

‘Supergel’ system cleans radioactively contaminated structures

Argonne researchers have developed a system that can clean radioactive contamination from porous structures, such as brick and concrete, which are notoriously hard to clean.

The system uses engineered nanoparticles and a super-absorbent gel to clean buildings and monuments exposed to radioactive materials. Having this system available will allow the nation to be more prepared in case of a terrorist attack with a “dirty bomb” or other radioactive dispersal device.

The polymer gel that absorbs the radioactivity is similar to the absorbent material found in disposable diapers. When exposed to a wetting agent, the polymers form something like a structural scaffold that allows the gel to absorb an incredible amount of liquid.

The amount of contamination removed depends on the characteristics of the contaminated structure—its age, type of material, whether painted or unpainted—and the radioactive isotope involved. Removal ranges from roughly 80 to nearly 100 percent.

The system’s focus is on rapid response—getting as much of the contamination as possible, as quickly as possible, and filling a technology gap immediately.

Technique leaves structures intact

With current techniques it is common practice to demolish contaminated materials instead of attempting to remove radioactivity because no process currently exists that can effectively remove the contamination. Argonne’s technique preserves surfaces, which means that monuments or buildings would not have to be defaced to remove radiation.

Using a simple, three-step procedure, the system operates much like an automated car wash.

Application: Remote spray washers apply a wetting agent and a super-absorbent gel onto the contaminated surface.



SUPERGEL – Argonne researchers are designing a system to safely capture and dispose of radioactive elements in porous structures outdoors, such as buildings and monuments, using this spray-on, super-absorbent gel and engineered nanoparticles. Such a system would help the nation be more prepared in the event of a terrorist attack with a “dirty bomb” or other radioactive dispersal device.

Reaction: The wetting agent causes the bound radioactivity to re-suspend in the pores; the super-absorbent polymer gel then suctions the radioactivity out of the pores and it then becomes fixed in the engineered nanoparticles that sit in the gel.



SPRAY-ON APPLICATION – The gel adheres to vertical surfaces and can be sprayed on using commercially available equipment. The consistency of the sprayed-on gel does not change significantly upon application.



CLEAN SURFACE – The gel is removed with a dry/wet vacuum with “squeegee” attachment, purchased at a home supply store. The vacuumed surface of the concrete remains wet but contains none of the gel material.

Cleanup: The gel is vacuumed and recycled, leaving behind only a small amount of radioactive waste for disposal.

Next steps

The next step is to test the process in a hot cell facility using actual radioactive materials.

The “Supergel” project was funded by the Department of Homeland Security under the auspices of the interagency Technical Support Working Group (TSWG). TSWG is the U.S. national forum that identifies, prioritizes and coordinates interagency and international research and development requirements for combating terrorism. The TSWG rapidly develops technologies and equipment to meet the high-priority needs of the terrorism-combating community and addresses joint international operational requirements through cooperative R&D with major allies.

Argonne’s “Supergel” technology is patented and available for licensing.

For more information

Contact Michael Kaminski, Nuclear Engineering Division, Argonne National Laboratory (630-252-4777, kaminski@anl.gov).

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