

INTRODUCTION TO THE PYROPROCESSING SPECIAL ISSUE

Guest Editor

MICHAEL F. SIMPSON

Idaho National Laboratory

Approximately 75 researchers from seven different countries converged on Idaho Falls, home of Idaho National Laboratory, on August 8–10, 2006, to discuss and share research results in the area of pyroprocessing. This was the first in what is expected to be a long-term series of international conferences on pyroprocessing research. Pyroprocessing is a leading technology for achieving the separations goals of the nuclear fuel cycle; it is being developed by several nations and currently plays a prominent role in the United States–led Global Nuclear Energy Partnership. It is a dry processing technique in which spent fuel is electrochemically separated into reusable product and waste streams using high-temperature molten salt electrolytes. Compared to aqueous processing techniques, such as PUREX, pyroprocessing has compact space requirements and certain proliferation advantages. It also offers potential improvements in waste management because of the low number of waste streams generated. It has not yet been commercially implemented, but it has been demonstrated at an engineering scale for the EBR-II Spent Fuel Treatment project at Idaho National Laboratory.

This special issue of *Nuclear Technology* features some of the best papers presented at this conference. A variety of subjects within the general area of pyroprocessing are covered, including electrorefining, actinide recovery, voloxidation, oxide reduction, advanced materials, and waste processing. In addition to being useful starting points for more in-depth review of these specific technologies, these papers also showcase the accomplishments and interests of several different research organizations, including Argonne National Laboratory, Idaho National Laboratory, Korea Atomic Energy Research Institute, Japan's Central Research Institute of Electric Power Industry, Japan Atomic Energy Agency, and several others. Academic researchers interested in exploring the feasibility of performing pyroprocessing projects should use this special issue of *Nuclear Technology* as an excellent reference to identify niche opportunities and pursue collaborations with these organizations. This technology provides not only practical benefits for closing the fuel cycle but also represents a vast, largely unexplored area for applied research in physical chemistry, chemical engineering, electrochemistry, radiochemistry, and more.

The success of the first pyroprocessing conference led to the decision to support a second such meeting. Thus, the 2nd International Pyroprocessing Research Conference is currently being planned to be held September 1–3, 2008, on the beautiful JeJu Island in South Korea, hosted by the Korea Atomic Energy Research Institute.