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Eawag Seminar Invitation

Nanotechnology-Enabled Water Treatment to Address Growing Challenges of the Water Energy Nexus

Speaker **Prof. Pedro J.J. Alvarez,**
Nanotechnology-Enabled Water Treatment Center (www.newtcenter.org)
Rice University, Houston, TX. 77005, USA

When **May 4, 11.00 – 12.00 a.m.**

Where **Forum Chriesbach, room C20, Eawag Dübendorf**

Abstract Water is one of the most critical resources needed to produce oil and gas, and paradoxically, water is also (by far) the largest waste stream of the energy industry. The produced waters represent both a major disposal challenge and a significant opportunity for reuse to minimize freshwater withdrawals and enable beneficial disposition (e.g., to enhance oil recovery and non-potable water supply for agriculture and greening efforts). The NSF-sponsored Engineering research Center on Nanotechnology-Enabled Water Treatment (NEWT), headquartered at Rice University (which is an epicenter for nanotechnology), is developing advanced materials and modular water treatment systems that are easy to deploy to protect human lives and support sustainable economic development. This includes enabling “fit-for-purpose” treatment and “tailored” reuse of produced waters.

Through control over material size, morphology and chemical structure, nanotechnology offers novel materials to introduce superior catalytic, adsorptive, optical, quantum, electrical and/or antimicrobial properties that enable multi-functional technology platforms for next-generation water treatment. This presentation will address emerging opportunities for nanotechnology to harness solar energy directly to reduce costs of water purification (eliminating the need to burn oil for making clean water) and improve the selectivity and efficiency to remove priority pollutants. Examples of applicable nano-enabled technologies include solar-thermal processes enabled by nanophotonics to desalinate with membrane distillation, fouling-resistant membranes with embedded ENMs that allow for self-cleaning and repair; capacitive deionization with highly conductive and selective electrodes to remove multivalent ions that precipitate or cause scaling; rapid magnetic separation using superparamagnetic nanoparticles; disinfection and advanced oxidation using nano-photocatalysts; and nanostructured surfaces that discourage microbial adhesion and protect infrastructure against biofouling and corrosion.

We envision a future where advanced technologies and accompanying policies will make water will be more abundant, affordable, and accessible to all users – energy, food, domestic, industry. Join us in our efforts to help the energy industry become more sustainable and more cost-efficient in regards to its water footprint and enhance the benefits of water.