

# ***NUCLEAR ENERGY RESEARCH INITIATIVE***

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## **Real-Time Detection of Actinide Compositions in the UREX+ Process**

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**Project Number:** 08-039

**Program Area:** Advanced Fuel Cycle R&D

**Collaborators:**

Argonne National Laboratory

Purdue University

University of Illinois, Chicago

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### **Project Description**

The objective of this project is to develop real-time detection methods to monitor the efficacy of the UREX+ process and to safeguard the separated transuranics materials (TRUs) against unlawful diversion from a processing facility. Project tasks represent a comprehensive development strategy that will enable the incorporation of an array of traditional detectors and advanced metastable fluid detectors into a novel detector assembly designed specifically for application in a UREX+ centrifugal contactor array. The consortium will develop experiments ranging from laboratory benchmarks to hot-cell demonstrations with actual spent fuel. Team members will also perform supporting research to develop safeguards strategies for the UREX+ process and to evaluate the corrosion behavior of critical component materials that are in contact with process fluids.

At the end of three years, the proposed detector assembly and detector arrays will be completed, benchmarked, and ready for full-scale application. This will include bench-scale testing with simulated and real UREX+ process fluids. In addition, a complete safeguards strategy will be in place to take advantage of the information stream enabled by this new detector system and a corrosion database will be available to enable material selection for superior detector performance.