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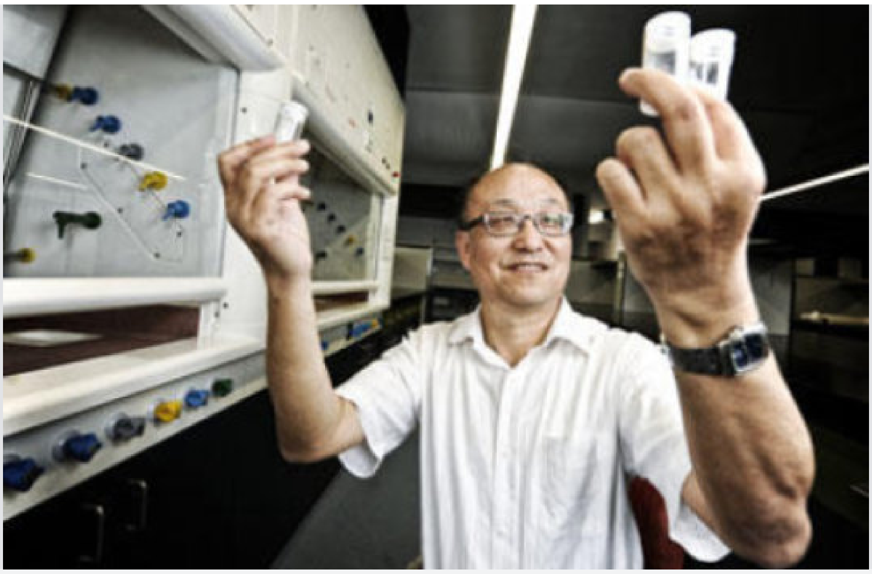
Summary: Australian researchers have developed new technology capable of removing radioactive material from contaminated water and aiding clean-up efforts following nuclear disasters.

FULL STORY



Professor Huai-Yong Zhu from QUT Chemistry.

Credit: Image courtesy of Queensland University of Technology

Queensland University of Technology (QUT) researchers have developed new technology capable of removing radioactive material from contaminated water and aiding clean-up efforts following nuclear disasters.

The innovation could also solve the problem of how to clean up millions of tonnes of water contaminated by dangerous radioactive material and safely store the concentrated waste.

Professor Huai-Yong Zhu from QUT Chemistry said the world-first intelligent absorbent, which uses titanate nanofibre and nanotube technology, differed from current clean-up methods, such as layered clays and zeolites, because it could efficiently lock in deadly radioactive material from contaminated water.

The used absorbents can then be safely disposed without the risk of leakage, even if the material became wet.

"One gram of the nanofibres can effectively purify at least one tonne of polluted water," Professor Zhu said.

"This saves large amounts of dangerous water needing to be stored somewhere and also prevents the risk of contaminated products leaking into the soil."

The technology, which was developed in collaboration with the Australian Nuclear Science and Technology Organisation (ANSTO) and Pennsylvania State University in America, works by running the contaminated water through the fine nanotubes and fibres, which trap the radioactive Cesium (Cs^+) ions through a structural change.

"Every year we hear of at least one nuclear accident. Not only is there a risk of contamination where human error is concerned, but there is also a risk from natural disasters such as what we saw in Japan this year," he said.

Professor Zhu and his research team believed the technology would also benefit industries as diverse as mining and medicine.

By adding silver oxide nanocrystals to the outer surface, the nanostructures are able to capture and immobilise radioactive iodine (I^-) ions used in treatments for thyroid cancer, in probes and markers for medical diagnosis, as well as found in leaks of nuclear accidents.

"It is our view that just taking the radioactive material in the adsorbents isn't good enough. We should make it safe before disposing it," he said.

"The same goes for Australian sites where we mine nuclear products. We need a solution before we have a problem, rather than looking for fixes when it could be too late."

With a growing need to find alternatives to meet global energy needs, Professor Zhu said now was the time to put safeguards in place.

"In France, 75 per cent of electricity is produced by nuclear power and in Belgium, which has a population of 10 million people there are six nuclear power stations," he said.

"Even if we decide that nuclear energy is not the way we want to go, we will still need to clean-up what's been produced so far and store it safely," he said.

"Australia is one of the largest producers of titania that are the raw materials used for fabricating the absorbents of titanate nanofibres and nanotubes. Now with the knowledge to produce the adsorbents, we have the technology to do the cleaning up for the world."

Story Source:

Materials provided by **Queensland University of Technology**. *Note: Content may be edited for style and length.*