## 2012 Clarke Prize Laureate

***Pedro J.J. Alvarez, Ph.D., P.E., DEE***
*George R. Brown Professor of Engineering*
*Rice University*

Alvarez is a global leadership and contributions to enhancing water resource sustainability through water pollution control. He is best known for his pioneering research in two fields: bioremediation and environmental nanotechnology.

Alvarez began his career in the mid-1980s, working on a U.S. Congress directive to evaluate environmental impacts associated with the deployment of intercontinental ballistic missiles. This experience, which focused on assessing water supplies and treatment infrastructure at U.S. Air Force bases, inspired his passion to apply science, technology, and policy to protect water resources.

He moved on to earn his Ph.D. at the University of Michigan, which is where he first began to make advancements in understanding the practice of bioremediation, a water treatment process that involves using microorganisms to remove contaminants from water supplies. Alvarez's initial research focused on remediating groundwater aquifers impacted by hydrocarbons, organic compounds that naturally occur in oil. Fellowships and awards followed, as well as expanded research. Today, he is the author of two textbooks on bioremediation in soil and water, and the oil and gas company BP recently used his research to develop hydrogeology models to evaluate potential groundwater impacts from different types of biofuel blends.

Alvarez later pioneered research on groundwater impacts associated with ethanol fuel releases, resulting in the development of guidelines for many states and the USEPA on the remediation and natural attenuation of groundwater impacted by leaking underground storage tanks. He has also made significant findings in the area of phytoremediation (which uses plants to remove contaminants), such as discovering that TCE, a chemical found in industrial solvents, can be taken up and transformed by plants irrigated with contaminated water.

Since joining Rice University in 2004, Alvarez has taken the lead in evaluating the environmental impacts of nanotechnology, an emerging field that involves the uses of technology at the molecular level. Alvarez studies the fate, transport, and impact of a number of nanomaterials in the environment, a unique approach that includes examining both the benefits that may be produced from nanomaterials and any risks these materials may later pose to human health and safety. He is also examining the response of microorganisms to exposure to nanomaterials. His papers on the subject of environmental implications of nanotechnology are among the most widely read and cited in the water industry.