

# Ongoing Research Activity Using NIFS-HEATs

## Japanese Universities

|                    |  |
|--------------------|--|
| Hokkaido U.        | Hydrogen retention/permeation                                      |
| Tohoku U. (Eng.)   | Optimization of TMT<br>Oxidation, corrosion in water               |
| Tohoku U. (IMR)    | Defect property<br>High temp. mechanical property                  |
| U. Tokyo           | MHD coating<br>Compatibility (Li, Flibe)                           |
| Nagoya Inst. Tech. | Fracture toughness   |
| Kyoto U. (KUR)     | Fundamental radiation effects                                      |
| Hiroshima U.       | Laser welding  |
| Kyushu U.          | Ion irradiation effects (welding, impurity)                        |
| NIFS               | Fabrication technology, welding<br>Fracture toughness, MHD coating |

## Japanese Institutes

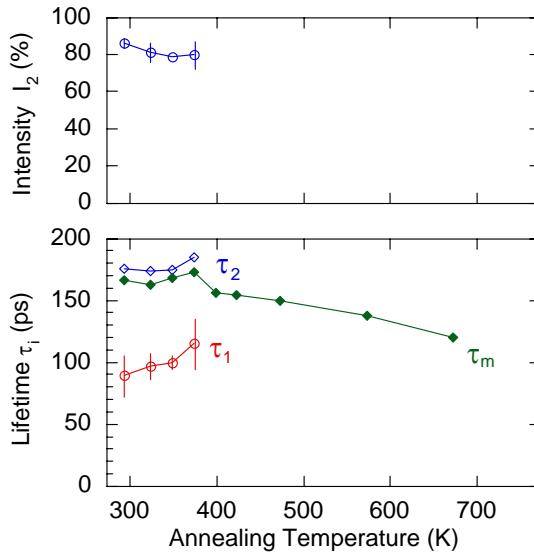
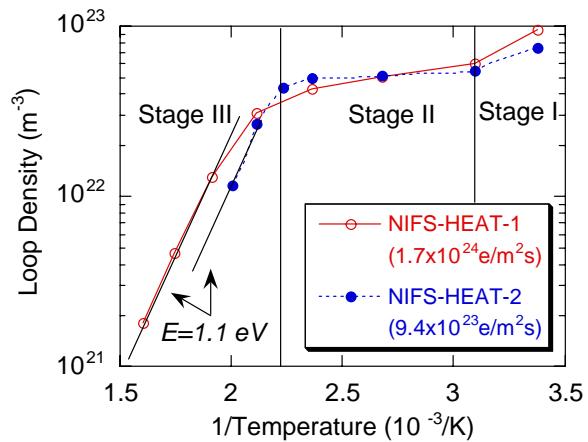
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|-------|---------------------|
| NIMS  | Helium implantation |
| JAERI | Activation analysis |

## Foreign Institutes

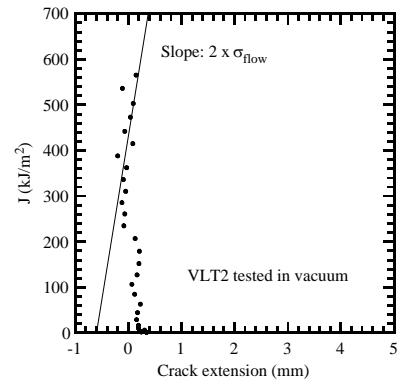
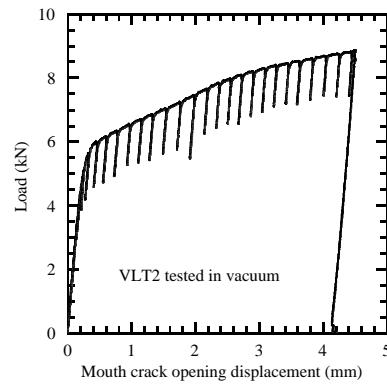
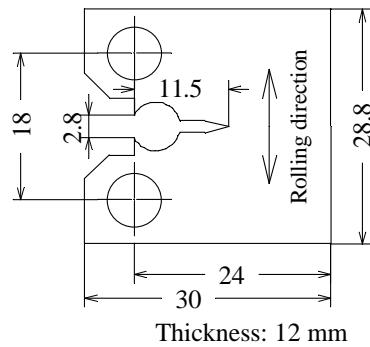
|                         |                        |
|-------------------------|------------------------|
| SWIP (China)            | Hydrogen embrittlement |
| IPP -Garching (Germany) | MHD coating            |

## US

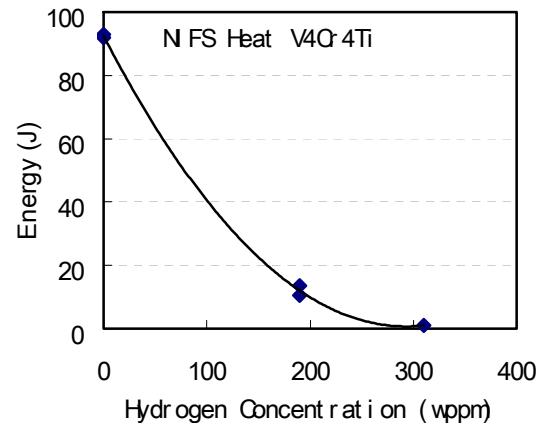
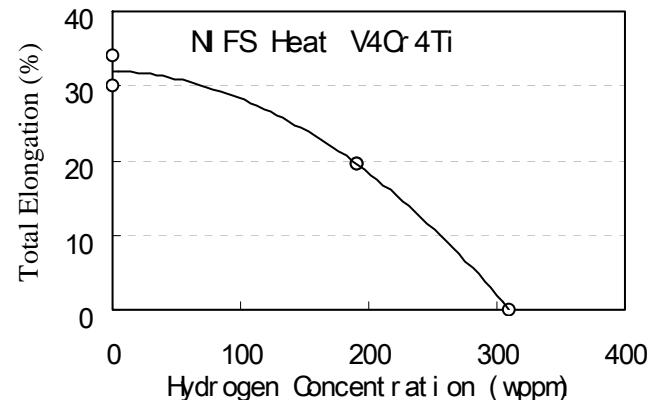
Specimen fabrication for irradiation tests



Apparent migration energy of interstitial+impurity  $\wedge 1.1\text{eV}$   
 Clustering of vacancies starts at  $\sim 373\text{K}$   
 (Xu, Yoshiie, Kyoto U.)



1/2CT tests showed high ductility and toughness.  
 Dependence on TMT and test direction in progress  
 (Nishimura, NIFS)



The alloy became completely brittle at 300wppm H  
(Chen, Xu, SWIP)

# Future Plan of Collaboration Using NIFS-HEATs

## NIFS research plan

- Welding with dissimilar materials
- Fracture toughness and low cycle fatigue (standard size)
- MHD coating fabrication and characterization
- Installation into LHD
  - Small coupon
  - Test specimens
  - Component

## Major collaboration subjects in the future

- Neutron radiation effects (JUPITER-II, JMTR, JOYO)
- Mechanical property of base metal and joints
- Irradiation Creep
- Helium effects

## Summary report of NIFS-HEAT tests

- within Japan -- end of FY 2002
- International -- next IEA-WS

## Design of next NIFS-HEAT (if budget available)