RERTR 2018 – 39TH International Meeting on
Reduced Enrichment for Research and Test Reactors

November 4-7, 2018
Sheraton Grand Hotel and Spa
Edinburgh, Scotland

STATISTICAL STUDY OF U-Mo-Zry-4 MINIPLATES FABRICATION PROCESS

M. LÓPEZ, B. PICCHETTI, H. TABOADA
Gerencia del Ciclo de Combustible Nuclear, Centro Atómico Constituyentes
Comisión Nacional de Energía Atómica, Avenida Libertador 8250, 1429, Buenos Aires, Argentina

ABSTRACT

The studies of high density nuclear fuels led us to work with Uranium Molybdenum alloys and Zircaloy-4 as cladding. Nowadays, the study is focused on the application of this alloy to monolithic fuel plates development. The Zry-4 alloy used as cladding material is extensively known in the nuclear industry due to its low neutron capture section efficiency and excellent mechanical and corrosion resistance properties. Since first experiments in 2003, CNEA is employing this material as cladding. Miniplates fabrication process involves a welded compact made of two Zry-4 covers and a frame surrounding a monolithic U-Mo core, which is co-rolled at high temperature. The alloy contains 7% to 10% (mass) of Molybdenum, which guarantees the presence of meta-stable bcc gamma phase without penalizing in excess the neutron economy due to the capture cross section of the isotope Mo^{98}.

In previous works has been studied the Dog-Bone effect under different external conditions (temperature and compressive stress) and the influence on the fabrication process. Based on these results a co-rolling process controlled step by step was developed: constant percentage reduction (5% or less) leads to a Dog-Bone under 30%. Despite this satisfactory result a statistic study is needed in order to guarantee the reproducibility; in this work the same essay was done several times under the equal experimental conditions and the statistical parameters were obtained.

Concerning the monolithic U-Mo plates fabrication, involved in the alt future experiments, a new workshop has been conditioned. The aim is to use all the valuable information collected during the miniplates fabrication for the full scale plate fabrication development.