

The influence of sample preparation on XPS quantification of oxygen-functionalised graphene nanoplatelets

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Industry using graphene-related two-dimensional materials (GR2Ms) need an accurate understanding of their material properties to be able to develop innovative new products. X-ray photoelectron spectroscopy (XPS) is widely used for characterising the chemistry of GR2Ms, however the careful preparation of the sample for analysis is important in obtaining representative quantifications. [1,2] We report an investigation by three laboratories showing that the preparation method for oxygen-functionalised graphene nanoplatelet (GNP) powders has a significant effect on the homogeneous-equivalent elemental composition measured in XPS. We show that pressing GNP powders onto adhesive tapes, into recesses, or into solid pellets results in inconsistencies in the XPS quantification. The measured O/C ratio from GNP pellets depends upon the die pressure used to form them and the morphology of the GNPs themselves. We recommend that powder samples of GR2Ms are pelletised prior to XPS analysis to improve repeatability and reproducibility of measurements. [3]

References

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- [2] C.A. Clifford, E.H. Martins Ferreira, T. Fujimoto, J. Herrmann, A.R. Hight Walker, D. Koltsov et al., Nat. Rev. Phys. 34 (2021) 233.
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Figures

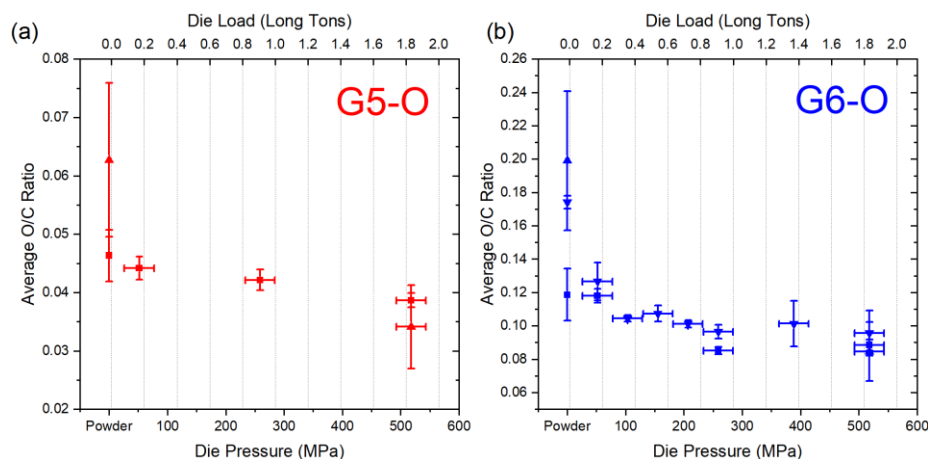


Figure 1: Influence of pellet formation pressure on the quantification of oxygen functionalised graphene. The measured O/C ratio decreases with increasing pellet formation pressure.