INTERNATIONAL NUCLEAR ENERGY RESEARCH INITIATIVE

VHTR Environmental and Irradiation Effects on High-Temperature Materials

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Collaborators: None

Project Number: 2006-006-K

Program Area: Generation IV

Start Date: October 1, 2006

End Date: September 30, 2009

Project Abstract

This project will select and qualify high-temperature materials for the next generation of reactors. The collaboration will include work to analyze irradiation and environmental effects and to develop a materials handbook containing the properties of high-temperature metallic materials.

Specifically, researchers will study the effects of helium environments on the mechanical properties of high-temperature metallic alloys proposed for use in the very high-temperature gas reactor (VHTR).The helium primary coolant in an operating VHTR is expected to be contaminated by small amounts of gaseous impurities from a variety of sources. Corrosion of structural alloys by these impurities at elevated temperatures can be significant. Researchers will also evaluate the effects of irradiation on these alloys using the Republic of Korea's High-Flux Advanced Neutron Application Reactor (HANARO) and the irradiated materials evaluation facility (IMEF). Reactor operating conditions are very challenging for the materials and they require qualification against the effects of irradiation. Materials testing of key components, such as the reactor pressure vessel, will provide the necessary design data and develop and confirm margins available for the materials. Lastly, researchers will develop the *Gen IV Materials Handbook* containing a database of high-temperature materials.