

Gordon Research Conference Environmental Nanotechnology



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June 21-26, 2015
Mount Snow Resort
West Dover, VT

Panel Discussion

Environmental Applications of Nanotechnology for Water Purification

Moderator: Paul Westerhoff (Arizona State University / USA)

Panelists:

- Tony Byrne (University of Ulster / North Ireland)
- Jean-Yves Bottero (CEREGE / France)
- Gilbert Rios (UNESCO / France)

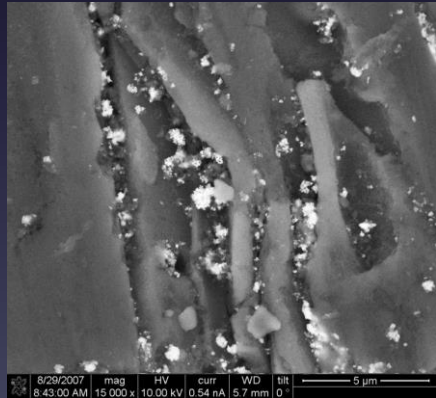
Why Nano for Water Purification?

- Current technologies are largely Victorian Age
 - Large footprints
 - Chemical intensive
 - Risk-adverse / brute force technologies
 - Large capital investments
- Nanotechnology offers:
 - Tailored reactivity
 - Faster kinetics = smaller reactors
 - Ability to treat target pollutants
- Many have gone from bench to practice

Environmental Nanotechnology

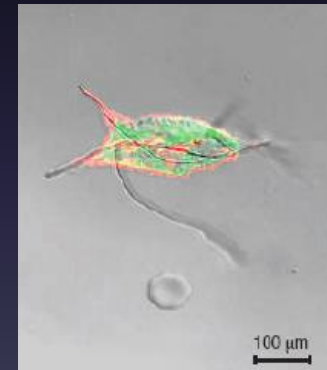


GOOD
nano



Quantum size effects result in unique mechanical, electronic, photonic, and magnetic properties

BAD
nano



Stone & Donaldson, 2006

Use lessons learned from nano-risk to develop safe WTP processes

- Unique nanoscale property to harness
- NSF approved materials
- Barriers to prevent NP release
- Immobilized NPs or nanostructured architectures
- Analytics to monitor treated water
- Take a life cycle perspective in selecting nanomaterials - many NPs have high embedded energy content

Agenda

- Primer: Panelists will provide brief 8-10 minute examples of nano-technology used in water (30 minutes)
- Moderated discussion of emerging topics by the panelists (10 minutes)
- Moderated discussion among the entire congress (15 minutes)



Panel & Audience Q&A

- Nano-scale photo catalysts have been developed for decades. Why are they not being widely employed at large municipal water treatment plants? Where are they being applied currently? What barriers exist for their implementation more widely?
- Nano-scale iron has been injected into hundreds if not > 1000 groundwater sites. What have been the social or regulatory concerns at these site if “nano particles” escape?
- What opportunities and risks exist as we integrate nano materials into biological water treatment systems? Are nano-porous membranes viewed as “nanotechnology”?
- Where do you see nanotechnology advancing DESALINATION?

- Europeans tend to be more conservative regarding new technology that starts to get “close to the mount” - like GMOs. Do such concerns exist about using nano materials in drinking water treatment?
- What Risks of using nano materials did measure, consider, or could worry about if the nano materials³escaped² your treatment reactor/treatment zone
- What is your opinion of the use of nano materials for water purification in your country? Is it positive, or do regulators have a concern?
- We have heard about using catalytic photonic and highly reactive/high surface area properties of nano particles today. How do you envision water treatment systems to harness other unique properties of nano materials (e.g., magnetic, other photonics properties, strength, etc.)?
- Other questions from the audience?

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