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Production of Monolithic UMo Plates for the EMPIRE Irradiation Experiment

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ABSTRACT

The EMPIrE irradiation experiment, taking place in ATR in 2017, is an important step in the comprehension of fabrication and irradiation behavior of dispersion and monolithic UMo fuel. In the part concerning monolithic fuel, focus lies on verification of the fabrication techniques for the Zr TUM PVD coating and the cladding application using the C2TWP process of AREVA NP.

The developments with inert material showed that both processes, advanced PVD and C2TWP, conveniently allow fabricating monolithic plates. In a second step, bare DU foils produced at BWXT were chemically and partially plasma cleaned, then PVD-coated at TUM and finally cladded by AREVA NP. Results supported the developments performed so far, augmented by a heat treatment of UMo foils prior to coating.

As final step towards the irradiation experiment, two types of LEU foils were produced by BWXT, co-rolled and bare UMo foils, both heat treated. The co-rolled foils were delivered to AREVA NP, characterized and then directly processed with C2TWP. The bare foils were shipped to TUM, characterized, chemically and plasma-cleaned and coated with Zr using PVD with optimized parameters from the DU tests. Afterwards, the foils were shipped to AREVA NP and processed into plates with C2TWP.

Finally, the plates will be shipped to Idaho National Lab for irradiation in ATR.