

Impact of probe sonication and sulfuric acid pretreatment on graphene exfoliation in Water

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Graphene is a 2D material with promising commercial applications due to its physicochemical properties. Producing high-quality graphene economically and at large scales is currently of great interest. Here, the potential of producing high-quality graphene at a large scale via water-phase exfoliation methods is investigated, as seen in figure 1. By altering exfoliation parameters, the production yield of graphene and flake size are evaluated. Pretreatment of the precursor graphite powder using acidic solutions of H₂SO₄ at different concentrations is found to increase further the yield and structural quality of the exfoliated graphene flakes. These findings are confirmed by means of various spectroscopy and surface characterization techniques. Flakes with thicknesses ranging from 1nm to 10nm and increased yield are achieved through optimization of the sonication process, centrifuge time, and H₂SO₄ pretreatment.

Figures

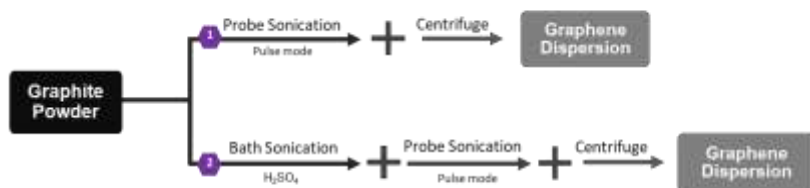


Figure 1: Graphene exfoliation approaches as implemented in this study.