

## RADIAL PROFILE OF THERMAL DIFFUSIVITY AT HIGH SPATIAL RESOLUTION ON METALLIC TRANSMUTATION FUELS

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### *Abstract*

In the realm of radioactive materials, a major challenge to the development of materials is the measurement of the properties for which the material is being developed. For example, the phenomenon of microstructure evolution of a nuclear fuel in reactor is well known but the details of the effects of the change on the behavior of such important phenomena as thermal conductivity, mechanical properties, and phase formation have not been quantified at high spatial resolution. There is a strong need to develop or adapt advanced instrumentation for measurements on radioactive materials. Idaho National Laboratory has an ongoing effort to develop or adapt a variety of measurement techniques to radioactive and highly radioactive materials. These efforts are also coupled with efforts to produce experimental results at spatial and temporal scales that are equivalent to those available to computational modeling and simulation. A laser based device called the Scanning Thermal Diffusivity Microscope, conceived and developed over the past few years, has recently been installed in a hot cell where examinations of fresh and irradiated fuel samples have begun in order to profile the thermal diffusivity of fuels and materials down to 50 $\mu$ m spatial resolution. Recent high spatial resolution thermal diffusivity results from the radial profiling of metallic transmutation fuels at various levels of burnup will be presented.