Innovative Nuclear Space
Power and Propulsion Institute

"Space Exploration is the ultimate investment in America's Future"

An International Leader in Space Applications

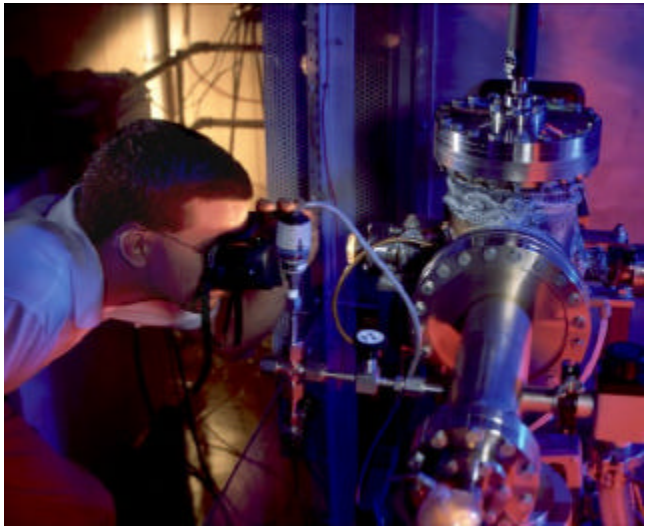
Contact Information

General: Ms. Lynne Schreiber, lynne@inspi.ufl.edu
Research: Dr. Travis Knight, knight@inspi.ufl.edu
Academic: Ms. Ines Aviles-Spadoni, iaviles@ufl.edu

INSPI
P.O. Box 116502
Gainesville, FL 32611-6502
Phone: (352) 392-1427
FAX: (352) 392-8656

www.inspi.ufl.edu

UNIVERSITY OF FLORIDA



The Innovative Nuclear Space Power and Propulsion Institute

INSPI was established as a national consortium of universities and high-technology industries which have pooled their scientific and technological expertise for high-payoff fundamental research on ultrahigh-temperature nuclear space power generation and conversion and nuclear thermal and electrical properties.

INSPI, at the University of Florida, is funded through several government and private industry research grants and contracts to conduct fundamental and applied research in areas related to application of nuclear power in space.

Founded in 1985, INSPI research covers a broad range of activities including feasibility analysis of ultra-compact and ultra-light nuclear reactors for space power and propulsion applications. Among many others, INSPI' s research has been focused on reactor concepts utilizing gaseous, liquid, and solid-phase fluorides, carbides, oxides, nitrides, carbonitrides, and Cermet fuels.

General Information

People

INSPI has 25 faculty, staff and students from around the world and of all advanced levels of academia. Professionals and graduate students are working on various projects relating to diverse fields of space nuclear power. Faculty and research staff include:

S. Anghaie, Professor and Director (Ph.D., 1982 Penn State)
G. Chen, Associate Engineer (Engineer's Degree, 1995 UF)
H. Farabi, Visting Professor (Ph.D., 1978 University of Aston, UK)
S. Kim, Visiting Professor (Ph.D., 1995 Seoul National University)
T. Knight, (Adjunct) Associate Professor (Ph.D., 2000 UF)
L. Schreiber, Research Coordinator (M.S., 1995 UF)
B. Smith, Research Scientist (Ph.D., 1998 Victoria University, New Zealand)

Research

Current research is focused on the design studies related to nuclear thermal propulsion based on tri-carbide square lattice honeycomb and Cermet fuels, and multi-megawatt power reactor concepts based on gaseous fuel reactors with MHD generator and thermionics. Specific research projects are conducted in areas such as ultrahigh temperature nuclear fuels and materials, static and dynamic nuclear design analysis, two-phase CFD and heat transfer, and development of a web based space nuclear power information resource and database system.

Research in the ultrahigh temperature materials laboratory at INSPI is primarily focused on the development of nuclear fuel and related high temperature materials. Advanced nuclear fuels are under development and testing to enable a manned mission to mars using high performance nuclear thermal and electric propulsion methods. These ultra-high temperature fuels and materials for NTP can operate at temperatures above 3000 K (~5000 F) generating specific impulse as high as 1000 sec. with thrust to weight ratios above 10. NEP systems based on gaseous and liquid uranium fluorides and MHD could provide multimegawatt space power at less than 1 Kg/Kwe, conditioned to directly feed large Lorentz force electric thrusters. Processing techniques have been developed for producing high quality, single-phase solid-solution mixed carbides. Efforts at testing these materials to determine their performance characteristics are also being investigated.

INSPI computational fluid and gas dynamic with heat transfer modeling is an advanced system of codes under development for analysis of all microscopic and macroscopic heat transfer phenomena associated with energy conversion in reactor space systems. In particular, a two-phase computational fluid dynamic model is under development to provide detailed analysis of micro boiling convection and condensation in complex geometries of space power reactors and energy conversion systems.

Research Facilities

- Nuclear Fuels and Materials Processing
- Ultrahigh Temperature Test Loops with Hot Hydrogen
- Major Microstructural Characterization Instruments
- Accelerator Based Neutron Irradiation System
- Inductive, Jet Arc, Plasma Torch and DC Furnaces

INSPI at the University of Florida, Gainesville , FL