Reduced Graphene Oxide Foams for Micro and Nano plastic Filtration

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Abstract

The heavy use of plastics in today's age has inevitably contributed to the presence of micro- (<5 mm in diameter) and nano- plastics (MNPs) (<100 nm in at least one dimension) in various water systems [1].Filtering out such plastic pollutants especially of 20 µm or less is challenging with current filtration systems [2], [3]. In an effort to offer new technological solutions, this work involves developing 3D reduced graphene oxide-based foams (rGOFs), with tailored pore morphologies, for MNP filter filtration from polluted water systems. The rGOFs were fabricated via a chemical reduction route, using ammonia solution and tetraethyl orthosilicate (TEOS) as a chemical reducing agent and reinforcing agent, respectively. Scanning electron microscopy and Raman spectroscopy were used to characterise the foam morphologies and chemistry after thermal annealing. The physiochemical nature of the resultant rGOFs permits water flow whilst selectively adsorbing polymeric MNPs. The structural rigidity and the ability of the rGOFs to maintain their function in aqueous conditions, as well as under an applied water pressure, were also investigated.

References

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Figures

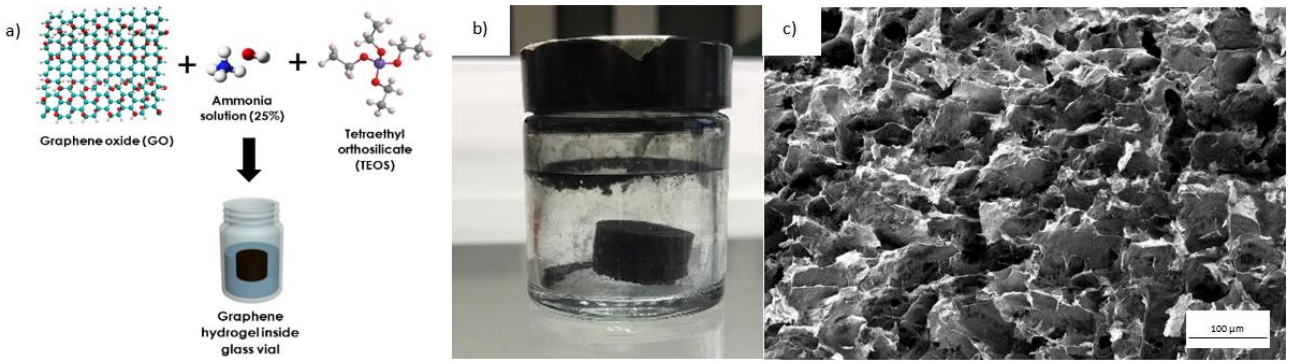

Figure 1: a) Representation of the key process required for rGOF synthesis, b) Graphene aerogel inside glass vial and c) SEM micrograph of the rGOF cross-section