

Graphene-based material for oil spill removal

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Oil spill events required efficient and rapid response by authorities and operating staff. The emergency management is not simple and usually is affected by a large consumption of materials and high operative costs. The optimization of the adsorbents is a starting point to reduce these costs. In this study, a graphene-based material (called Grafysorber[®], produced by Directa Plus S.p.A) was used inside adsorbent devices (barriers and pillows) to treat waters containing an oily separated phase. Grafysorber[®] is a super-expanded graphite with a production apparent density of about 2.5 g/L. Three different kind of oils were tested: kerosene, diesel fuel and crude oil, to understand if there is a relationship between viscosity and sorption capacity. In addition, reusability of each device was evaluated. Little pillows of about 10*10 cm were used for adsorption tests. Results showed that the greater is the viscosity, the greater is the amount of oil sorbed; 50.8 g/g for kerosene, 76.5 g/g for diesel fuel, 81.78 g/g for crude oil. Grafysorber[®] pillows can be reused, after simple squeezing, for about 4-5 times. A progressive decrease of adsorption capacity was detected. Polypropylene, the standard adsorbent material used worldwide in case of water oil spill clean-up activities, showed a sorption capacity at least six times lower than Grafysorber[®]. The effect of the waves was considered, using diesel fuel, in a 1*5 meters tank, and small adsorbent barriers (7.5 cm diameter and 50 cm length). Water motion caused an increase in the saturation's speed but also an increase of retained water both for Grafysorber[®] and for Polypropylene barriers. A dropping phase of 5 min is necessary for Grafysorber[®] and polypropylene devices to favor the water expulsion from the adsorbent device. Anyway, it has been demonstrated that Grafysorber[®] retains on average the 50% less of water than polypropylene.

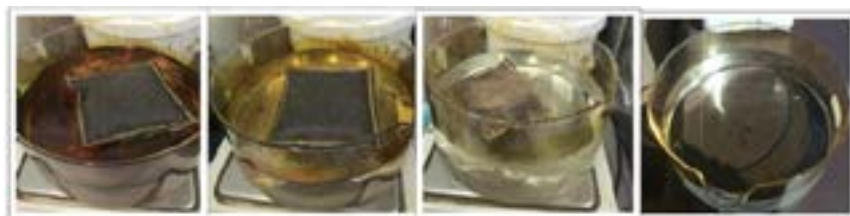


Figure 1: Example of crude oil adsorption by Grafysorber G+

Biography

Annalisa Pola graduated in Environmental Science (University of Insubria – Como – Italy) and is an Environmental Application Manager at Directa Plus S.p.A. Directa Plus is one of the largest producers and suppliers of graphene-based products for use in consumer and industrial markets worldwide.

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