National Aeronautics and Space Administration

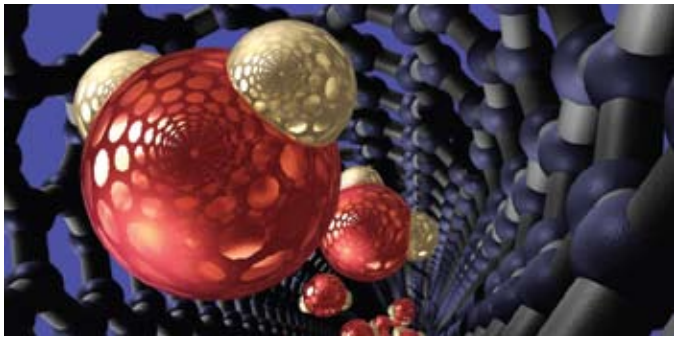
technology opportunity

Filtering Water with Acoustics Nanotube Technology

Effectively eliminates contaminants from water supplies







Innovators at NASA's Johnson Space Center have developed a filtration device to eliminate contaminants from water supplies. Originally developed to purify wastewater for reuse aboard the International Space Station, the innovation is applicable to numerous situations on Earth where there is a need to collect potable, medical-grade water from a contaminated water supply. The unique aspect of the technology is its use of acoustics rather than pressure to drive water through small-diameter carbon nanotubes. The invention requires less power than conventional filtration systems and is well-suited to a variety of water processing needs.

Benefits

- **Effective:** Produces clean water by eliminating contaminants
- **Efficient:** Requires less power than conventional filtration systems, enabling remote operation and solar power options
- **Flexible:** Does not depend on gravity for water to flow through the system
- **Scalable:** Allows for use of a single filter or a large bank of integrated filters, depending on filtration needs
- **Widely applicable:** Suits applications for a variety of water processing needs, ranging from industrial to consumer applications

Applications

- Municipal water facilities
- Medical facilities
- Laboratories
- Distilleries
- Desalination plants
- Industrial facilities
- Wastewater treatment facilities
- Consumer markets

The Technology

This water filtration innovation is an acoustically driven molecular sieve embedded with small-diameter carbon nanotubes. Turning the idea of filtration on its head, this technology pushes water away from contaminants, rather than removing contaminants from water.

How It Works

Water enters the device and first contacts the filter matrix, which can be made of polymer, ceramic, or metallic compounds, depending on end-use requirements. Carbon nanotubes within the matrix allow only water molecules to pass through, leaving behind any larger molecules and contaminants.

The unique aspect of the technology is its use of acoustics to help drive water through the filter. An oscillator circuit attached to the filter matrix propagates acoustic vibration, further causing water molecules to de-bond and move through the filter. This use of acoustics also eliminates dependence on gravity (and thus filter orientation) to move water through the device. When water exiting the system diminishes to a pre-determined set point, a cleaning cycle is triggered to clear the sediment from the inlet of the filter, reestablishing the standard system flow rate. Unlike other filtration systems, flushing of the filter system is not required.

Why It Is Better

Existing water filtration technologies are generally plagued by limited performance, high energy consumption, and high costs. New filtration and treatment techniques designed to mitigate these problems generally depend on pressure to drive water through the filtration system. The combination of acoustics and small-diameter carbon nanotubes in this innovation make it an effective and efficient means of producing contaminant-free, clean water.

Patents

Johnson Space Center is seeking patent protection for this technology.

Licensing and Partnering Opportunities

This technology is part of NASA's Innovative Partnerships Program (IPP), which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to consider licensing this Water Filtering Device technology (MSC-24180-1) for commercial applications. Supporting technologies are available as well:

- MSC-24508-1 – Method for Making a Microporous Membrane
- MSC-24353-1 – Deluxe Model Water Filtration Device

For More Information

If you would like more information or want to pursue transfer of this technology, please contact us at:

Advanced Planning Office
NASA's Johnson Space Center
Phone: 281-483-3809
Email: jsc-techtran@mail.nasa.gov
Web: http://technology.jsc.nasa.gov

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MSC-24353-1
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