

Short Note

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Nuclear Energy Research Cooperation
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Cooperative R&D activities in INL/JAEA/MHI INL/ATR irradiation program for Cr-coated Zr-alloy Cladding

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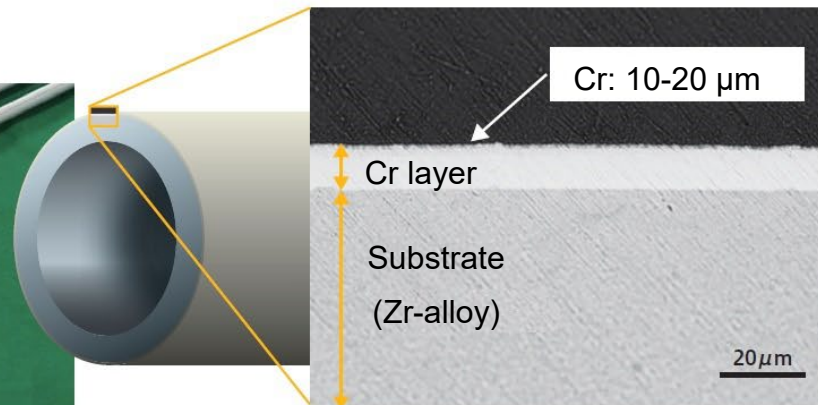
2023.2.24

Brief summary of MHI Cr-coated Zr cladding

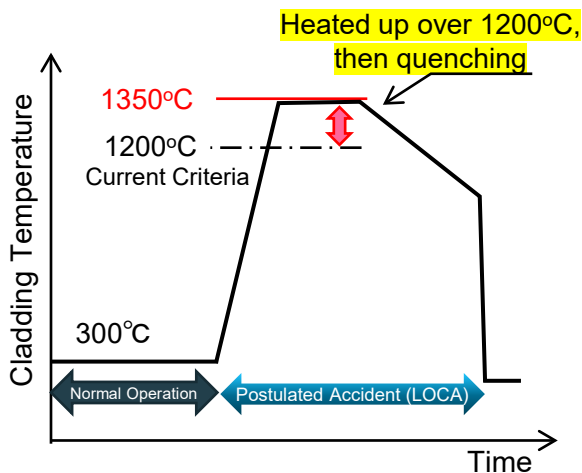
- Two coating processes “PVD sputtering” and “Electroplating” have been developed.
- Both types of Cr-coated cladding tubes show significant resistance to oxidation and embrittlement during postulated accident condition, as well as corrosion resistance at normal operating condition.



Cr-coated Zr cladding



Optical microscopy



Cr-coated



Intact even though higher temperature experience

Un-coated (conventional Zr cladding)



Split after quenching due to oxidation & embrittlement

Collaboration with Idaho National Laboratory

- **Test train of 6 test Cr-coated cladding rodlets** with instrumentations have been **ready to irradiate in ATR**.
- Total **4 ATR normal operation cycles** (2-month-long / cycle) will be held, then some rodlets will be **examined at the Hot Fuel Examination Facility (HFEF)** in INL.
- **Results from the program** will be reported via various communication channels, such as this symposium, **DOE/EPRI joint ATF Workshop**, and other **International meetings**.



Appearance of the test train

For future cooperation

- Currently in Japan, **advanced fuel** like ATF is considered as **key technology** to achieve both **enhancement of safety** and **increasing operation efficiency**.
- **The ATR irradiation programs** will **accelerate Japanese ATF R&D program**, and the **program** must be a **symbol** to expand **civil nuclear energy development partnership** between **the United States and Japan**.
- **MHI contributes to progress the partnership** through the fuel project with INL & JAEA.

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