

Effect of hydrogenation on the particular layer in isotopically labelled Turbostratic- and Bernal stacked bilayer graphene

Karolina Drogowska

Petr Kovaříček, Martin Kalbáč

*J. Heyrovsky Institute of Physical Chemistry
Czech Academy of Sciences
Dolejškova 2155/3, 18223 Prague, Czechia*

Karolina.drogowska@jh-inst.cas.cz

References

- [1] P. Kovaříček, Z. Bastl, V. Valeš and M. Kalbac, *Chem. – A Eur. J.*, 2016, **22**, 5404–5408.
- [2] K. Drogowska, P. Kovaříček and M. Kalbáč, *Chem. - A Eur. J.*, 2017, **23**, 4073–4078.

Investigation of physical properties of graphene bilayers (BLG) still requires attention in order to understand the enormity of effects and phenomena allowing for broadening the range of their applications. One of the most efficient methods providing manipulation and modification of the graphene properties is its chemical functionalization¹. The main challenge that still remains is to distinguish the effects taking places in each of the layer.

Here we have prepared the ¹²C/¹³C BLG, both turbostratic (T) and Bernal (AB) stacked, and investigated the effect of the hydrogenation using the Raman spectroscopy. Thanks to isotopically labelled layers we were able to describe the changes in intensity of the D mode in both layers. Hydrogenation of the T-stacked BLG resulted with the appearance of the D mode related to the both layers, however, the median value of the ratio I(D)/I(G) is higher for the top layer (0.34) as compared to the bottom layer(0.22). In case of AB-stacked BLG only top layer reveals appearance of the D mode with the ratio I(D)/I(G) of 0.36 . Moreover, the efficiency of the hydrogenation of BLG is significantly lower than SLG revealing the value of the I(D)/I(G) ratio almost twice lower². These results suggest lower extend of hydrogenation for the bottom graphene layer than for the top layer, as well as lower efficiency of hydrogenation of BLG than SLG.