

443d Nanofibers in Capturing Submicron Particles

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Nanofibers 100-300 nm obtained from electrospinning are known to improve capture efficiency of submicron particles. In this paper, the capture mechanical mechanisms by diffusion, interception, and inertia are examined for submicron aerosol particle capture with nanofibers. Also methods will be compared between conventional fiber with addition of nanofibers and filters with just nanofibers (without larger fibers). In particular, filter efficiency (or penetration), pressure drop, most penetrating particles, and also quality factor (quotient of minus logarithm of penetration to pressure drop) are used to characterize the performance between these two types of filters with nanofibers and this is compared with conventional filter with larger microfibers (1 micron – 20 microns). Parameters examined include fiber concentration or density (for a wide range of concentration), fiber diameter, challenging particle size, and air velocity. The most appropriate mechanical capture efficiency correlation selected is used to compare with previous reported test results in the literature with very good agreement. Finally, some interesting optimization results are obtained using this correlation in terms of filter efficiency, fiber concentration and pressure drop.