

Centrifugal multi-spinning system for large scale production of nanofiber in the mask filter application

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Polymer nanofiber has gained increasing attention in various applications including filtration, wound dressing, tissue engineering, protective clothes, and lithium ion battery. To satisfy the increasing demand of nanofiber, large scale production method of polymer nanofiber is required. Compared with electrospinning, centrifugal spinning is a strong spinning method of polymer nanofiber due to its advantages of high production rate without electrically conductive target and high voltage. For the mass production of polymer nanofiber, we designed centrifugal multi-spinning unit by integrating multiple spinning disks. Using the disk, we produced polystyrene (PS) nanofiber with a production rate of 24 g/h, showing the potential and scalability of our spinning unit. We further introduced air flow and moving fiber collector for the continuous production of nanofiber. We also fabricated PS nanofiber-based dust filter mask, and the fabricated mask showed high capture efficiency of 80.3% under NaCl particle (average diameter ~ 0.6 μ m) test condition.