

# Liquid phase exfoliated graphene nanosheets as laminates for water purification

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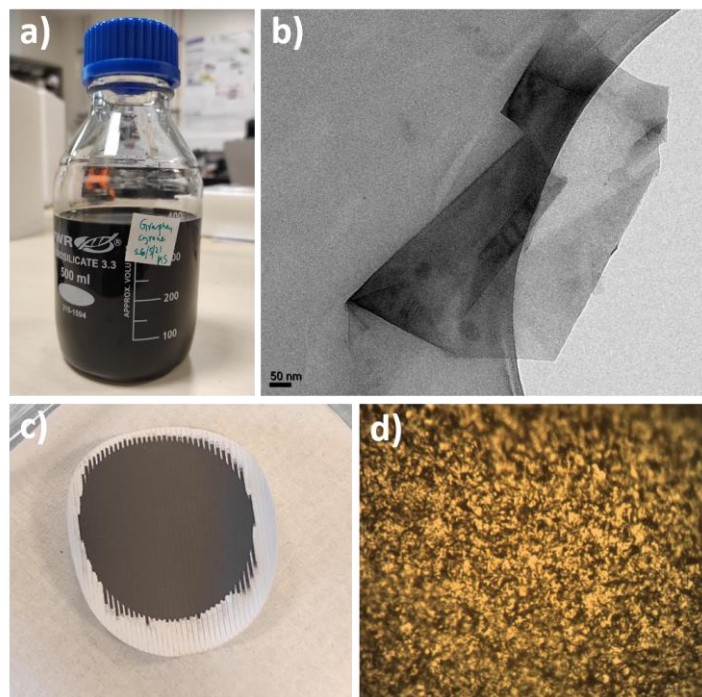
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Graphene and derivatives have drawn increasing attention for their imminent application in various technological fields, such as energy storage and conversion, gas separation and water purification. Over the past decade, graphene oxide and reduced graphene oxide have been explored as membrane materials for water and ion transport systems. However, when these materials are processed into aqueous medium, the produced membranes showed several drawbacks, including swelling, poor mechanical strength and stability issues. Here we describe an approach for the low-cost and large-scale production of graphene nanosheets (GNs) without any oxygen content, suitable to fabricate membrane for water purification. GNs were produced in a non-aqueous and non-toxic solvent (cyrene) via high-shear liquid phase exfoliation (LPE). The GN concentration, measured by thermogravimetric analysis, was as high as ~1 mg/mL. The prepared GN dispersion appeared highly stable over a long period (30 days). Raman spectroscopy and transmission electron microscopy were performed to confirm and evaluate the structure of the few-layer graphene nanosheets. GN-based membranes were prepared by vacuum filtration method using polyvinylidene difluoride supports. No swelling and pinholes were observed during ion the transport studies in water-based media.

## REFERENCES

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## FIGURES



**Figure 1:** a) Photographic image of the as-prepared graphene dispersion in cyrene solvent. b) TEM image of graphene nanosheets. c) As-fabricated graphene-based membrane. d) Optical microscopy image of the graphene laminates.