

# Engineers develop technique to help combat nuclear proliferation

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Ben-Gurion University of the Negev engineers have developed a technique to "denature" plutonium created in large nuclear reactors, making it unsuitable for use in nuclear arms. By adding Americium (Am 241), a form of the basic synthetic element found in commercial smoke detectors and industrial gauges, plutonium can only be used for peaceful purposes.

This technique could help "de-claw" more than a dozen countries developing nuclear reactors if the United States, Russia, Germany, France and Japan agree to add the denaturing additive into all plutonium. An article on the technique and findings will appear next month in the Science and Global Security journal.

"When you purchase a nuclear reactor from one of the five countries, it also provides the nuclear fuel for the reactor," explains Prof. Yigal Ronen, of BGU's Department of Nuclear Engineering, who headed the project. "Thus, if the five agree to insert the additive into fuel for countries now developing nuclear power -- such as Bahrain, Egypt, Kuwait, Libya, Malaysia, Namibia, Qatar, Oman, United Arab Emirates, Saudi Arabia and Yemen -- they will have to use it for peaceful purposes rather than warfare."

Ronen originally worked on Neptunium 237 for the purpose denaturing plutonium, but switched to Americium, which is meant for pressurized water reactors (PWRs), such as the one being built in Iran.

"Countries that purchase nuclear reactors usually give the spent fuel back to the producer," explains Ronen. "They wouldn't be able to get new plutonium for weapons if it is denatured, but countries that make nuclear fuel could decide not to denature it for themselves."

Nuclear fuel used in nuclear reactors has two isotopes of uranium. One is fissionable, while the other is not. The unfissionable component undergoes a number of nuclear reactions, turning some of it into plutonium. The plutonium also includes fissionable and unfissionable components. The amount of fissionable components created in nuclear reactors is enough to be used as nuclear weapons.

Source: American Associates, Ben-Gurion University of the Negev

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