Nanotechnology application to Geo-environmental engineering fields based on performance of nanofifer made geosynthetics

Han-Yong Jeon

Inha University, South Korea

Nanotechnology is a kind of new technology which can make the ultimate fine device such as fiber by controlling atoms and molecules with 10-9m unit and this technology can be widely used to all the industrial parts. Among the nanoproducts, nanofibers could be controlled on the fiber length, diameter, surface property, pore distribution, fiber evenness, cross sectional shape etc. Nanofiber is one of the most advanced materials which can be easily designed with high performance from these distinctive properties. New geosynthetic materials which have separation, filtration and absorption functions could be made could be developed in the field of geoenvironmental applications by using nanofibers. As an example of nanofiber geosynthetics in geoenvironmental applications, it is very important to eliminate the toxic and organic components of the waste leachate solutions. But there is no function for the simply manufactured nonwoven geotextiles and it is needed to manufacture the functional nonwoven geotextiles which can absorb the toxic and organic components to be harmful to the men's health. However, it is able to manufacture this functional nonwoven geotextiles by using nanotechnology. The goal of this study is to introduce the nanofiber manufacturing technology and possibility of nanofiber geosynthetics in the geoenvironmental applications. Also, separation and filtration function by effects of nanofiber geosynthetics were also introduced as an important point of view. For an example of nanoparticle used geotextiles, Yellow clay as nanoparticle was added to the nonwoven geotextiles to improve the removal effects of the toxic and organic components of the leachate solutions. Engineering performances were evaluated to confirm the effects of yellow clay addition. Finally, the possibility of nanofiber geosynthetics in the future was considered through the expert's suggestion.