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Microstructural analysis of proton irradiated zircaloy-4

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Abstract content (Max 300 words)
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To help understand the microstructural evolution of reactor materials under neutron irradiation, charged particle irradiation of materials in an accelerator environment are carried out. Charged particles have been shown to produce damage effects equivalent to those of neutrons in materials. In this experiment, zircaloy-4 in tubular form was exposed to a pulsed proton beam in a radio frequency quadrupole (RFQ) accelerator at the South African Nuclear Energy Corporation (Necsa). The sample was irradiated to a total dose of 1.19×10^{19} ions/cm². Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM) and X-ray diffraction (XRD) were used to characterize the induced changes in the materials microstructure. With XRD, a reversal of the residual stress and grain growth were observed after proton irradiation. SEM and TEM revealed crack formation in the microstructure plus grain growth as revealed by XRD.

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Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

Main supervisor (name and email) and his / her institution

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