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The Mo Distribution and Grain Refining in Monolithic U-Mo Fuels

J.-F. Jue, D. Keiser, J. Madden, T. Trowbridge, A. Winston, D. Jadernas, and J. Cole
Idaho National Laboratory, 2525 N Fremont Avenue, Idaho Falls, ID 83415 – USA

ABSTRACT

The purpose of this study is to document Mo distribution in monolithic fuel plates both before and after irradiation. Preliminary results indicate that Mo distribution is inhomogeneous (i.e. exhibits chemical banding) in both as-fabricated and irradiated specimens from the RERTR-12 and AFIP-6MKII experiments. Grain refining in the irradiated fuel specimens has been confirmed by both SEM and EBSD. Bubble formation/grain refining seems to start at grain/phase boundaries. The remaining non-grain-refined areas in the irradiated fuel specimens exhibit higher Mo concentrations than the neighboring areas with refined U-Mo grains. These results support the benefit of higher Mo in the U-Mo fuel since it delays the grain refining/bubble formation process that can lead to unstable or unpredictable fuel behavior. The findings from this study will guide future revisions of monolithic fuel specifications.