

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

OCTOBER 11-14, 2015

THE PLAZA HOTEL

SEOUL, SOUTH KOREA

Fabrication Characteristics of U-7Mo Fuel Coated by Atomic Layer Deposition

Thomas Wiencek

M3 Program, Nuclear Engineering Division

Argonne National Laboratory, 9700 South Cass Ave, Argonne, IL 60430 – USA

ABSTRACT

Diffusion barriers to improve the irradiation performance of U-7Mo fuel have historically been deposited by various methods such as physical vapor deposition, chemical vapor deposition and pack diffusion. Integrity and adhesion of the coating are critical to the success of a diffusion barrier. A novel method of coating U-7Mo fuel, atomic layer deposition (ALD), is being studied at Argonne National Laboratory. This method was chosen due to its excellent adhesion and uniformity of the coating. Spherical U-7Mo fuel coated with Zr_3N_4 and a dual coating of Zr_3N_4 and AlN by ALD was rolled into fuel plates. The plates were then inspected radiographically and destructively. Results show that the adherence of the coating to the fuel is excellent after rolling and that there is no degradation of the fuel zone homogeneity. ALD coated fuel is included in the EMPIRE irradiation matrix which is scheduled to be tested in the Advanced Test Reactor.