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**Uniformly dispersed polymeric nanofiber composites by electrospinning:
poly(vinyl alcohol) nanofibers/polydimethylsiloxane composites**

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Abstract

A method for the fabrication of homogeneous and well-dispersed polymeric nanofiber composites was investigated. Nanofiber fillers can be used to produce polymeric nanocomposites by mixing the fillers to base polymers, eventually enhancing the mechanical property of the matrix polymers. To produce such composites, nanofibers were usually sandwiched by molten matrix polymers at high temperature before molding. The traditional so-called sandwich method, however, was found to produce rather biased and inhomogeneous composites due largely to the solid entanglement of the nanofibers. In this work, unwoven polymer nanofibers were synthesized through electrospinning by controlling the electrostatic repulsion of the nanofibers. We modified the electrospinning apparatus for the direct synthesis of homogenous composites: nanofibers were electrospun and directly ejected from the electrospinning syringe to the matrix polymer *solution* (not in a solid state), where a regular metal electrode plate was replaced by an optimized metal container containing the base polymer solution. It was found that this new fabrication method could realize homogeneous mixing of the nanofibers that were eventually uniformly dispersed in the

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