

Improvement of moisture management properties of face masks using electrospun nanofiber filter insert

ABSTRACT

Face coverings such as a face mask are one of the important preventive measures amidst the COVID-19 pandemic, by limiting exhaled particles and reducing expiratory droplet spread. Adding a filter to face masks may offer extra protection against the virus. Nevertheless, there remains a significant concern where thicker, tightly woven materials of masks may reduce the ability to breathe comfortably, due to inadequate moisture management properties of woven fabric in existing disposable surgical face masks. Therefore, the study on the properties of air permeability, water vapor permeability, and flexural rigidity of a face mask fabric is highly essential. This study is aimed at analyzing the potential application of electrospun nanofibers fabricated from electrospinning technique, as filter inserts in commercial surgical face masks. The function of electrospun nanofiber filter (NF) inserted in commercial surgical face masks was introduced in the study. The results indicated the significant reduction in air permeability and water vapor permeability along with the additional usage of electrospun NF within the surgical face masks, due to the smaller fiber size and interspaces in the filter layer as analyzed from FESEM analysis. The percentage of air permeability value was slightly decreased by 15.9%, from 339.5 to 285.5 mm/s, whereas the value of flexural rigidity of surgical face masks with and without electrospun NF insert is 0.1358 and 0.1207 mg/cm, respectively. Hence, the NF inserts are recommended as the potential core component in a face mask.