

Recent Results from LOCA Study at JAERI

Fumihisa NAGASE and Toyoshi FUKETA (JAERI)
nagase@popsvr.tokai.jaeri.go.jp

Objective

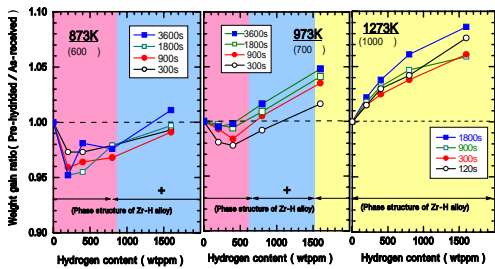
To evaluate high burnup fuel behavior under LOCA conditions and accumulate data for regulatory judgment

High burnup effects to be examined

- Corrosion
- Hydriding (Most important for cladding embrittlement)
- Neutron irradiation
- New alloys

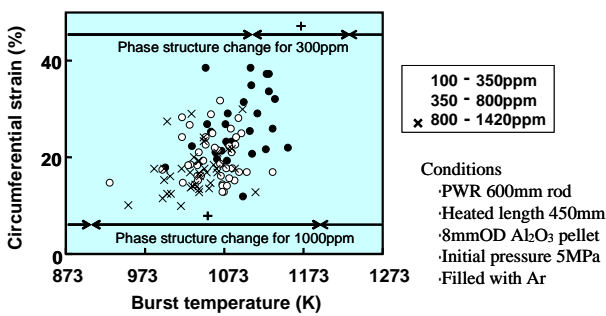
Separate effects of hydriding on cladding behavior under LOCA conditions

High temperature oxidation



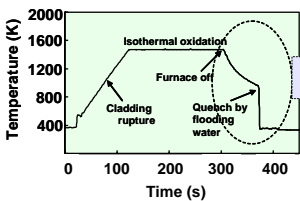
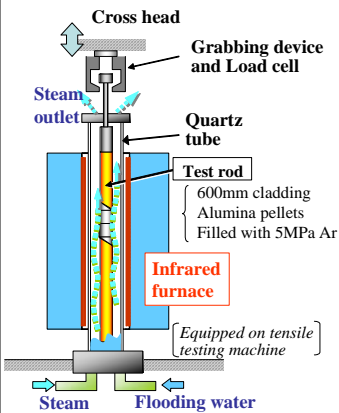
Pre-hydriding may enhance oxidation, but the extent is negligible for the realistic hydrogen concentration and time ranges.

Rupture behavior

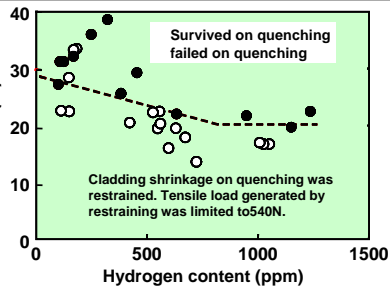
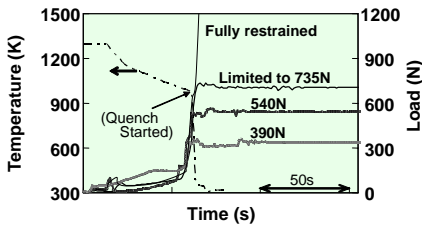


Increase of hydrogen concentration changes phase transformation temperature, resulting in change of burst strain.

Failure boundary on quenching

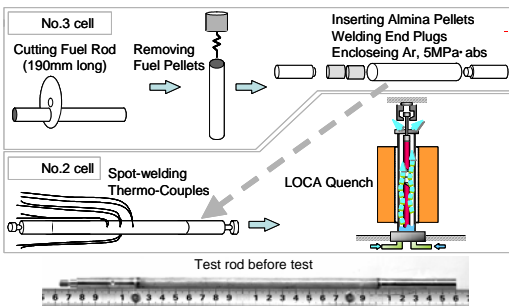


Cladding shrinkage on quenching was restrained. Maximum tensile load generated by restraining was limited at intermediate load levels.

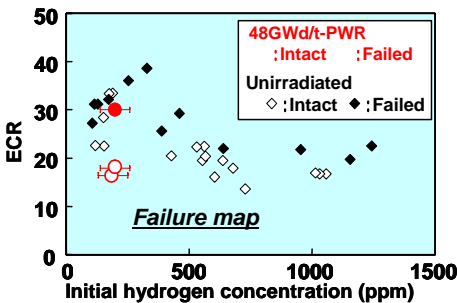


The influence of pre-hydriding was obviously seen on the failure threshold value under axially restrained conditions.

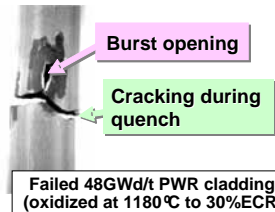
Irradiation effects on cladding behavior under LOCA conditions



Results for 48GWd/t PWR cladding



Failure boundary is not reduced so significantly by irradiation to the examined burnup level.



Test schedule

FY	2001	2002	2003	2004	2005	2006	2007
Unirradiated (Pre-hydride)							
48GWd/t PWR							
55GWd/t PWR							
71 - 75GWd/t PWR							
63GWd/t BWR							

