

# HYDROTHERMAL EXFOLIATION OF GRAPHITE TO PRODUCE FEW-LAYER GRAPHENE

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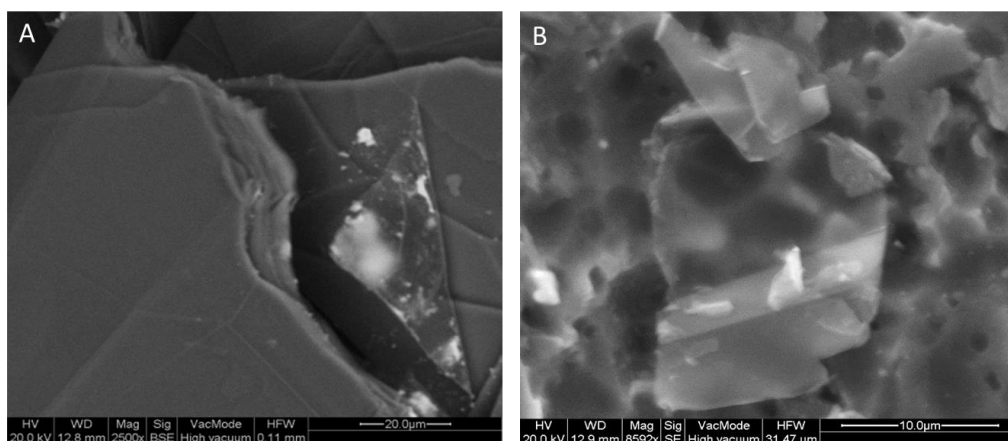
## Abstract (POSTER ONLY)

This poster describes an easy exfoliation of graphite in surfactant-water solution<sup>1</sup>. Here, we report that pristine graphite heat-treated (pre-treatment) in an autoclave for 15 hours at 180 °C<sup>2</sup> with a surfactant-water solution improves the process of sonication. The cationic surfactant hexadecyltrimethylammonium Bromide (CTAB)<sup>3,4</sup>, used in this work can be exploited both as dispersant and stabilizer, for pre-treatment and direct exfoliation of graphite, without the continuous addition of surfactant<sup>5</sup>, without a polymer stabilizer<sup>2</sup> and without extensive sonication periods<sup>6</sup>. Scanning Electron Microscope shows: (i) the distance between the layers increases in the pre-treatment of graphite without significant damage to the crystal structure, and (ii) thin and semitransparent films about 3 to 10 μm after the sonication process were observed. The absorption spectrum of graphene in the surfactant-water solution shows a peak around 268 nm characteristic of the  $\pi \rightarrow \pi^*$  interactions, it remarks that graphene absorption spectrum is flat and featureless.<sup>7,8</sup> Raman spectroscopy allows to observe a D peak, can be attributed to the surfactant/graphene interaction, and not to a disorder in the structure, also a 2D peak is observed comparable to previous reports <5 layers<sup>1</sup>. The graphene suspended was stable for several months without a substantial sedimentation and it can be vacuum filtered to make thin conductive films and put onto surfaces as individual flakes, maintaining its electronic properties, which can be used in a wide range of applications. This work opens the possibility of improving the heat-treated of graphite with other surfactants.

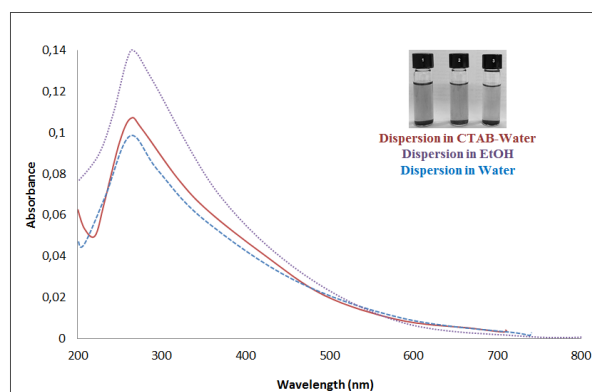
## References

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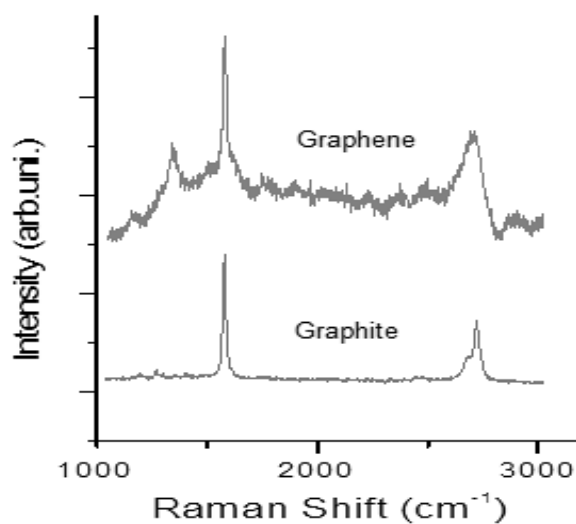
## Figures



**Figure 1.** SEM images of heat-treated graphite (A) and semitransparent film obtained from the surfactant-water solution dried at room temperature after sonication process (B).



**Figure 2.** UV-visible spectrum. Graphene dispersion in CTAB-water (brown solid line), dispersion in EtOH (purple dashed line) and dispersion in water (blue dotted line).



**Figure 3.** Raman spectra of dried graphene from surfactant-water solution (top) and graphite (down).