

Fabrication of carbon nanofibers based on electrospun polymeric nanofibers

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Among many methods of producing nanofibers (NF), electrospinning is well known and important process because of its cost effectiveness and handling convenience. Also, electrospun NFs have superior properties include high surface area to volume ratio, very thin and excellent mechanical properties. Especially, synthesis of carbon nanofibers (CNF) produced by carbonization of electrospun NFs have been widely used for reinforcing materials. However, there have been remaining issues in the application of CNFs as reinforcing materials. One of the main problems is difficulty in uniformly dispersing the CNFs in the matrix materials because the CNFs based on electrospun NFs exist in the entanglement state. In this reason, mechanical properties of CNF based composite have shown the mechanical properties lower than those of theoretically predicted values.

To overcome this problem, short CNFs were prepared by carbonizing the short PVA NFs which were produced by cutting the iodine treated long PVA NFs. Iodine treatment, which reduced strain value of PVA NFs by changing molecular structure of PVA, was essential process in order to cut long PVA NFs into short fibers. The length of cut CNFs strongly depended on the iodination and sonication time.