

## **Modeling of Nanoparticle Filtration Using Nanofibers of Different Patterns**

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### **Abstract**

A 3-D numerical model was developed to simulate nanoparticle filtration in nanofiber media. Two nanofiber patterns, i.e., 90 degree and 45 degree between two adjacent nanofiber layers, were studied and compared. The 3-D flow field was firstly solved assuming slip wall boundary conditions. Individual particle's trajectory was then simulated with diffusion included and excluded, and the particle collection efficiency can be calculated based on trajectories of a large amount of nanoparticles. It was found that the two studied nanofiber patterns gave almost the same collection efficiency in the studied particle size range, i.e., 5 – 200 nm. When diffusion is considered, the most penetrating particle size is around 80 nm and the collection efficiency is around 40% there. The model can be a useful tool in the study of nanoparticle filtration using nanofibers.

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