# Managing the degree of exfoliation and number of graphene layers using Probe sonication approach

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Abstract

Graphene, a two dimensional carbon based material having hexagonal lattice structure of $sp^2$ bonded carbon atoms owing to its unique nanostructure (1), electrical (2) and thermal properties (2) combined with its elasticity (1,2) and mechanical stiffness (1,2) has set the research and development sectors ablaze with interest in the recent times (2).

We have demonstrated a fast, versatile and scalable approach to synthesize high quality few layer graphene sheets with low defect ratio and high crystallinity produced from exfoliation of graphite flakes in DMF by using probe sonication. The effect of sonication time on degree of exfoliation and number of graphene layers has been fully investigated. The degree of exfoliation of graphene sheets as a function of sonication time has been successfully analyzed by XRD, UV-Vis spectroscopy, TEM and BET studies. The morphological changes at different sonication times have also been observed by SEM. A structural and defect characterization of graphene sheets has been discussed in detail by Raman spectroscopic technique.

## References

[1] Amanpreet Kaur, Ravi Chand Singh, Fullerenes, Nanotubes and carbon nanostructures, 25, 5(2017) 318-326.

[2] A.K Geim, K.S. Novoselov, Nature materials, 6, 3(2007)183-191.

## Figures

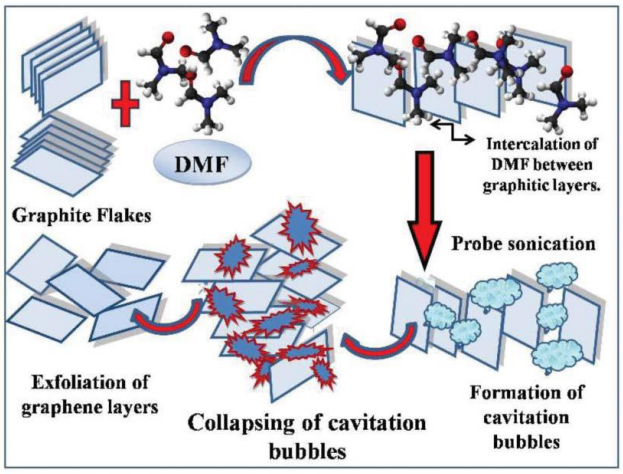


**Figure 1:** The schematic representation of exfoliation of graphite in DMF using probe sonication.

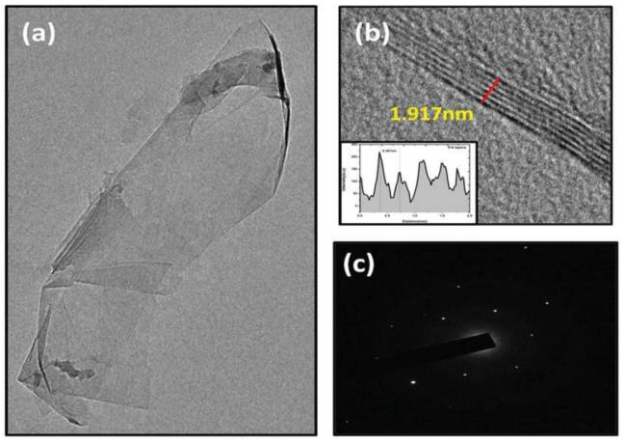


**Figure 2:** TEM images of: (a) graphene flakes of PS-90 (b) HR-TEM image of corresponding graphene flake (plot profile is shown in inset) (c) SAED pattern of corresponding graphene sheet.