Nanostructured Materials for Environmental Decontamination of Chlorinated Compounds

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Professors Vijay John (Tulane) and Yunfeng Lu (UCLA) have developed a new class of nanostructured porous materials containing zerovalent iron nanoparticles (NZVI) for the *in situ* destruction of chlorinated environmental contaminants. The technology developed involves the encapsulation of ZVI nanoparticles in porous submicron silica spheres produced through an aerosol process. The silica spheres are functionalized with alkyl groups.

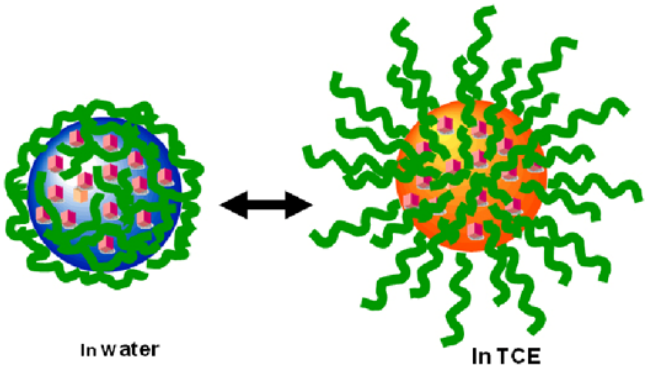

Figure. *Caption*.

These composite particles have the following characteristics

1. They are in the optimal size range for transport through sediments.
2. Dissolved TCE adsorbs to the organic groups thereby bringing tremendously increasing contaminant concentration near the ZVI sites.
3. They are reactive as access to the ZVI particles is possible.
4. When they reach bulk TCE sites, the alkly groups extend out to stabilize the particles in the TCE bulk phase or at the water-TCE interface.
5. The materials are environmentally benign.

   The researchers have extensively demonstrated these concepts through reactivity studies, and transport studies using column transport, capillary and microcapillary transport studies.

   These iron/silica aerosol particles with controlled surface properties also have the potential to be efficiently applied for *in situ* remediation and permeable reactive barriers construction.

References/Publications

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