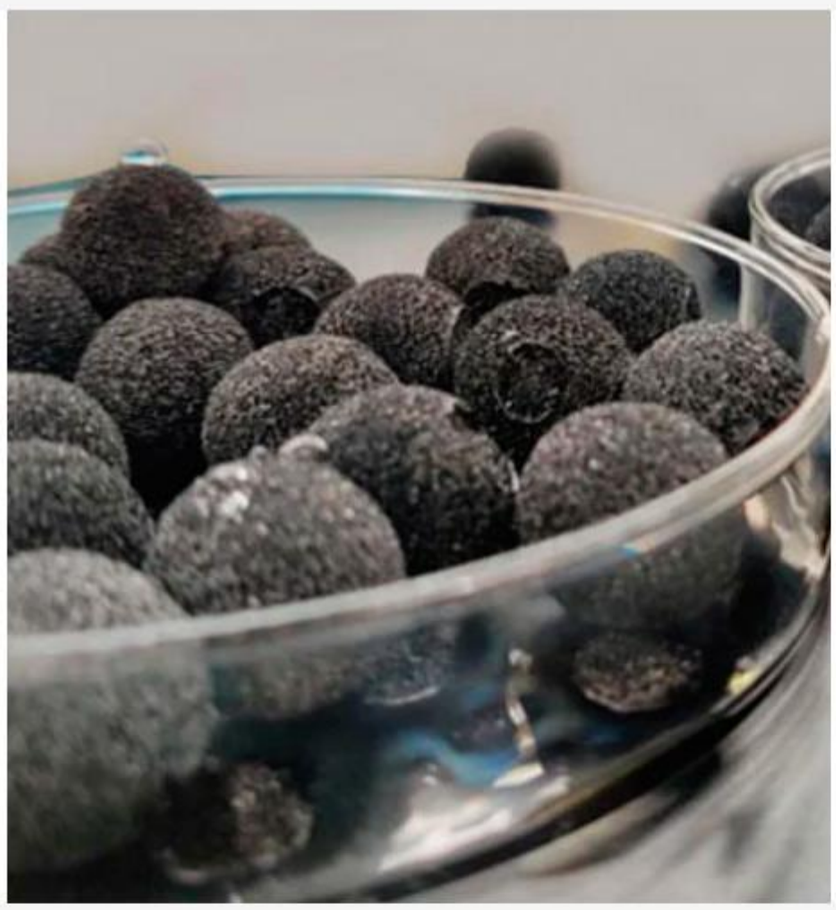


GRAPHENE MODIFIED POROUS MATERIAL (SPHERICAL GRAPHENE MODIFIED SPONGE)

Product Description

MstnLand's graphene modified sponge is a kind of 3D graphene modified porous material which combines hydrophobic and oleophilic graphene with common commercial porous sponge. By incorporating graphene into a sponge-like structure, the resulting graphene modified sponge inherits the excellent properties of graphene and gains additional functionalities. The graphene component enhances the mechanical strength, electrical conductivity, and overall performance of the sponge material. So that it has the high mechanical strength of graphene, high electrical conductivity, high thermal conductivity, excellent hydrophobicity, but also has the characteristics of sponge high resilience, porous structure, large porosity and large surface area. These characteristics make it suitable for a variety of applications, and has great performance advantages in adsorption, filtration, and catalytic applications. The graphene modified sponge has a high adsorption capacity for various water pollutants such as dyes, oils and other organic solvents, and it's capable of absorbing various oil and organic solvent pollutants equivalent to 120 times its own weight.

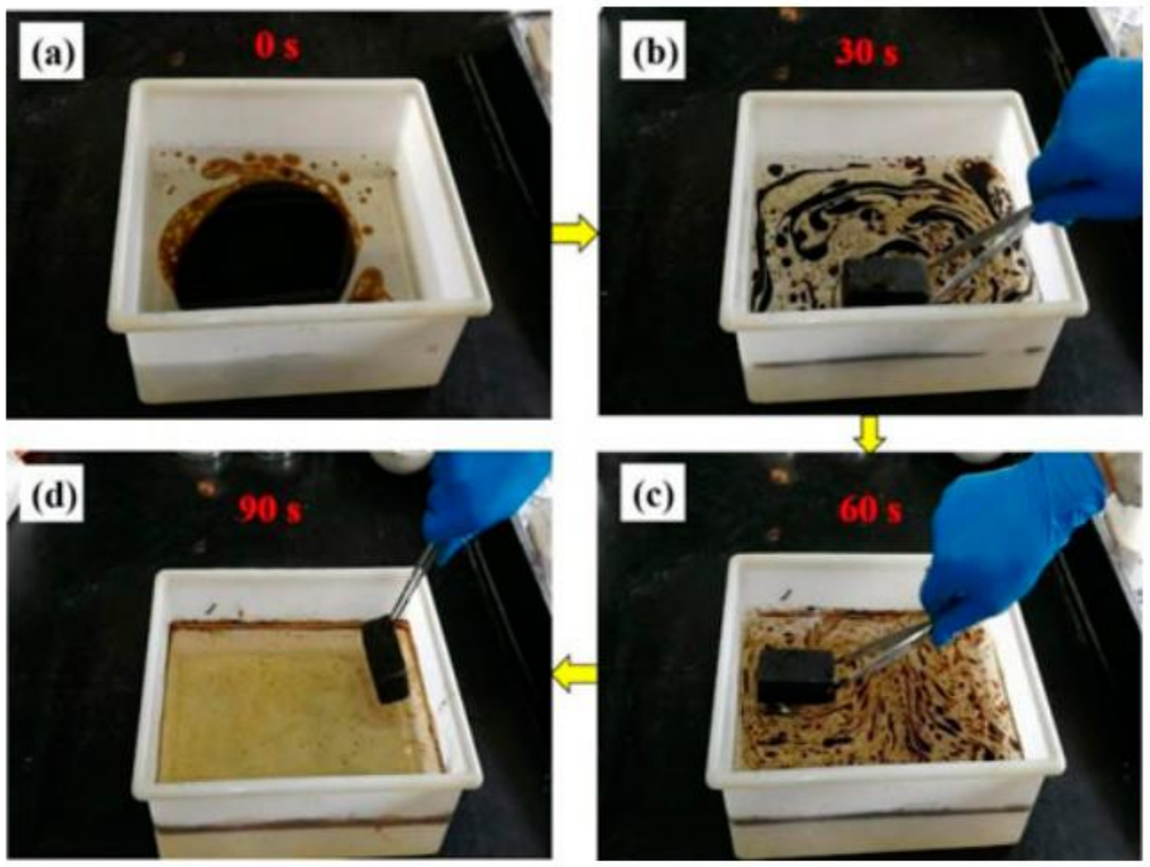
MstnLand's graphene modified sponges can be used to deal with oil spills during oil extraction, refining and transportation, as well as organic solvent pollution used and emitted in the chemical industry. Using graphene modified sponge instead of oil absorbing felt to deal with oil spill pollution at sea, it can still float on the water after absorbing oil, easy to salvage and recycle, and can be reused more than thousands of times. When the graphene modified sponge reaches the absorption saturation state, it can be used repeatedly after physical extrusion treatment, and can keep the structure and performance without significant change and degradation.

Due to different application scenarios and technical specifications, MstnLand's graphene modified sponges can be customized according to customer requirements in various shapes, sizes and specifications, such as graphene sponge balls, graphene sponge blocks, graphene sponge boards, graphene sponge cakes, graphene sponge filters, etc.

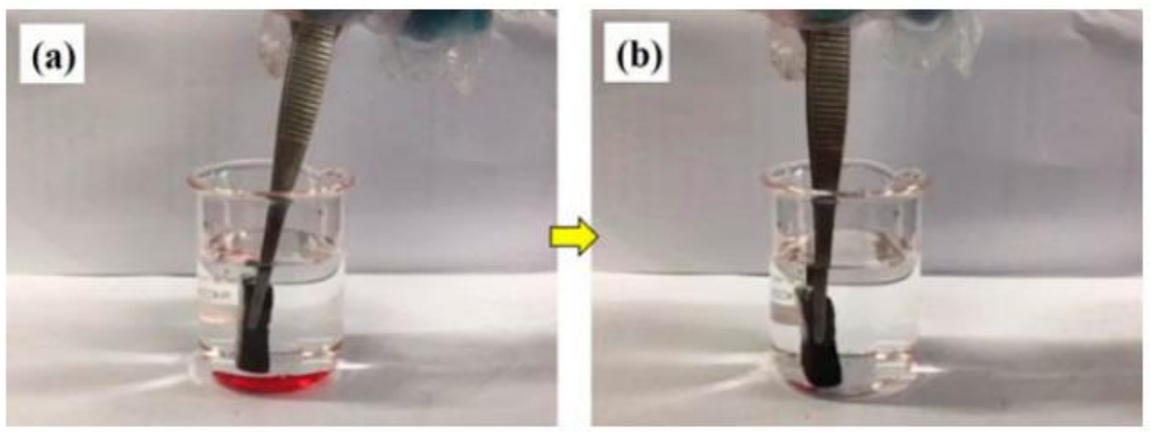
Graphene modified sponge ball with 6cm diameter

Graphene based oil sponge ball with 4cm diameter

Graphene based oil sponge ball with 2cm diameter



As shown in the figure above, add a simulated sea water containing 3.5% NaCl and pour 10 mL crude oil into the tank. A graphene modified sponge is held with tweezers and the oil on the water surface is absorbed back and forth. Under the action of the sponges' lipophilic and capillary forces, the crude oil from the water surface quickly penetrates into the sponges' pores. With the recovery process, the oil storage space of sponge gradually decreases, and the oil absorption rate decreases compared with the beginning. After 90s, most of the oil is recovered, and the sponge can continue to float on the water surface, which is conducive to salvage and recovery.

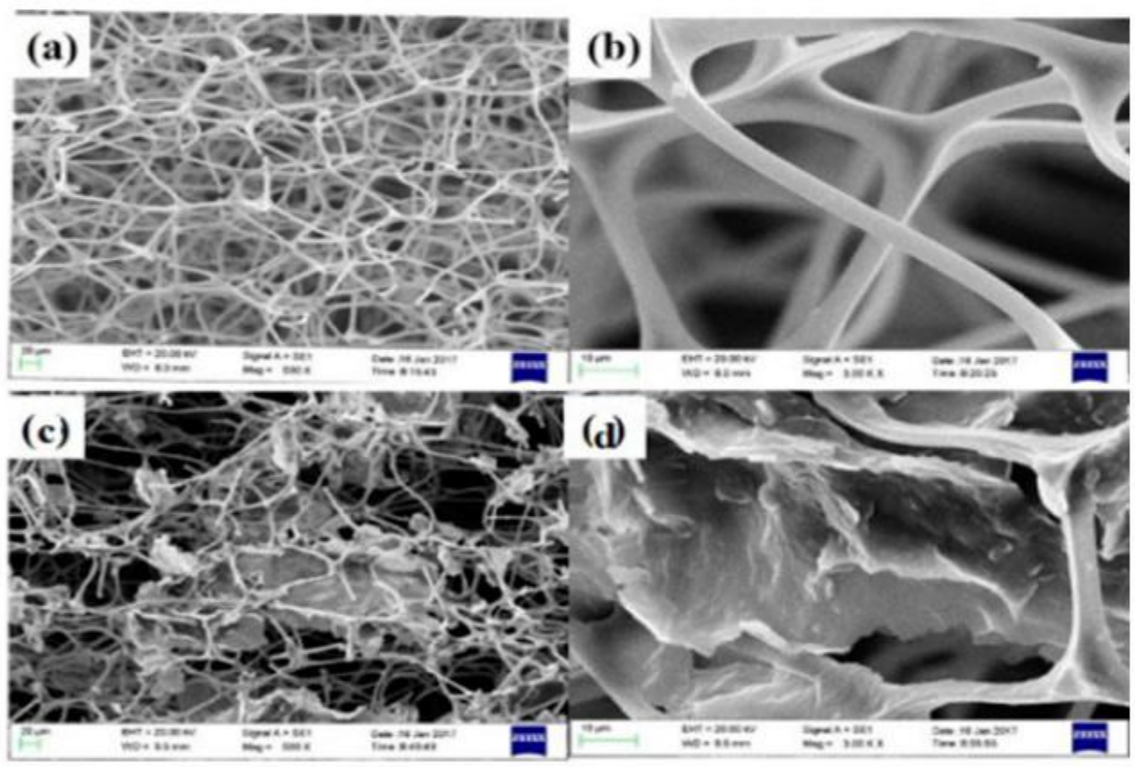


The water bottom of the beaker is trichloromethane stained with Sudan Red III. Dip the graphene modified sponge into the water bottom, and the trichloromethane is immediately adsorbed without absorbing water. It can be seen that in addition to oil recovery on the water surface, graphene modified oil absorbing sponge also has good selective adsorption for underwater oil or organic solvent leakage, and can be applied in the field of underwater oil and water separation. Sponges are good at oil philicity and hydrophobicity, and have strong selective absorption for heterogeneous oil-water mixing systems. They have great advantages in waters where large mechanical recovery equipment is difficult to operate, such as shoals and riverbanks

Technical specifications

Function: Can be used for oil slick, organic solvent recovery, which can be recycled by extrusion or negative pressure, after regeneration it can be reused.

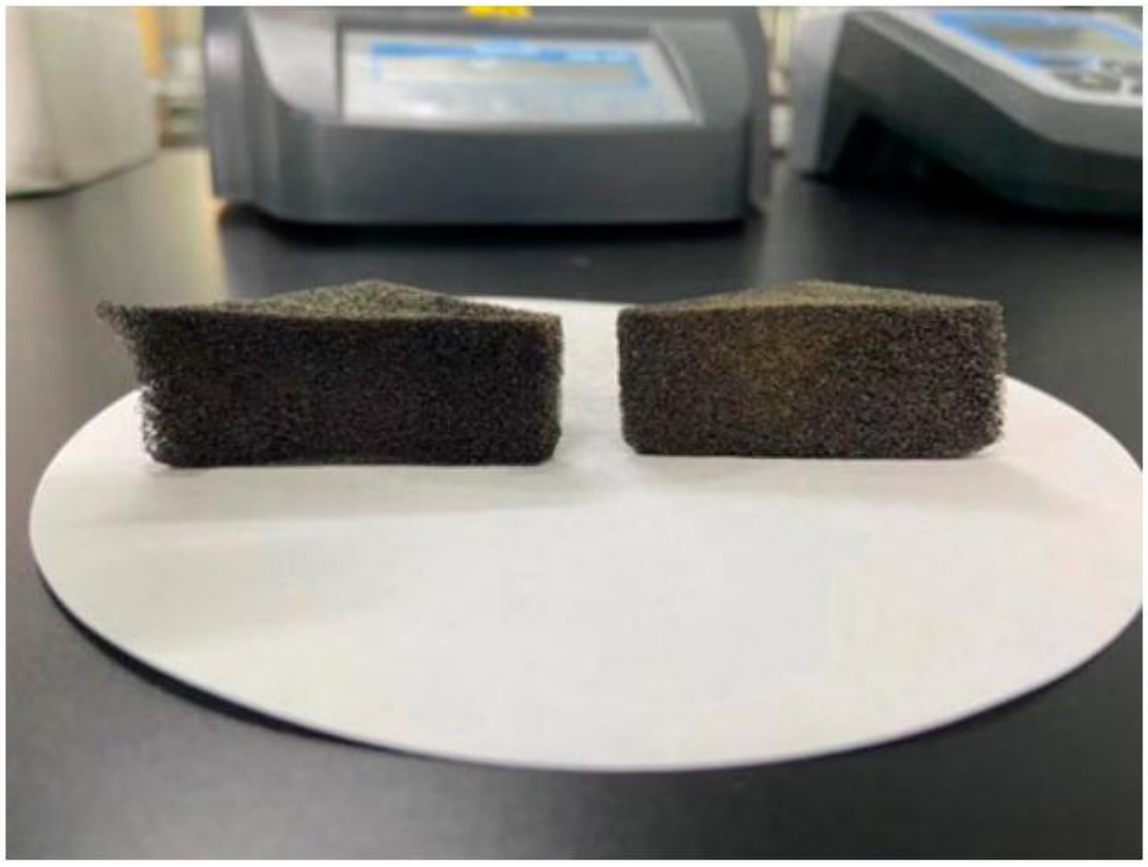
Item	Parameter
Color	Brown/black
Voidage	5ppi ~ 60ppi
Density	15 ~ 50kg/m3
Size	Non-standard and customizable
Shape	Non-standard and customizable
Applicable materials	Oil slick, organic solvent and so on



The above is the electron microscope scanning of the corresponding microstructure of blank sponge and graphene-supported sponge magnified 500 times (left) and 3000 times (right) respectively. Figure a and b show that the skeleton of blank melamine sponge is smooth and interwoven, forming multistage micropore structure with pore size ranging from tens to hundreds of microns. Therefore, oil or organic solvents can freely pass through the internal pores; The cross-linked skeleton structure of the sponge can also effectively support the weight of the adsorbed oil, giving the sponge a larger oil absorption capacity. According to the surface wetting theory, the material surface wettability is related to surface roughness and chemical properties. Because the blank sponge skeleton surface is smooth and flat, and contains a large number of hydrophilic groups, the oil-water separation selectivity is poor. As can be seen in Figure c and d, a large number of clumped and irregularly distributed graphene coatings appeared on the surface of the skeleton structure of the graphene loaded sponge. After local amplification, it could be clearly seen that there were crumpled protrusions with micro or nano size attached to the pore wall, which greatly increased the roughness of the sponge.

Product advantages

- Super hydrophobic, contact angle can be more than 150°;
- The adsorption rate is high, the adsorption capacity of crude oil can reach 120 times of its own weight;
- High desorption rate, up to 95%;
- After repeated use, the adsorption rate remains high after up to thousands of adsorption-desorption.



New graphene-based oil sponge (lift) VS graphene-based oil sponge that has been reused more than 1,000 times (right)

Water contact angle test diagram of graphene modified sponge

Applicable fields

Graphene modified porous materials and graphene modified sponges have wide application prospects in industrial fields such as oil refining, petrochemical, catalytic slurry filtration, printing and dyeing, carbon black raw materials, Marine fuel, coking raw materials, charcoal/asphalt raw materials, residual oil cracking and hydrogenation raw materials due to their unique properties and structures. Some notable applications of them include:

- Oil-Water Separation: Graphene modified sponge and graphene modified porous materials can be used to efficiently separate oil from water. Its hydrophobic nature allows for selective oil adsorption, making it effective in treating oily wastewater and oil spills.

- Environmental Cleanup: Graphene modified sponge and graphene modified porous materials's high oil adsorption capacity makes it suitable for environmental cleanup, including the remediation of contaminated soils and sediments.

- Energy Storage: Graphene modified sponge and graphene modified porous materials has been investigated as an electrode material for supercapacitors and batteries. Its large surface area and high electrical conductivity enable improved energy storage and faster charging and discharging rates.

- Water Filtration and Purification: The porous structure of graphene modified sponge and graphene modified porous materials allows for effective water filtration and removal of contaminants such as heavy metals, organic pollutants, and microplastics.

- Water Desalination: Graphene modified sponge and graphene modified porous materials can serve as effective membranes for water desalination due to their exceptional permeability and selectivity. They allow for efficient removal of salt and other impurities from seawater or brackish water, offering a potential solution for clean water scarcity.

- Catalysis: Graphene modified sponge and graphene modified porous materials can function as a support material for catalysts in various chemical reactions. Its high surface area and structural stability enhance catalytic activity, making it useful in areas such as hydrogen production and environmental remediation.

- Gas Separation and Storage: The nanoporous structure of graphene modified sponge and graphene modified porous materials can enable selective gas separation and storage applications. They can be used to separate specific gases from gas mixtures or to store gases for applications such as hydrogen storage.

- Sensing and Biosensing: Graphene modified sponge and graphene modified porous materials's surface can be modified for sensing and biosensing applications. Its high sensitivity and selectivity make it suitable for detecting gases, chemicals, and biomolecules.

- Thermal Management: Graphene modified sponge and graphene modified porous materials has excellent thermal conductivity and mechanical flexibility, making it useful for thermal management in electronic devices, heat exchangers, and advanced cooling systems.

- Sound Absorption: The porous structure and conductive properties of graphene modified sponge and graphene modified porous materials enable effective sound absorption. It can be used in architectural acoustics, noise reduction materials, and acoustic panels.

- Drug Delivery: Graphene modified sponge and graphene modified porous materials can serve as a carrier for drug delivery due to its biocompatibility and large surface area for drug loading.