

# **Environmental Nanotechnology: Application of Nanomaterials for Environmental Protection and Pollution Abatement**

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Nanotechnology is emerging as one of the promising technologies for the environmental protection and pollutant abatement. Many types of nanomaterials have been used for organic and inorganic contaminant removal from water, air, and soil. Currently, many researchers investigate on the synthesis of the novel nanoscale materials and find a way to be used in environmental protection. However, the success of this technology is totally accounted on the properties and reaction mechanism of those invented materials.

To envisage and enhance the application of environmental nanotechnology, this presentation focused on theory, mechanism, and application of the nanomaterials. First, emphasis will be placed on the fundamental properties of nanoparticles that lead to a high performance, success, and failure of those nanoparticles in contaminant removal. Some required properties of nanomaterials for pollutant cleanup can be designed from the synthesis method. The performance of the invented materials can be measured in the lab scale prior to the real application.

Second, the reaction mechanism such as surface adsorption, photocatalytic reaction, and Fenton and photo-Fenton processes occurred during application of nanomaterials for environmental cleaning will be addressed. The examples of existing applications of nanotechnology in the commercial market for clean water, wastewater treatment, and air purification will be given. Many drawbacks and limitations of technology applications such as the required quality of influent or air stream to the reaction unit, the post-treatment requirement, the releasing of nanomaterials to environment, and the cost of technology, are also included.

It is known that the application of nanomaterials in everyday life can cause the releasing of these materials to the environment, and the adverse effect may occur on human health. The last topic of this talk is the nanosafety aspect for the application of nanotechnology. Currently, the safety of nanomaterials mainly assessed on the basis of the pristine substance. The knowledge on the transformation of nanomaterials (NM) is very limited. The nanosafety consideration in applying this technology will base on our works with experts in OECD Working Party on Manufactured Nanomaterials. The precautions in using this technology will be educated and raised to create the sustainability of the nanotechnology for the environment.