A study on the coating of nanofibers on the surface of commercial mask filter by electrospinning

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전기방사에 의한 상용 마스크 필터 표면의 나노섬유 코팅에 관한 연구

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Abstract

With the wide discovery of nanotechnology and control technology, nanofibers are currently widely used in a variety of fields, such as filter media, biosensors, military protective coatings, three-dimensional tissue scaffolds, composites, drug delivery, wound dressings and electronic equipment. Generally, nanofibers can be fabricated by drawing, template synthesis and electrospinning. Among these technologies, electrospinning technology is very attractive because of its simplicity, versatility and the ability to form a series of biopolymer nanofibers. Moreover, electrospun nanofibers have the advantages of small fiber diameter, excellent pore interconnectivity, large specific surface area and easy modification of functional groups. Therefore, nanofiber membranes prepared by electrospinning generally have good permeability and filtration efficiency. On the other hand, with the improvement of people's understanding of environmental pollution, a greener and healthier living environment has become the goal pursued by modern people. Fine particles such as PM2.5 and volatile harmful gases such as VOCs are common harmful substances in daily life. However, it is difficult to capture and remove them using ordinary filter membranes. This is because ordinary filtration membranes have large pore size, large fiber diameters, and no functional functional groups on the fibers.

In this study, in order to ensure that the mechanical strength of the original commercial mask filter membrane does not decrease, while improving the filtration performance of the mask filter membrane and having good antibacterial properties, the surface of the commercial mask filter membrane is coated with nanofibers by using electrospinning technology. The composite nanofibers were characterized with field emission scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM) and X-ray diffractometer (XRD). The binding characteristics of commercial mask fibers and electrospun nanofibers were observed by FE-SEM. The filtration characteristics and antibacterial activity of commercial mask filter membranes before and after nanofiber coating were compared and investigated.

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