

Graphene benchmarking – market analysis and characterization strategies

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Graphene flakes or few layer graphene (FLG) are an obvious choice for fabrication of various bulk materials based on graphene, like elastic polymer composites, multifunctional coatings or lightweight foams. The quality of the graphene powder has a vital impact on the end product and thus the properties of a fabricated material. Most scientific groups worldwide use commercially bought graphene and have to rely on often poorly described product datasheet. The data provided is often vague and differs from manufacturer to manufacturer making it hard to determine the right supplier. What is more the overall quality of graphene flakes on the market is poor and the product is greatly overpriced [1].

We have studied the datasheets provided by the graphene manufacturers and distributors worldwide to prepare an FLG powder market analysis. We tested a selected group of commercially bought commercially bought FLG powders and two of our own production to verify the data provided in the datasheets. Finally we propose a characterization strategy for FLG powders to determine the average number of layers in a flake, the overall quality of graphene, graphene type (rGO powders are sometimes sold as “graphene”), possible chemical residues and the average lateral size of the flakes.

Additionally we present a novel physical method of large scale, high quality FLG production.

References

[1] Kauling, Alan P., et al. "The worldwide graphene flake production." *Advanced Materials* 30.44 (2018): 1803784.

Figures

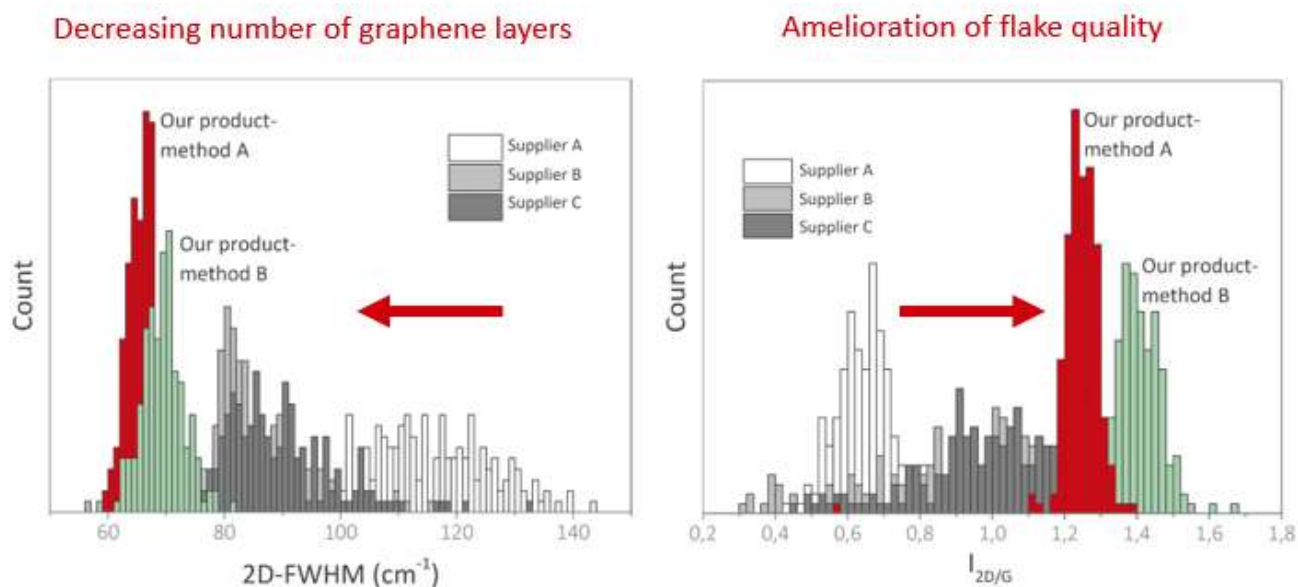


Figure 1: Statistical Raman spectroscopy of five FLG powders, three commercially bought and two fabricated by our group – a tool to determine the quality of commercially bought graphene flakes and estimating the average number of graphene layers in a flake.