

Synthesis and high-performance purification of functionalized graphene for water treatment

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Covalent modification of graphene oxide is a widely exploited strategy to tailor the surface and structure of graphene and enable new applications [1]. Several functionalized graphenes have been reported for water purification applications. Among them, covalent binding of branched polyethylenimine (PEI) has revealed great potential for the removal of metal ions from water [2] and for realizing membranes for ion sieving [3]. Here we report an unprecedented strategy allowing fast and efficient synthesis and purification of GOPEI. Microwave assisted epoxide ring opening combined to microfiltration on commercial hollow fiber modules allows to achieve GOPEI (63% yield) in only 30 minutes of MW irradiation at 80°C. PEI loading of about 40% was easily estimated by taking advantage of the microfiltration cartridge working mechanism (Fig. 1). The so obtained GOPEI nanosheets were exploited for arsenic and lead removal from water and the performances related to the surface properties (i.e. charge, polarity and structure) of the functionalized graphene.

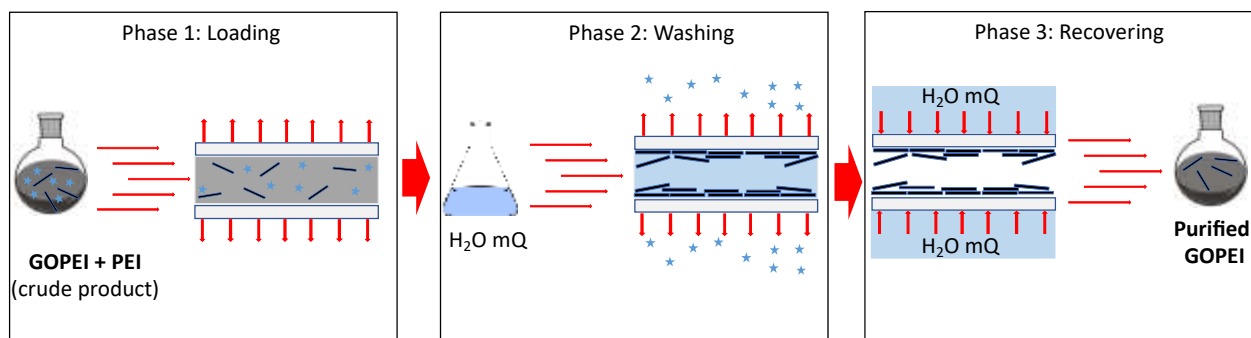


Figure 1: Sketch of the microfiltration procedure developed for modified GO purification. The crude material is introduced in the filtration module, the sheets are stopped by the membrane pores (cut off 100 nm) and washed and finally detached by inverting the water flow direction.

REFERENCES

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