

## Fabrication of highly aligned nanofiber with different weight ratios of the magnetic-nanoparticles by electrospinning

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Electro spinning has emerged as a very attractive approach to the fabrication of nanofibers. In electrospinning process, the ability to control the alignment and arrangement of fibers is critical to achieve the designed functions. When magnetic nanoparticles are mixed with polymers, aligned fibers can also be fabricated. In this paper, we have successfully obtained highly aligned nanofibers by adding properly an external magnetic field at the collector. The PVA polymer solutions with different weight ratios of  $\text{Fe}_3\text{O}_4$  nanoparticle (20 nm) were firstly prepared with the help of ultrasonic clean machine for 24 h. The aligned nanofibers could be achieved by the magnetic-electrospinning set-up. These nanofibers fabricated using the magnetic-electrospinning are substantially more uniform and with much less splitting than those without the field. By making observations and doing experiments we found that the electrical conductivity and viscosity of the polymer solutions had been obviously improved with the increase weight ratios of super-paramagnetic  $\text{Fe}_3\text{O}_4$  nanoparticle, and the proper magnetic-electrospinning concentration of PVA polymer solutions is 8%-10% and the weight ratio of magnetic nanoparticles is less than 0.5%. In addition, the scanning electron micrographs (SEM) showed the magnetic field could decrease the diameter of fibers and enhance the uniformity of fibers distribution. The X-Ray Diffraction revealed the magnetic field intensity and the weight ratios of magnetic nanoparticles could obviously improve the crystallinity of the nanofibers. In summary, the magnetic-electrospinning technique for generating uniaxially aligned nanofibers was illustrated. The well-aligned nanofiber has the potential applications such as fiber-reinforcement, fiber-oriented liquid crystal, and tissue engineering. It is a simple and efficient way which could generate highly aligned nanofiber mats.

### Biography

Hong-Ying Liu has got her Bachelor's degree at Dezhou University and now is a postgraduate in College of Textile and Clothing Engineering, Soochow University. She has got two patents since 2013.

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