

**RERTR 2015 – 36th INTERNATIONAL MEETING ON
REDUCED ENRICHMENT FOR RESEARCH AND TEST REACTORS**

**OCTOBER 11-14, 2015
THE PLAZA HOTEL
SEOUL, SOUTH KOREA**

TEM Characterization of High Burnup U-10Mo Monolithic Fuel Plate

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ABSTRACT

TEM results will be presented for the U-10Mo/Zr/Al6061 monolithic fuel plate (L1P09T, ~ 59% enrichment) irradiated in Advanced Test Reactor at Idaho National Laboratory as part of RERTR-9B irradiation campaign with a very high local fission density of $1.11\text{E}+22$ fissions/cm³. A total of 5 TEM lamellas were fabricated using focus ion beam lift-out technique. The estimated U-Mo swelling, based on the fuel foil thickness change, is approximately 76%. Large bubbles (> 1 μm) are distributed evenly in U-Mo and interlink of bubbles is evident. The average size of subdivided grains at this fission density appears similar to that at $5.2\text{E}+21$ fissions/cm³. The measured Mo in the matrix is ~ 30 at% in agreement with the calculated Mo content based on fission density. Significant amount Zr (~ 15 at%) was detected in matrix, higher than calculated ~6.6 at% from fission, likely due to radiation enhanced diffusion from Zr barrier to U-Mo.