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## Si based coated fabrics using plasma polymerization method for efficient oil-water separation

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In recent years, the increase of industrial effluents in particular the leakage of oil and the draining of industrial effluents in rivers, has created serious environmental hazards and huge economic lost. The use of hydrophobic and oleophilic fabrics has been considered as a way to clean up contaminants through the absorption and separation of pollutants from industrial effluents.

In this research, the low-pressure plasma polymerization method based on eco-friendly materials like Polydimethylsiloxane was used to fabricate hydrophobic and oleophilic cotton fabric. Also a low-pressure oxygen plasma pre-treatment was performed before plasma polymerization.

Contact angle test and absorption capacity test was used to represent hydrophobicity of coated fabric and to measure the absorbance ability of different oils. Also scanning electron microscopy (SEM) was used to observe morphological changes on the surface of cotton fibers and Infrared Fourier transform (FTIR-ATR) spectroscopy to detect the chemical bonds created on the surface of fibers. Water-oil separation efficiency and laundering test have been conducted to determine the separation rate and to represent durability of coated cotton, respectively.

The water contact angle of coated fabric was  $142\pm 3$  and this high hydrophobicity behavior remained after 10 cycle laundering. Also SEM results showed that the surface of fibers was covered by a random distribution of several microscale structures or a hierarchical surface structure like the lotus leaf. Our Water-oil separation tests demonstrated that coated fabrics had a high separation efficiency of 85 to 95 percent after 15 cycles for most of the industrial oil. These results indicate that si based coated cotton fabrics has a high potential for application in water-oil separation and selective oil absorption and they are promising for the development an environmental friendly and recyclable separation of oil from water.

### Keywords

Polydimethylsiloxane  
plasma polymerization  
hydrophobic-oleophilic fabrics  
water-oil separation