高效吸油石墨烯複合材料

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Superabsorbent for removal of oil

市場及需求：

油汙之移除是維護環境及生態重要議題，而油回收後的再利用則可減少資源的浪費及創造二次經濟效益。市面上雖已有許多吸附材料，但仍有許多問題待解決。本技術可應用於製備高效和低成本吸油和除汙材料，所吸附之油汙可輕易回收，故極具市場競爭力。

技術摘要(含成果)：

本簡易方法所製備之疏水功能性海綿(布料)具有多孔性奈米結構，故可以增加對油脂的吸附與脫附能力。此疏水功能性海綿(布料)對不同黏度的油脂皆有極佳的吸附效果，能夠吸附的油脂重量比本身海綿體重多出約 16 倍，例如本產品對於腳踏車鏈條油或機車引擎油的最大吸附容量為 880 和 840%。使用本產品，可快速且容易地進行油汙的吸附和脫附，並可藉由紙巾擠壓、按(擠)壓海綿(布料)或正己烷回收油汙。此外，本產品具價格低廉、產品穩定和可重複使用等優點。

優勢：

本產品所能夠吸附的機車引擎油重量比本身海綿體重多出約 16 倍，對比市面上其他產品而言，例如:膠原蛋白磁性奈米複合材料(2 倍)、聚氨酯海綿(13 倍)、功能性聚氨酯泡綿(13 倍)、聚二甲基矽氧烷海綿(10 倍)等，皆有較佳的吸油能力。顯示本產品具有絕佳的潛力作為大規模清理海中油汙的吸附材料。本產品亦可快速且有效的清除環境中(如廚房)之油汙和沾黏於手上之油汙(除上述油品外，尚包括文具用油品及染料、油漆等)，清除效果遠較市售產品為佳且快。

競爭產品：

親油性改質型黏土、纖維材料、還原石墨烯、聚氨基甲酸酯和吸油氈(毯)等已被用於清理污油的產品。

專利現況：

本研究團隊具有數十年研究經驗，著力於開發新穎且綠色的奈米材料合成方法並將其應用於除污方面。本團隊研究成果具體表現，包含大量論文發表於頂尖的國際期刊和積極參與許多國際合作案等。

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Graphene composites as super oil absorbents

Superabsorbent for removal of oil

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Market Needs: The removal of oils is beneficial for protecting the environment and preventing ecological issues. The absorbed oils can be removed and reused, which reduces the risks of oil wastes and creates sources for secondary fuels. Although many oil absorbents are readily available in the market, there are still many issues to be resolved. Having the advantages of fast and efficient absorption of oils, this product has great potential to compete with those products currently available in the market.

Our Technology: Functional hydrophobic sponges (clothes) prepared from common sponges (clothes) through simple chemical processes have porous structures that increase oil absorption capacity. The as-prepared sponge (cloth) absorbs oils with different viscosities at a faster rate. It absorbs bicycle chain oil ~16 times higher than its own weight. The maximum absorption capacity of the sponge for bicycle chain oil and motorcycle chain oil are 880 and 840%, respectively. The absorbed oils can be removed quickly by simply squeezing it with fingers, pressing it on a tissue paper, or extraction with hexane. The functional hydrophobic sponge (cloth) has advantages of low cost, stability, and durability.

Strength: This product absorbs bicycle chain oil ~16 times higher than its own weight, which is significantly higher than that of commercial absorbents, including collagen based magnetic nanocomposites (~2 times), polyurethane sponges, (~13 times), functional polyurethane foams (~13 times), and polydimethylsiloxane coated sponges (~10 times). This product has great potential to be used for preventing the massive oil pollution in sea. This product also has great potential to protect the environment. It can be used to remove oils from kitchen, and different types of stains including grease and stationary products (oil inks and paints) from hands. This product over commercial products provides greater capability and faster rate for removing oils and stains from the surfaces.

Competing Products: Lipophilic modified clay, fiber materials, reduced graphene oxide, polyurethane and absorption felt (blanket), etc., have been used for removal of oil spills.

Intellectual Properties: Prof. Chang's group has shown their strong experience in preparation of nanomaterials for the removal of pollutants. This research group has published many papers in high-quality international journals. To promote science & technology worldwide, Prof. Chang's team has been actively involved in several international collaborative projects.

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