

# International Nuclear Energy Research Initiative

## U.S. DEPARTMENT OF ENERGY INTERNATIONAL NUCLEAR ENERGY RESEARCH INITIATIVE DOE/France

### ABSTRACT

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#### SiC/SiC for Control Rod Structures for Next Generation Nuclear Plants

**Principal Investigator (U.S.):** P. Lessing, Idaho  
National Engineering and Environmental Laboratory  
(INEEL)

**Project Number:** 2004-004-F

**Project Start Date:** October 2004

**Principal Investigator (France):** TBD,  
University of Bordeaux

**Project End Date:** October 2007

**Collaborator:** Pacific Northwest National  
Laboratory

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This project falls under Gen IV materials R&D and the corresponding work package at INEEL is C.3.03.05.01.01.03 – NGNP Materials. George Hayner (INEEL) is the work package manager and has approved this submittal. This proposal is being submitted to Bill Corwin (National Technical Director of Gen IV Materials) for his approval and further transmittal.

This proposed research will develop tubular geometry SiC/SiC composite material for control rod structures with equal or better mechanical, thermal, and radiation damage resistant properties compared to present flat plate SiC/SiC composites. Material synthesis methods will be developed to optimize properties of SiC/SiC based on Nicalon Type-S fibers, CVI-SiC matrix, and either pyrocarbon or multilayered C/SiC interfaces. This work will generate a property database for the optimized materials using standardized ASTM test methods for strength, toughness, and thermal conductivity. Tests will be conducted on tubes of SiC/SiC prepared in this program and compared to flat plate materials made by current state-of-the-art methods. The project will deliver a state-of-the-art tubular SiC/SiC composite material together with a synthesis method for the same.

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