Timothy McKnight
Energy and Environmental Sciences Directorate

Timothy McKnight is a research staff member in the Electrical and Electronics Systems Research Division's Sensors and Embedded Systems Group. He holds engineering science degrees from the University of Michigan and University of Tennessee. His research interests include chemical, biological, and radiological nano- and microstructured systems. His work has resulted in over 65 publications and 18 patents. In 2014, he was recognized as a Battelle Distinguished Inventor.

Intellectual Property

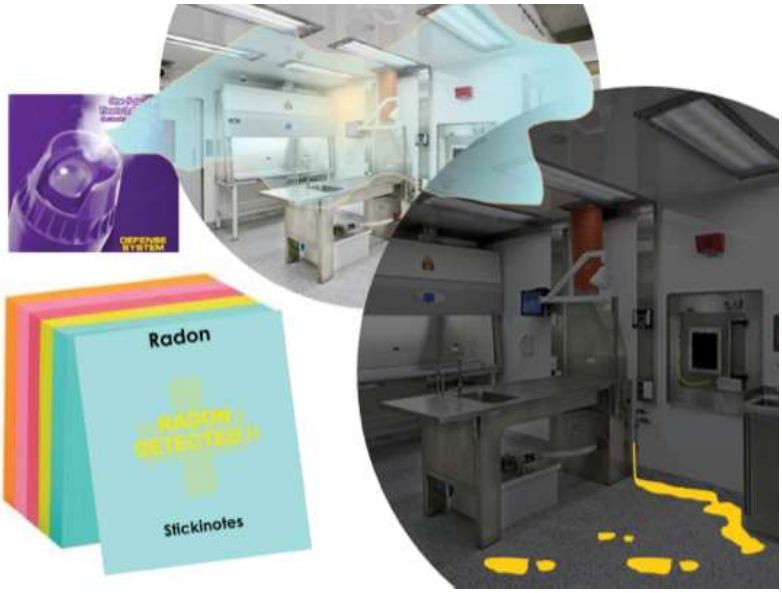
Radiation Contamination Visualizer; ID-201804293, DOE S-138,964

Nanocapsular Radiation Track Etch Indicator

Problem: Radioactive contamination from phenomena such as spills of radioactive materials and accumulation of radon gas within homes can be colorless, odorless, and essentially invisible without proper detection equipment. These characteristics result in a significant risk of harmful interaction with radioactive contamination and the uncontrolled spread of these materials. Conventional track etch materials, used for detection of radioactive materials, must be processed under laboratory conditions using caustic chemical etching, increasing risk and reducing flexibility.

Solution: ORNL is developing a nanocapsular track etch material that delivers a visible indication following exposure to alpha-particle radiation. Unlike conventional track etch materials, the new capsules feature a biodegradable etch mechanism that provides feedback to users without laboratory processing. The technology may be implemented on small, fixed surfaces such as wipes and sticky notes to provide low-cost single-point test strips or may be aerosol dispersed to larger surfaces, including entire laboratories, to facilitate safe and effective cleanup following radiological spill events.

Impact: Low-cost, passive indication of local areas of alpha-emitting radioactive contamination will significantly improve the health and safety of radiological technicians, contamination remediation personnel, and the public by reducing the time workers are exposed to potentially harmful materials and the uncontrolled spread of these materials during remediation operations. The technology, formulated as low-cost test strips, will also significantly impact in-home testing of radon, a hard-to-detect radioactive substance that causes approximately 21,000 lung cancer deaths each year in the United States.



ORNL's nanocapsular radiation track etch indicators can visualize the spatial extent of contamination within a facility via aerosol dispersal or may be immobilized onto paper and fabric substrates to provide low-cost single-point test strips.

For more information, please contact
Eugene Cochran, Ph.D.
Sr. Commercialization Manager
cochraner@ornl.gov
865-576-2830