

Wet-Nanotechnology: nanofluids at NIU

www.kostic.niu.edu/DRnanofluids

Dry- vs. Wet-nanotechnology

- Fluids (gases & liquids) vs. Solids in Nature and (Chemical & Bio) Industry
- More degree of freedoms
– more opportunities..(also more challenges)
- **Nanofluids**: nanoparticles in base fluids
 - * Understanding nano-scale particle-fluid interactions in physical-, chemical-, and bio-processes, and engineering new/enhanced functional products
- **Directed self-assembly**:
 - * starts from suspension of nanoparticles in fluids
 - * ends with advanced sensors and actuators, devices, systems, and processes
- **Synergy** of dry-nanotechnology (solid-state) & wet-nanotechnology (POLY-nanofluids)

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Nanofluids:

Suspensions of nanoparticles in base fluids

**Size does matter: unique transport properties,
different from conventional suspensions:
do not settle under gravity, do not block flow, etc ...**

- **Enhancing** functions and properties by combining and controlling interactions
- **Combining** different nanoparticles (structure, size) in different base-fluids with additives
- **Controlling** interactions using different “mixing” methods and thermal-, flow-, catalyst-, and other field-conditions

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Wet-Nanotechnology: nanofluids' applications

Advanced, hybrid nanofluids:

- **Heat-transfer nanofluids (ANL & NIU)**
- **Tribological nanofluids (NIU)**
- **Surfactant and Coating nanofluids**
- **Chemical nanofluids**
- **Process/Extraction nanofluids**
- **Environmental (pollution cleaning) nanofluids**
- **Bio- and Pharmaceutical-nanofluids**
- **Medical nanofluids**
(drug delivery and functional tissue-cell interaction)

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NIU- nanofluids

Development of advanced hybrid nanofluids:

POLY-nanofluids (Polymer-nanofluids) and
DR-nanofluids (Drag-Reduction-nanofluids)

- Development of **Heat-transfer nanofluids**
Collaboration with ANL and NSF Proposal
Related Invention/Patent Application pending
Coherent X-ray Scattering Dynamic Characterization
- Development of **Tribological nanofluids**
Center for Tribology and Coating (CTC) Project

More at:

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Web Search>nanofluids

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