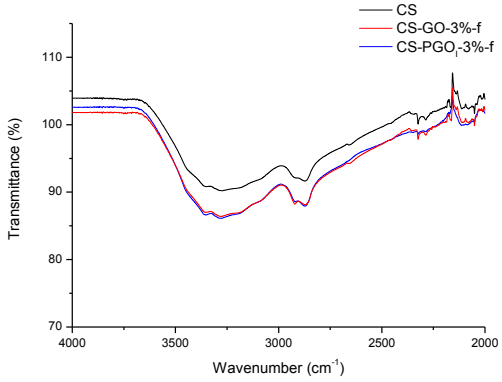


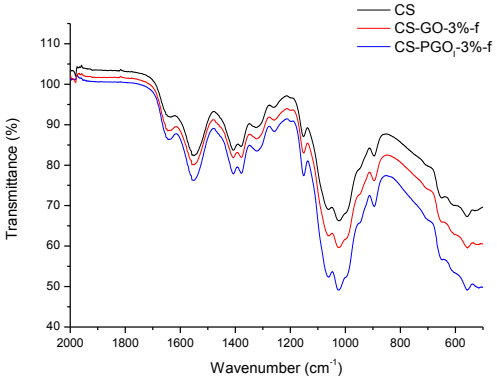




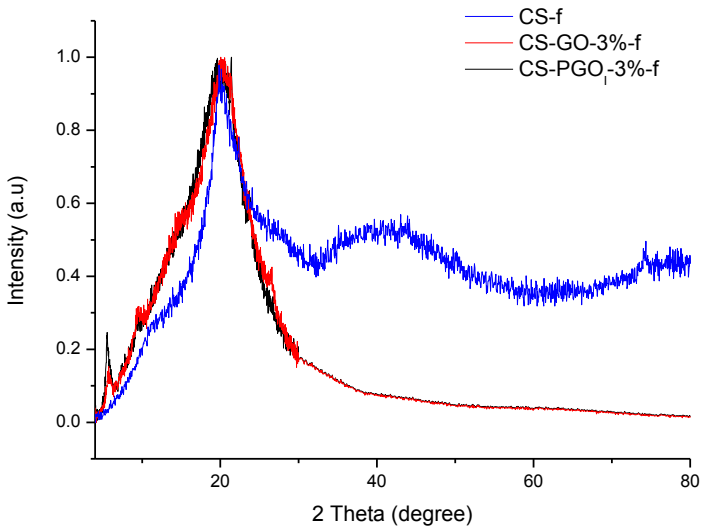
S16. DRIFT analysis of CS-GO-3%-*f* and CS-PGO$_I$-3%-*f*







S17. XRD analysis of CS-GO-3%-*f* and CS-PGO$_I$-3%-*f*



S18. TGA analysis of CS, CS-GO-3%-*f* and CS-PGO$_I$-3%-*f*