3D graphene foams: surface modification and applications

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Graphene based structures have recently gained enormous interest from the scientific community thanks to the very good properties of this material, like mechanical strength, electrical and thermal conductivity, flexibility, stability, and so on. Indeed, the possibility to realize three dimensional (3D)architectures, able to strongly increase the high specific surface areas, make them very promising in fields like sensing or catalysis.
In this work we realize 3D graphene foams (GF) by chemical vapour deposition on Ni foams used as templates. These structures are widely investigated in order to optimize the surface to improve its interfacial adsorption, its functionalization or its coupling with other organic materials. Different approaches have been used, going from the post-growth coverage of the GF with polyporphyrins to graphene N-doping during the graphene CVD growth. Through the former approach it is possible to obtain free standing devices for photocatalytic application in the visible range, while the latter could modify the C hexagonal structure and hence the graphene surface and its polarity and reactivity. Both the approaches show to be very promising in order to control and properly modify the GF properties, representing an important knowledge for future challenging applications in fields like gas and biosensing or water remediation.

References

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Figures

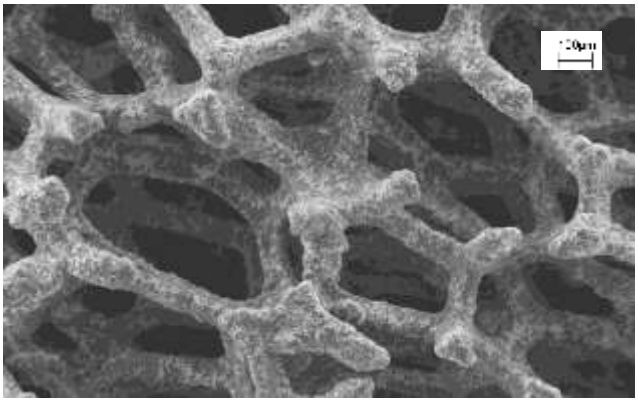

Figure 1: Scanning electron microscopy of GF

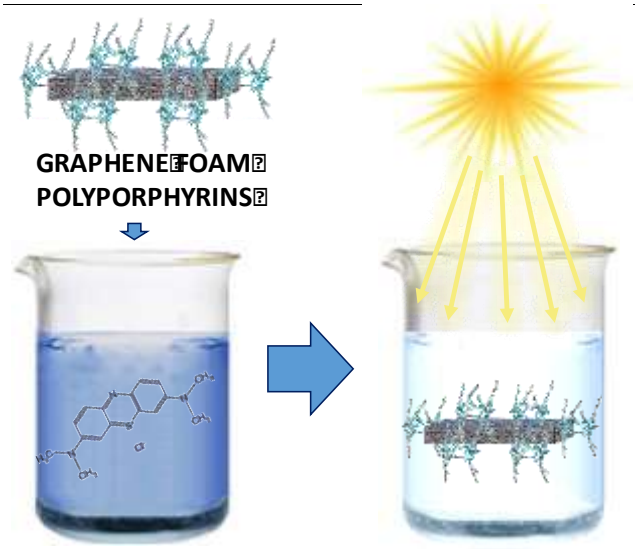

Figure 2: Scheme of application of GF-porphyrin hybrid systems for water remediation