Argonne NATIONAL LABORATORY

Office of Technology Transfer

Bioengineering for New Medical Treatments

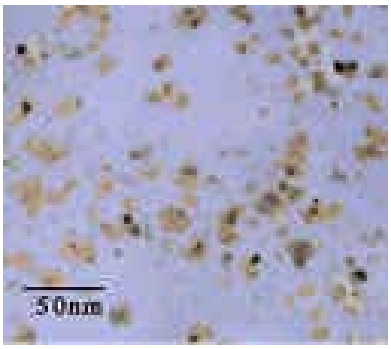
From discovery to realization, Argonne is working with industry and academia to improve the quality of life for all of us

From Buildings to Cars to Medicine — Fundamental Research at Work

Nanofluids: Tiny "Magic Bullet" May Help Treat Disease

The use of nanofluids — an innovative class of heat transfer fluids created by dispersing solid particles smaller than 40. nanometers in diameter in traditional heat transfer fluids — is already being implemented in fields as diverse as transportation, micromachines, metalworking, and energy supply.

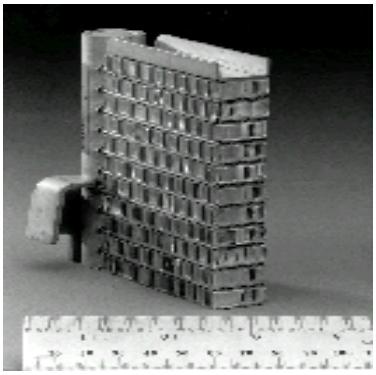
Now engineers are examining ways to use nanoparticles to save lives. Efforts are underway to use Argonne's nanofluids technology to develop even smaller ice particles for ice slurries. Research is also focusing on developing magnetic nanoparticles that convey chemicals to specific targets such as tumors or blood clots.



Ultrasmall particles like these — less than one-thousandth the diameter of a human hair — are needed to pass through the smallest capillaries in the body, such as those in the brain, which measure hundredths of a millimeter in diameter.

Microscale Heat Transfer Devices: Cooling the Chaos

Thermal management strategies — handling the heat generated by a process or processes — affect the efficiency of all kinds of systems, from cars to building cooling systems to our own bodies. Effectively controlling temperatures in the human body — in particular, in the brain — requires an extensive knowledge of microscale fluid dynamics and heat transfer.



Studies to optimize the performance of the compact heat exchanger shown here is allowing development of small, implantable heat exchangers for localized medical cooling.

Argonne is investigating nanofluid heat transfer in tiny channels — called microchannels — including the effects of channel size and shape on heat transfer efficiency. Several of the tiny heat and mass transfer devices developed as part of this work have sparked the interest of the medical community, which can use small coolers/heat exchangers to treat such disorders as epilepsy. Researchers are exploring ways to implant the coolers near the region of the brain where chaotic disturbances occur to suppress the disturbances during a seizure.

For More Information,

Contact Argonne's Office of Technology Transfer (800-627-2596, partners@anl.gov)

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