

Clearing the air: PNNL technology wins award for improving submarine air quality

Pacific Northwest National Laboratory

RICHLAND, Wash. – Creators of a nanotech-based system that captures carbon dioxide directly from the atmosphere within a submarine, while providing a more environmentally friendly removal process, have won the Federal Laboratory Consortium Interagency Partnership Award for 2012. The technology — Self Assembled Monolayers on Mesoporous Supports, or SAMMS — is destined for incorporation into future submarines to improve air quality for sailors who serve on them.

The FLC's Interagency Partnership Award annually recognizes employees from at least two different federal agencies or laboratories who have "collaboratively accomplished outstanding work in transferring a technology." The IPA acknowledges the collaborative relationship among the Department of Energy's Pacific Northwest National Laboratory, the U.S. Naval Surface Warfare Center Carderock Division, Ship Systems Engineering Station and the U.S. Naval Sea Systems Command.

The Navy continually seeks technology to improve processes and conditions for the thousands of sailors serving onboard its current fleet of submarines. This approach is an entirely new application developed to cleanse breathing air in the confined space of a submarine. The system demonstrated that it can replace a bulky, heavy, corrosive and malodorous liquid process that produces a significant organic solvent waste stream used for more than half of a century by the U.S. Navy and navies of many other countries.

"This is a new application of a technology that was previously developed by PNNL to remove heavy metal contamination from ground and surface waters found at many DOE waste sites," said PNNL Material Scientist Glen Fryxell, one of the key PNNL inventors of the SAMMS technology. The SAMMS materials can absorb large quantities of liquid and airborne contaminants without creating secondary waste, and is disposable as nonhazardous waste.

The SAMMS technology is based on a new class of hybrid nanoporous materials that can rapidly capture contaminants such as carbon dioxide, mercury or arsenic directly from the atmosphere or liquid environments. For air rejuvenation systems, SAMMS can provide a controlled release of the carbon dioxide using a gentle application of heat or vacuum.

"The technology could open doors to other large scale or small scale air quality treatments," said Fryxell. Researchers believe the air-cleansing system might be used in underwater rebreather SCUBA gear, in space-based vehicles or in spacesuit air rejuvenation systems. SAMMS carbon dioxide removal also has potential in minimizing heating and cooling costs in buildings by reducing outdoor air exchange.

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PNNL, NSWCCD-SSES and NAVSEA will receive the 2012 FLC Interagency Partnership Award at a ceremony, May 3, 2012, at the FLC National Meeting in Pittsburgh, Pa.

The FLC is a nationwide network of federal laboratories that provides a forum to develop strategies and opportunities to link the laboratories' missions and expertise with the marketplace. The FLC was organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986 to promote and strengthen technology transfer nationwide. More than 250 federal laboratories and centers and their parent departments and agencies are FLC members.

Since 1984, when the FLC awards program was established, PNNL has earned 74 of the awards, far more than any other national laboratory. This is PNNL's first FLC IPA award, however.

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