



Contribution ID: 221

Type: **Poster Presentation**

## Investigation of corrosion resistant nanocrystalline TiZrN layers deposited on ZIRLO

*Tuesday, 4 July 2017 17:10 (1h 50m)*

Zirconium-based alloys (zircaloy and Zirlo) are used as nuclear fuel rod cladding in water-cooled nuclear reactors. Since zircaloy is oxidized by steam, which results in the release of hydrogen and the formation of brittle zirconium hydrides, the application of thin coatings on zircaloy to protect its surface from corrosion and reaction with hydrogen is currently enjoying considerable interest. Nanocrystalline TiZrN coatings have promising corrosion resistance characteristics and were therefore investigated as potential corrosion resistant coating on zirconium alloys. The nanocrystalline TiZrN coating was deposited onto a Zirlo substrate by cathodic arc physical vapor deposition (CA-PVD). A Helios NanoLab FIB was used to cut TEM lamellae from specific areas and these were investigated in a 200 kV JEOL 2100 TEM. The microstructural examination revealed that the coating exhibited a single TiZrN phase with columnar grains. The TiZrN nanocrystals are oriented with their close-packed {111} FCC planes parallel to the close-packed (001) planes of the HCP structure of the alpha phase of zirlo. Steam exposure of the TiZrN layers and Zirlo was performed in an autoclave and the results will be presented.

**Apply to be considered for a student award (Yes / No)?**

Yes

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

MSc

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

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**Would you like to submit a short paper for the Conference Proceedings (Yes / No)?**

No

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**Session Classification:** Poster Session 1

**Track Classification:** Track A - Division for Physics of Condensed Matter and Materials