Filtration and Dust Loading on Nanofiber Filters

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Nanofiber media has emerged as a promising media which can provide a greater filtration efficiency and higher performance than conventional fibers. We investigated the nanofiber filters composed of a layer of nanofibers on a substrate made of micron-sized fibers. The pressure drop and filtration efficiency were measured experimentally and the figure of merit was obtained. We developed models to compute the efficiency and figure of merit and the results were in good agreement with experimental ones. Experiments were also performed to study dust loading on nanofiber filters. Loading on the nanofiber filters entered the dust cake regime very quickly whereas the substrates had longer depth filtration regime. It was observed that the pressure drop across nanofiber filters increased faster with dust loading compared to that across substrates. The dust cake on nanofibers can be easily cleaned in reversed pulse jet applications, which could lead to long filter life.