Supplementary Information. Aqueous phase reforming of glycerol using doped graphenes as metal-free catalysts

Iván Esteve-Adell,[a] Bertrand Crapart,[a,b] Ana Primo,[a] Philippe Serp[b] and Hermenegildo Garcia [a,*]

[a] Instituto de Tecnología Química, Universitat Politècnica de València-Consejo Superior de Investigaciones Científicas, Avenida de los Naranjos s/n, 46022 Valencia, Spain. E-mail: hgarcia@qim.upv.es

[b]CNRS, LCC (Laboratoire de Chimie de Coordination), composante ENSIACET, 4 allée Emile Monso, BP 44099, F-31030 Toulouse Cedex 4, France

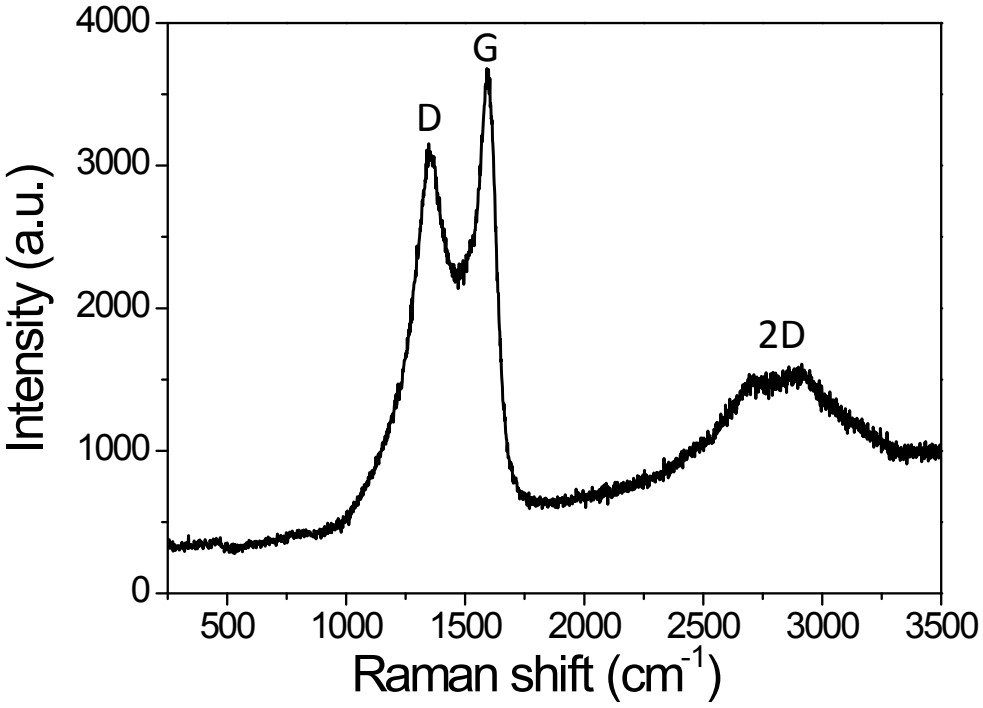


Figure S1. Raman spectra recorded using 514 nm excitation laser. The spectra exhibit the 2D, G and D bands at about 2750, 1590, 1350 cm^{-1}, respectively.

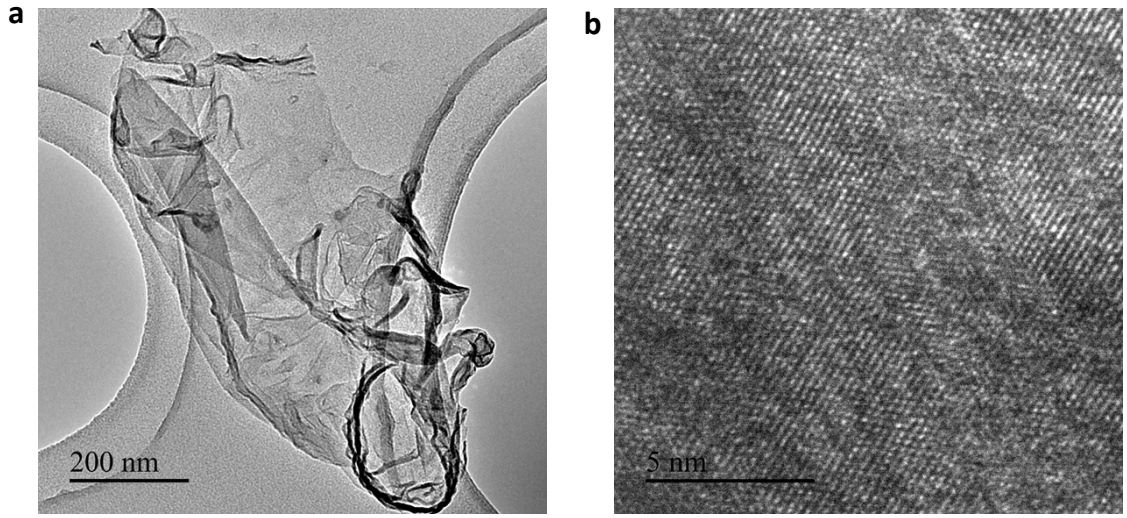


Figure S2. TEM images at low (a) and high (b) magnification of G showing its morphology and hexagonal arrangement.

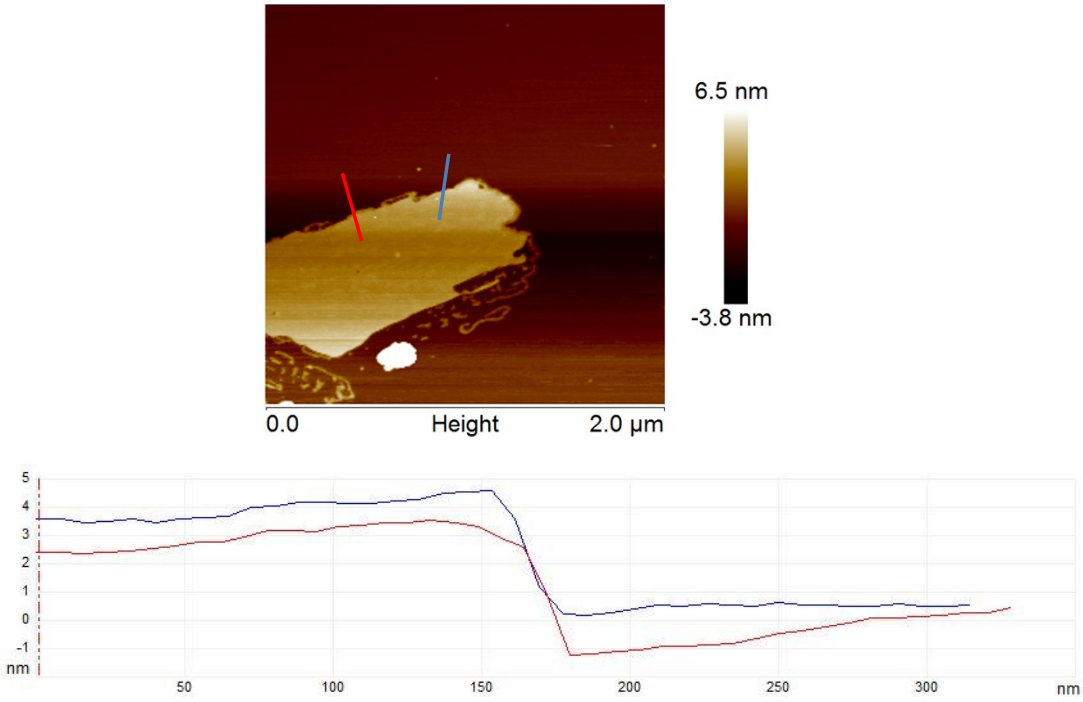


Figure S3. Frontal AFM view of one G sheet with its corresponding thickness about 3-4 nm.

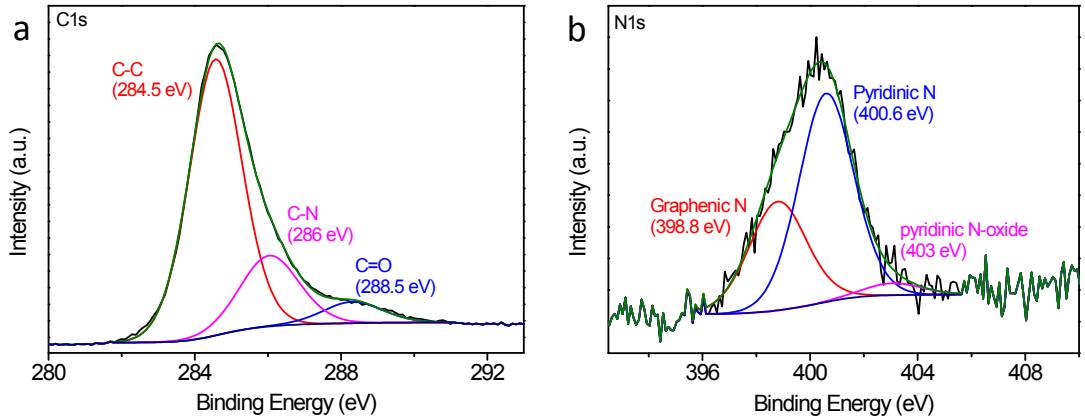


Figure S4. XPS C1s (a) and N1s (b) peaks, as well as their best fitting to individual components recorded for (N)G sample.

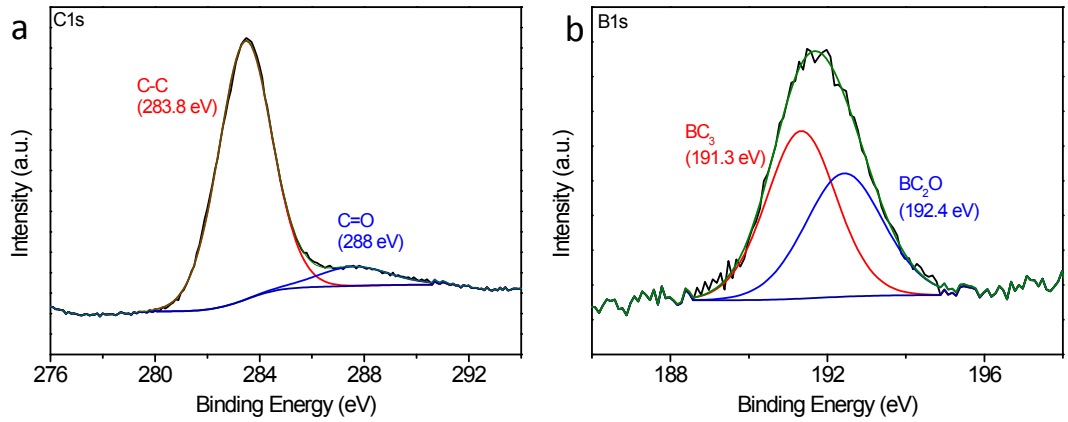


Figure S5. XPS C1s (a) and B1s (b) peaks, as well as their best fitting to individual components recorded for (B)G sample.

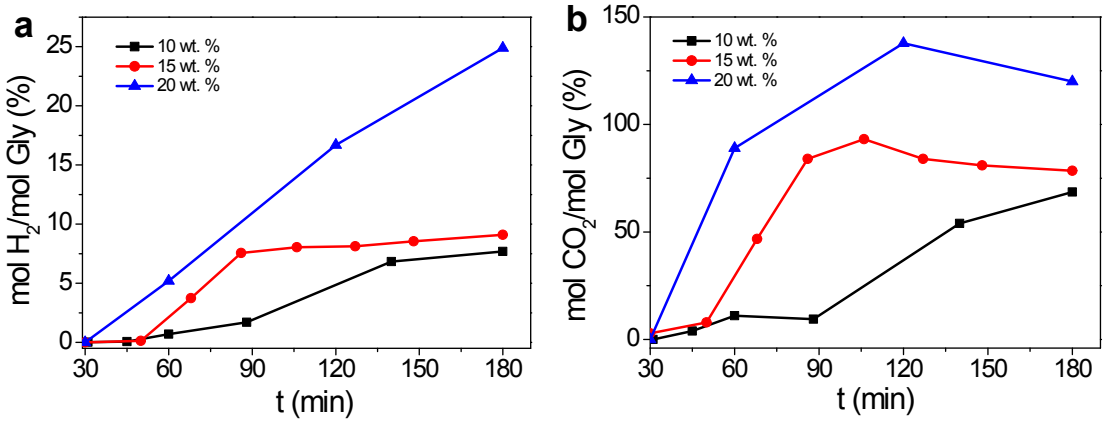


Figure S6. Temporal profile of H_2 (a) and CO_2 (b) evolution in the APR reaction of glycerol in the presence of different amounts of G catalyst. Reaction conditions: Glycerol 10 vol. %, catalyst 10, 15 or 20 wt. % respect to glycerol, temperature 250 ºC.

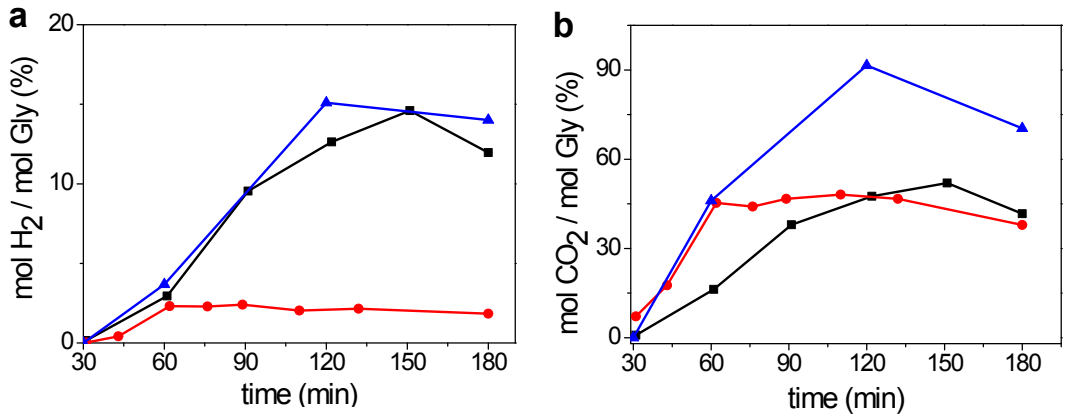


Figure S7. Temporal profile of H_2 (a) and CO_2 (b) evolution in the APR reaction of glycerol in the presence of MWCN (▲), (B,P)G (■) and GO (●). Reaction conditions: Glycerol 10 vol. %, catalyst 20 wt. % respect to glycerol, temperature 250 ºC.

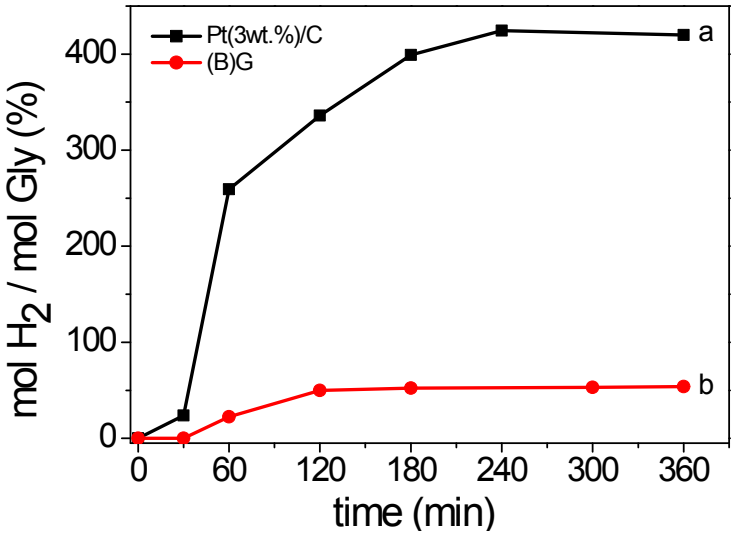


Figure S8. Temporal profile of H_2 evolution in the APR reaction of glycerol in the presence of Pt(3wt.%)/C (a) and (B)G (b). Reaction conditions: Glycerol 10 vol. %, (B)G and Pt(3wt.%)/C catalyst, 20 wt. % and 0.5 mol % of Pt respectively, respect to glycerol, temperature 250 ºC.

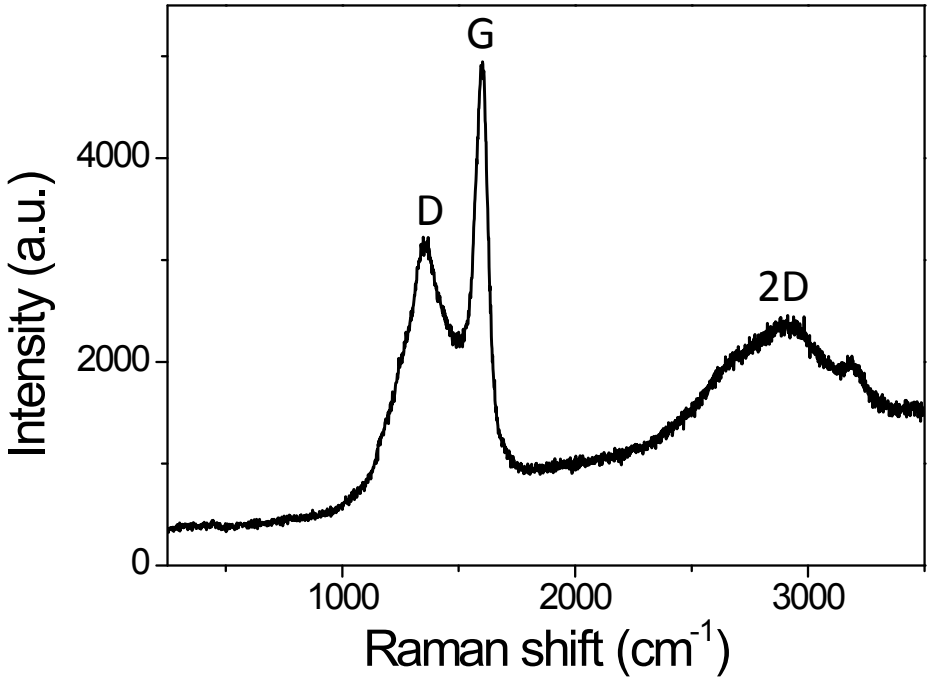


Figure S9. Raman spectra of five times used (B)G catalyst in APR of glycerol recorded using 514 nm excitation laser. The spectra exhibit the 2D, G and D bands at about 2950, 1600, 1350 cm^{-1}, respectively.

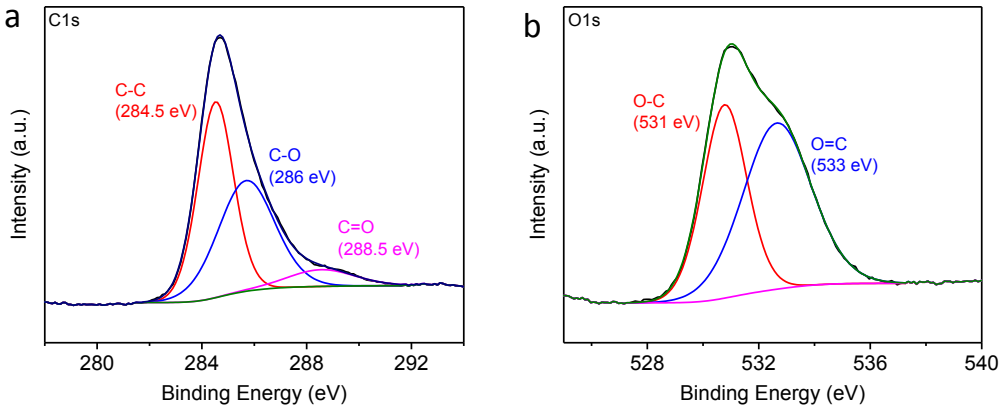


Figure S10. XPS C1s (a) and O1s (b) peaks, as well as their best fitting to individual components recorded for five times used (B)G sample.

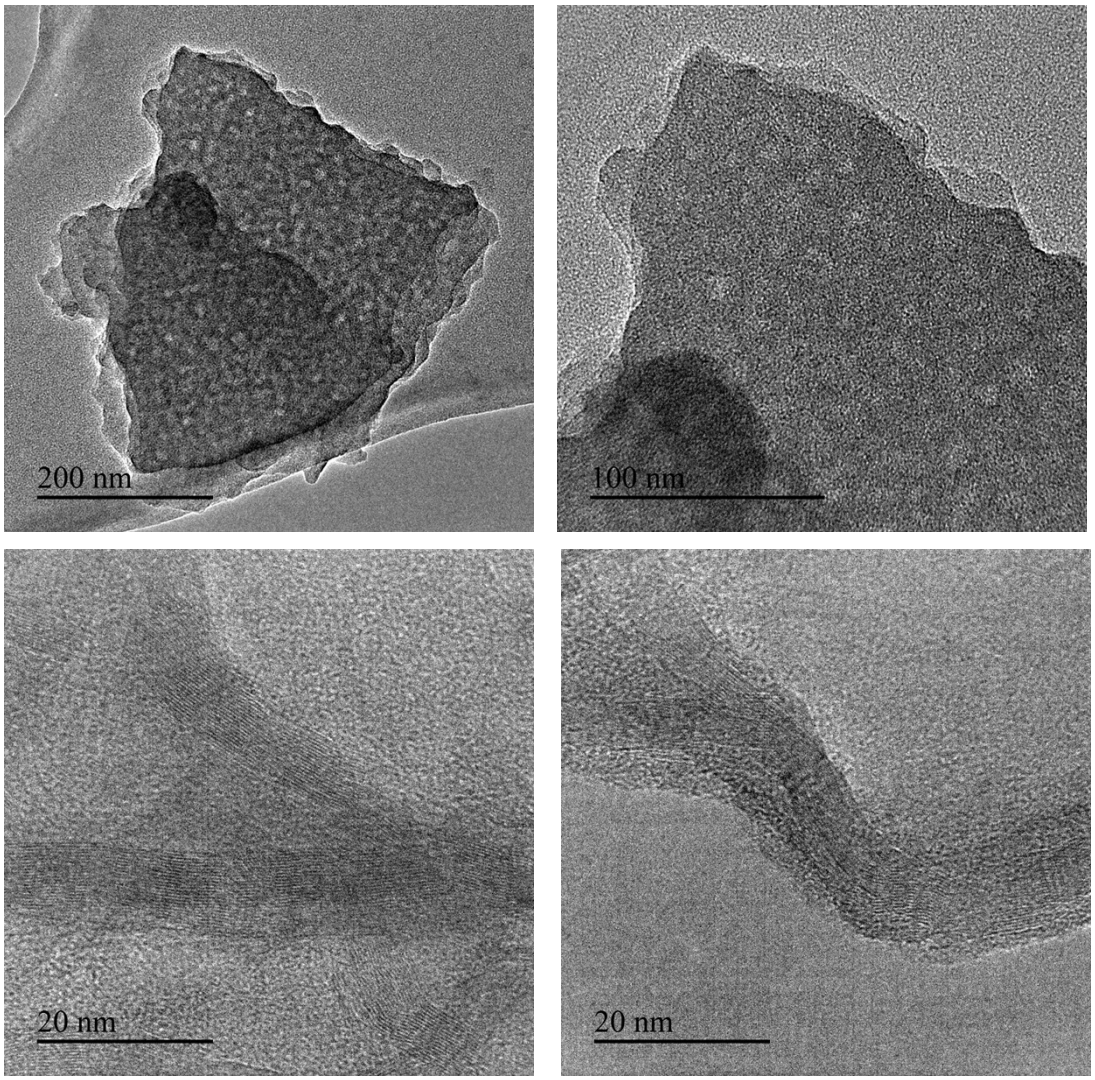
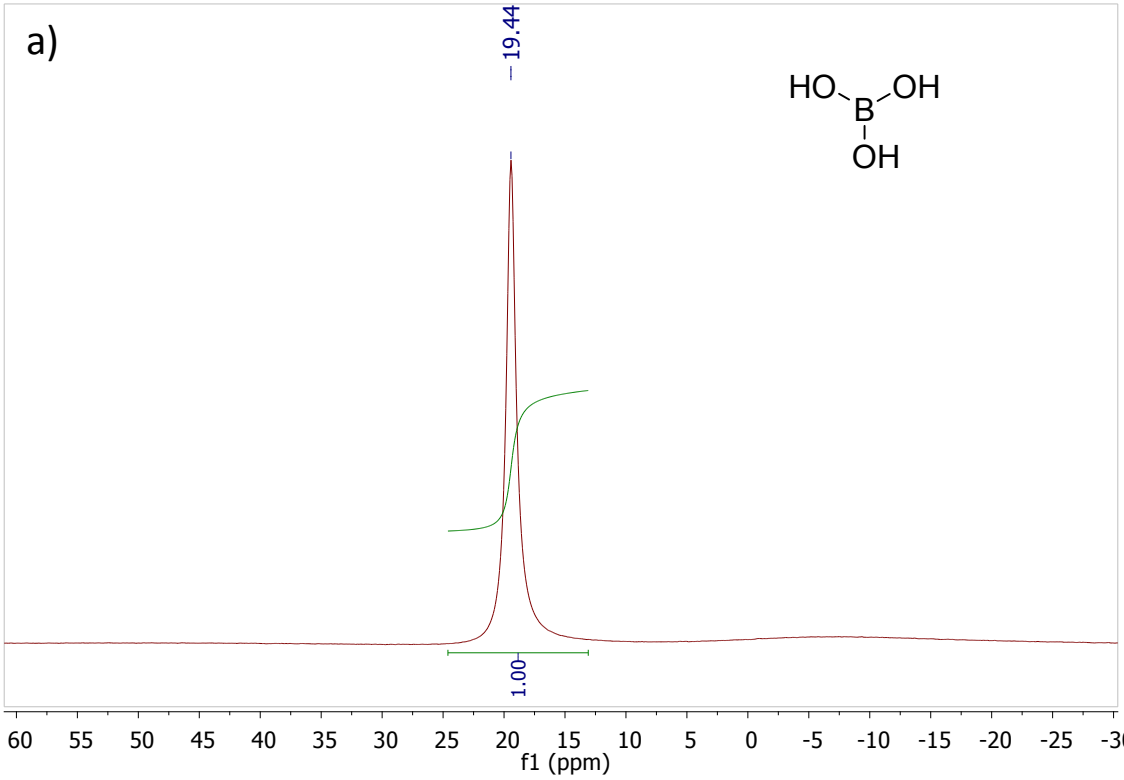
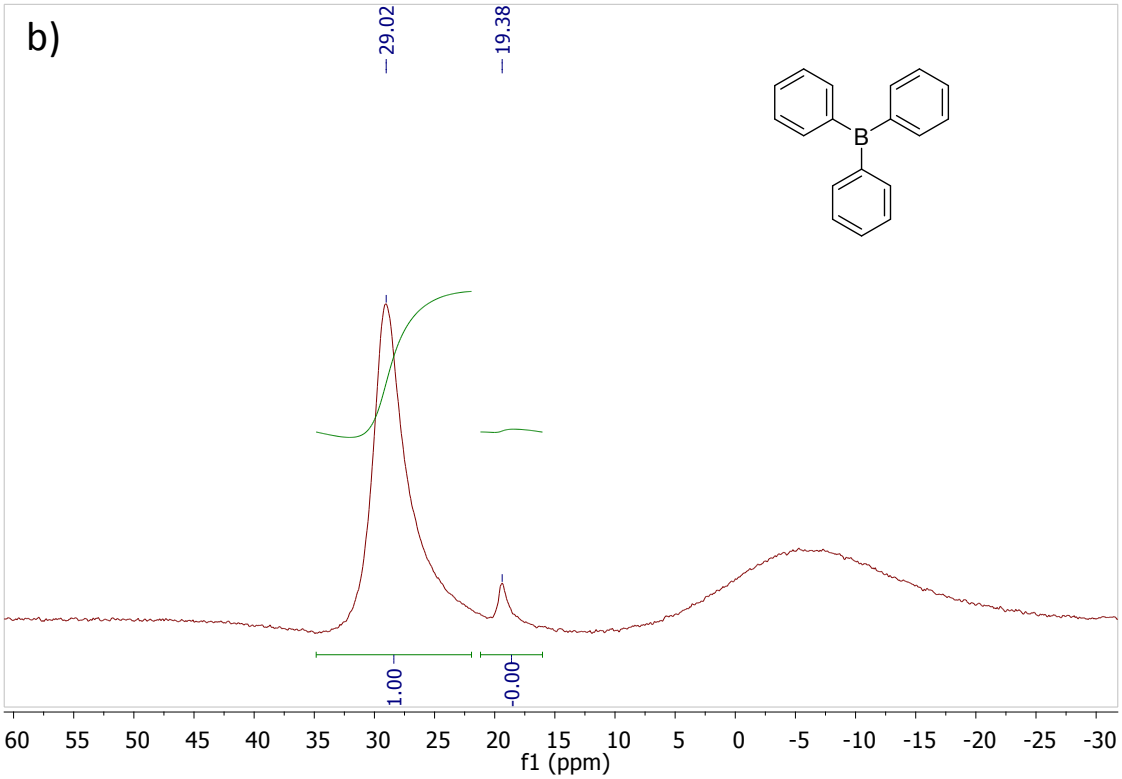


Figure S11. TEM images of the fifth times used (B)G sample at different magnifications.


a)
19.44
HO
OH
B
OH
1.00
60 55 50 45 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30
f1 (ppm)



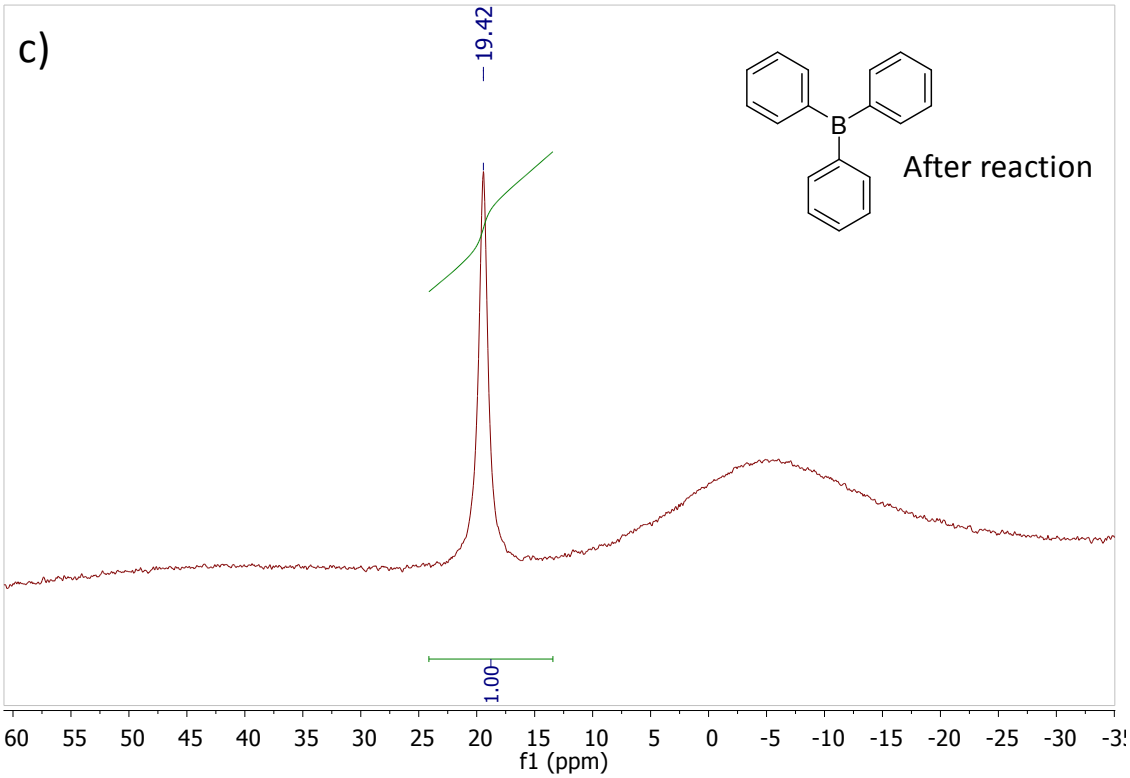


Figure S12. ^{11}B NMR spectrum in D_2O for H_3BO_3 (a), triphenylborane (b) and triphenylborane after reaction at 250 ºC during 3 h (c). The very broad band from 5 to -20 ppm corresponds to the B present in the borosilicate glass of the NMR tube.

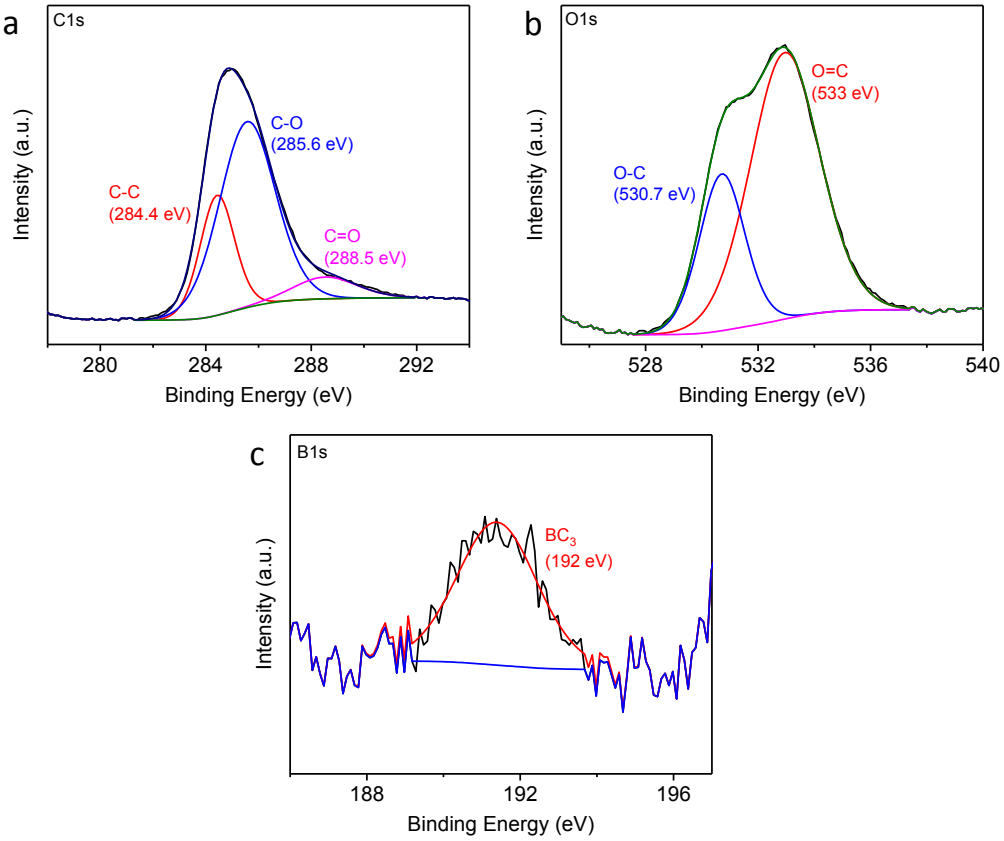


Figure S13. XPS C1s (a), O1s (b) and B1s (c) peaks, as well as their best fitting to individual components recorded for G+BPh_3 sample.