

Title : Preparation of a superhydrophobic coating on a hydrophilic substrate for use as a liquid-absorbent material in medical applications

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Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

ABSTRACT

This study aims to develop superhydrophobic/superhydrophilic double-layer coatings on gauze for use as liquid absorbers in medical applications. The fabrication of superhydrophobic medical materials is a crucial strategy for reducing contamination, controlling liquid absorption, and minimizing infection risks, particularly in wound-contacting materials such as gauze dressings. However, achieving superhydrophobicity on inherently hydrophilic materials like gauze remains challenging, necessitating efficient coating or spraying techniques. This work investigates the wetting behavior of silver nitrate-modified polydimethylsiloxane (PDMS) and its role in inducing superhydrophobicity. The experiment was conducted using silver nitrate at a concentration of 100 mM, which was dissolved in deionized water. The solution was homogenized for 5 minutes at ambient pressure and room temperature. Gauze dressings were immersed in the silver nitrate solution for 15 minutes, air-dried, and subsequently coated with polydimethylsiloxane (PDMS) solutions with the concentrations of 1%, 3%, and 5% by spray coating technique. Surface morphology was analyzed using scanning electron microscopy (SEM). The results indicated that an increase in PDMS concentration enhanced the thickness and water resistance of gauze fibers. However, higher PDMS concentrations led to a reduction in surface roughness. Notably, the surface roughness of the coated fibers played a critical role in determining the superhydrophobic properties, with optimized conditions achieving a water contact angle exceeding 150° . Furthermore, the antibacterial activity of the samples was investigated, analyzed, and discussed.

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