

# Cold Shot

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If you want to ferret out uranium's hiding place in contaminated soil, freeze the dirt and zap it with a black light, an environmental scientist reported Tuesday at the American Chemical Society national meeting.

Scientists have long known that uranium salts under ultraviolet light will glow an eerie greenish-yellow in the dark. This phenomenon sent Henri Becquerel down the path that led to his discovery of radioactivity a century ago.

Others since noted a peculiar feature about the UV glow, or fluorescence spectra, of uranium salts: The resolution of the spectral fingerprint becomes sharper as the temperature falls.

Zheming Wang, a staff scientist at the Department of Energy's Pacific Northwest National Laboratory in Richland, Wash., has now dusted the frost off the files, applying a technique called cryogenic fluorescence spectroscopy to uranium in contaminated soil at a former nuclear fuel manufacturing site.

By cooling the sediments to minus 267 degrees Celsius, near the temperature of liquid helium, Wang and colleagues at the PNNL-based W.R. Wiley Environmental Molecular Sciences Laboratory hit a sample with UV laser on a contaminated sample to coax a uranium fluorescence intensity of more than five times that at room temperature.

What is more, other spectra that were absent at room temperature popped out when frozen, enabling Wang and colleagues to distinguish

different forms of uranium from one another, including uranium-carbonate that moves readily underground and is a threat to water supplies.

Source: Pacific Northwest National Laboratory

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