Cleaner water through nanotechnology

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Tiny particles of pure silica coated with an active material could be used to remove toxic chemicals, bacteria, viruses, and other hazardous materials from water much more effectively and at lower cost than conventional water purification methods, according to researchers writing in the current issue of the *International Journal of Nanotechnology*.

Peter Majewski and Chiu Ping Chan of the Ian Wark Research Institute, at the University of South Australia, explain that the availability of drinking quality water is fast becoming a major socio-economic issue across the globe, especially in the developing world.

However, water purification technology is often complicated, requires sophisticated equipment and is expensive to run and maintain. Moreover, it usually requires a final costly disinfection stage. The Australian team suggests that nanotechnology could provide a simple answer to the problem.

The researchers have investigated how silica particles can be coated easily with a nanometer-thin layer of active material based on a hydrocarbon with a silicon-containing anchor. The coating is formed through a chemical self-assembly process so involves nothing more than stirring the ingredients to make the active particles.

These active particles, so called Surface Engineered Silica (SES), were then tested to demonstrate that they could remove biological molecules, pathogens such as viruses like the Polio virus, bacteria like Escherichia

coli, and Cryptosporidium parvum, which is a waterborne parasite.

"The results clearly show that organic species can efficiently be removed at pH ranges of drinking water by stirring the coated particles in the contaminated water for up to one hour and filtering the powder," the researchers say. They point out that the filtration process occurs through an electrostatic attraction between the pathogens and the surface engineered particles.

The recent report entitled 'Water for People - Water for Life' of the World Water Assessment Program of the UNESCO says that more than 6000 people die every day due to water-related diseases, including diarrhea, worm infections, and infectious diseases. In addition, organic pollutants from industrial waste water from pulp and paper mills, textiles and leather factories, steel foundries, and petrochemicals refineries, are a major cause of illness in parts of the world where regulations do not necessarily protect people from such industrial outflows.

The team's nanotech approach to water purification could help prevent disease and poisoning for potentially millions of people.

Source: Inderscience Publishers