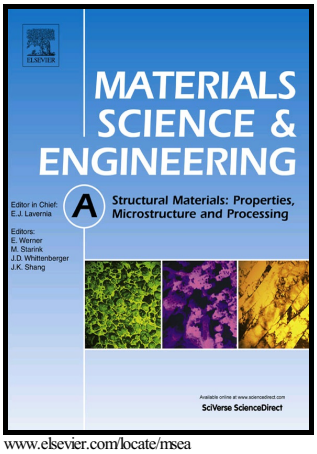
Characterization of different forms of Zr-2.5Nb samples before and after neutron irradiation

Chinthaka Silva, Keith Leonard, Michael Trammel, Chris Bryan



www.elsevier.com/locate/msea

PII: S0921-5093(18)30078-9
DOI: https://doi.org/10.1016/j.msea.2018.01.059
Reference: MSA36013

To appear in: *Materials Science & Engineering A*

Received date: 9 August 2017
Revised date: 11 January 2018
Accepted date: 15 January 2018

Cite this article as: Chinthaka Silva, Keith Leonard, Michael Trammel and Chris Bryan, Characterization of different forms of Zr-2.5Nb samples before and after neutron irradiation, *Materials Science & Engineering A*, https://doi.org/10.1016/j.msea.2018.01.059

Characterization of different forms of Zr-2.5Nb samples before and after neutron irradiation

Chinthaka Silva*, Keith Leonard, Michael Trammel, Chris Bryan
Oak Ridge National Laboratory, One Bethel Road, Oak Ridge, TN 3781.

Abstract

Deleterious effects of hydride precipitation on the mechanical properties of Zr-based alloy systems have been studied for many years. Most of these studies have been conducted at high-temperature irradiation conditions that are compatible with those in commercial reactor systems, such as light water and pressurized water reactors. Evaluations of hydride effects on the mechanical properties of welded Zr-2.5Nb are sparse among these reported studies. Research on the mechanical properties of Zr-based alloys neutron irradiated at low temperatures (<100 °C) is also very rare in the literature. Since some companies are interested in using Zr-based alloys as structural materials and in other parts such as pressure tubes in small reactor systems, low-temperature irradiation studies of these materials are important. The current work presents an evaluation of the tensile properties of Zr-2.5Nb welded using tungsten inert gas and electron beam welding as a function of hydrogen charging and neutron irradiation at low temperatures (60–100 °C).

*Corresponding author: C. M. Silva, silvagw@ornl.gov, telephone +1-865 574 6264; fax: +1-8652413650

Key words: Zir-2.5Nb; Neutron irradiation; E-beam welding; TIG welding; Zirconium hydride