## Nanoparticles in the Environment

Josh January 26, 2005

- Ways Nanoparticles could help the environment
  - Could be used to clean up environmentally polluted sites
  - Could react with organic solvents and/or heavy metals to form harmless compounds
- Ways Nanoparticles can harm the environment
  - o Contaminate soil and groundwater
  - Are used in disposable articles
  - Could constitute a new class of non-biodegradable pollutants in the future
- Specific areas of Nanoparticle damage
  - Air contamination (ultrafine particles)
    - UFPs contribute to air pollution
    - Concentration of UFPs correlates to the mortality rate in a population
    - Non-aggregating nanoparticles are potentially dangerous to lungs
  - o Pollutants in soil
    - Nanoparticles bind better to pollutants in the soil than colloids
      - Bonds to more pollutants
      - Transports pollutants farther and faster
    - Nanoparticles can be transported in water-saturated soil and could influence ecological systems
  - Absorption of nanoparticles by plants
  - Transport via the water cycle
    - Evaporation of nanoparticle-saturated water can lead to global distribution via precipitation
    - Nanoparticle presence in the atmosphere could lead to global warming or cooling
  - Removing nanoparticles from the environment
    - Water removal
      - Centrifugation and ultrafiltration are the only current ways to remove nanoparticles from drinking water
      - Both options are cost intensive and not suitable for processing large volumes of water
    - Air filtration
      - Conventional air filters are not designed to remove nanoparticles
      - Designing filters to block nanoparticles would make breathing an impossibility
      - "Nano-filters" are being developed by several manufacturers

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