

Liquid-Phase Exfoliation of Graphene in 'Green' Solvent

Anna Dużyńska

Anna Wróblewska, Anna Łapińska, Mariusz Zdrojek

Warsaw University of Technology, Faculty of Physics, Koszykowa 75, 00-662 Warsaw, Poland

anna.duzynska@pw.edu.pl

Mass production of graphene is crucial for its wide application in conductive ink, composite materials, supercapacitors, fuel cells, batteries, etc. Here we present the effective and scalable method to produce good quality few-layer graphene flakes with using liquid-phase exfoliation of graphite in 'green' solvent. Until now, the most commonly used solvent in the liquid exfoliation method was N-methyl-2-pyrrolidone (NMP) [1]. A relatively expensive and toxic solvent, which requires efficient cooling during the exfoliation process. We show that the replacement of NMP could be effective using a 'green' organic solvent [2], cheaper and more safe for human and environment. The details of the exfoliation process will be discussed.

In Figures 1-3 we present preliminary characterisation (SEM, Raman and AFM) of few-layer graphene flakes from our method. The method allows to obtain the good quality graphene flakes from a few to several dozen atomic layers and a surface in range from few to hundreds μm^2 . In addition, the studies of prepared samples indicate a negligible presence of defects in the structure of graphene layers.

References

- [1] K. R. Paton et al., Nat. Mater. **13**, 624 (2014).
- [2] A.D, A.W, A. Ł, M.Z, in preparation (2019).

Figures

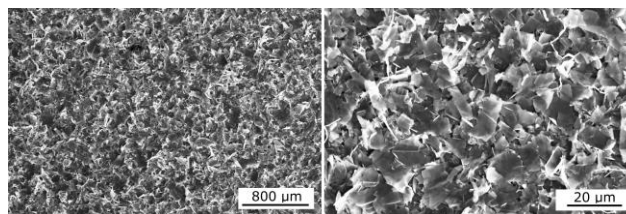


Figure 1: SEM images of graphene flakes from liquid exfoliation in 'green' solvent.

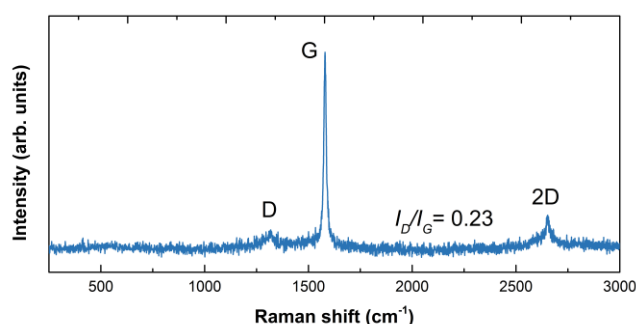


Figure 2: Raman spectrum of graphene flakes from liquid exfoliation in 'green' solvent.

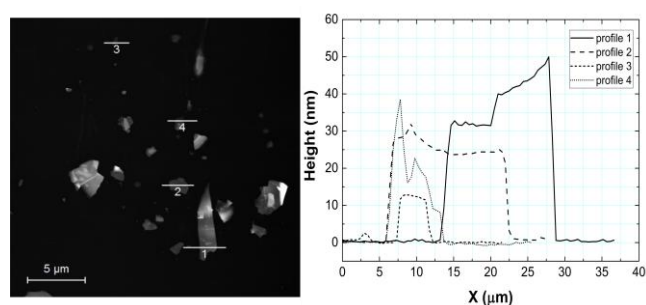


Figure 3: AFM image of graphene flakes from liquid exfoliation in 'green' solvent (AFM profiles were attached).