

Removing Hot Air from Nuclear Power Plants; Scientists Convert Nuclear Energy to Power without Steam

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(PhysOrg.com) -- For years, researchers have been in search of an economically feasible method of converting nuclear energy directly into electricity. Now, University of Missouri researchers are developing an energy conversion system that uses relatively safe isotopes to generate high-grade energy. A system that directly converts nuclear energy into electricity would be cheaper than current nuclear conversion technology.

"Direct conversion of nuclear energy has not been possible previously," said Mark Prelas, professor of nuclear engineering and director of research at MU's Nuclear Science and Engineering Institute. "Current nuclear technology has an intermediate thermalization phase between the nuclear reaction and when the energy is converted to electricity. This phase reduces the efficiency of the energy conversion process."

MU researchers have developed a process called Radioisotope Energy Conversion System (RECS). In the first step of the process, the ion energy from radioisotopes is transported to an intermediate photon generator called a fluorescer and produces photons, which are the basic units of light. In the second step of the process, the photons are transported out of the fluorescer to photovoltaic cells, which efficiently convert the photon energy into electricity.

Since the 1980s, MU researchers have worked to develop electrical power from a nuclear light bulb, which is a way of generating hydrogen, electrical power and laser energy directly from nuclear reactions. The nuclear light bulb was based on the Photon-Intermediate Direct Energy Conversion (PIDEC). PIDEC converts the high-grade ion energy to photon energy. In addition to improved efficiency, the PIDEC process also promises advantages in volume, mass and cost.

"RECS effectively utilizes the PIDEC system," Prelas said. "The system we are developing is mechanically simple, potentially leading to more compact, more reliable and less expensive systems."

Currently, the only method to convert nuclear technology into electricity is through nuclear fission. In the process, water is heated to create steam. The steam is then converted into mechanical [energy](#) that generates electricity.

Prelas has worked with industries, such as British Nuclear Fuel, Daimler Benz and the U.S. Semiconductor Corp. on RECS commercialization issues. He is the recipient of the 2009 Glenn Murphy Award given by the American Society for Engineering Education.

Provided by University of Missouri

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