

Nanotechnology – The Next Remediation Magic Bullet?

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Nanotechnology has been compared to the next industrial revolution in the scope of applications and scientific fields that it encompasses. Investment into and production of products from the nanotechnology industry is projected to be worth several trillion USD within the next 5 years. Applications of nanotechnology range from wrinkle resistant/antibacterial cloth to water purification devices. Within the environmental sector, nanotechnology may prove to be a significant tool in our arsenal of environmental remediation technologies for cleaning up heavy metals and organic compounds. Currently, industry and regulatory agencies face many challenges on how to remediate contaminated sites (soils, sediments and groundwater) in a cost effective manner that also takes into consideration the protection of the public and safeguarding the environment. Due to the unique physico-chemical properties of nanoscale particles, nanotechnology may be a cost-effective efficacious solution to these challenges. Several different nanoscale particles are being investigated as remedial solutions including nanofiber chitosan, polyamidoamine (PAMAM) dendrimers and nanoscale zero valent iron (nZVI).

Golder Associates Ltd., has been using nZVI for remediation of TCE contaminated sites and HydroQual laboratories has investigated the changes in total microbial profiles after the applications of nZVI in terrestrial environments. These scenarios, a general introduction into the uses of nanotechnology for remediation and the potential unforeseen consequences to the environment and human health will be discussed.

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Dr. Sylvia Chan Remillard is an Alberta Ingenuity R&D Associate. She is currently conducting the initial work studying the fate and effects of nanoscale particles on ecological receptors and is developing a preliminary risk based framework to assess the environmental impact of nanotechnology. She was nominated for the Governor General Gold Medal Award for her doctoral research where she studied the efficacy of dairy derived probiotics and bioactive peptides in altering intestinal microbial ecology in the treatment of gastrointestinal disorders. She has presented her current and previous work at numerous international and national conferences and has a number of technical and peer reviewed publications. Dr. Chan Remillard has been invited by the USEPA to participate as an expert panelist reviewing the use of nano TiO₂ in water treatment and topical sunscreens. Dr. Chan Remillard is actively involved in various professional societies including, the Society of Environmental Toxicology and Chemistry (SETAC), the American Society for Testing and Materials (ASTM) International, the Society for Risk Analysis and a fellow of the International College of Nutrition and their associated nanotechnology advisory groups.