6th IEA & JUPITER Joint Workshop on Vanadium Alloys for Fusion Applications
Loews Ventana Canyon Resort, Tucson, Arizona, June 21- 22, 2002

What experiments/modeling are ongoing in Japan?

Creep and Swelling

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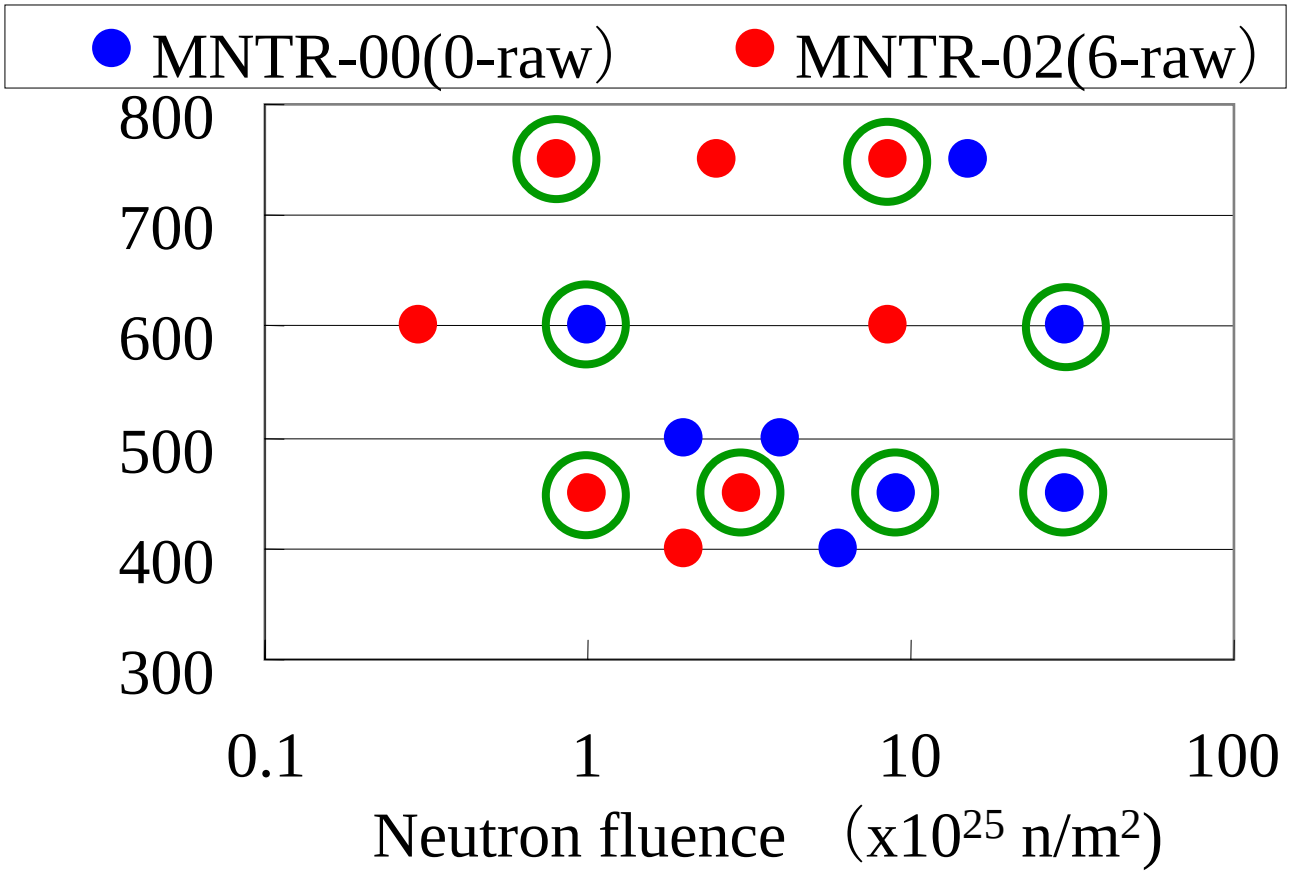
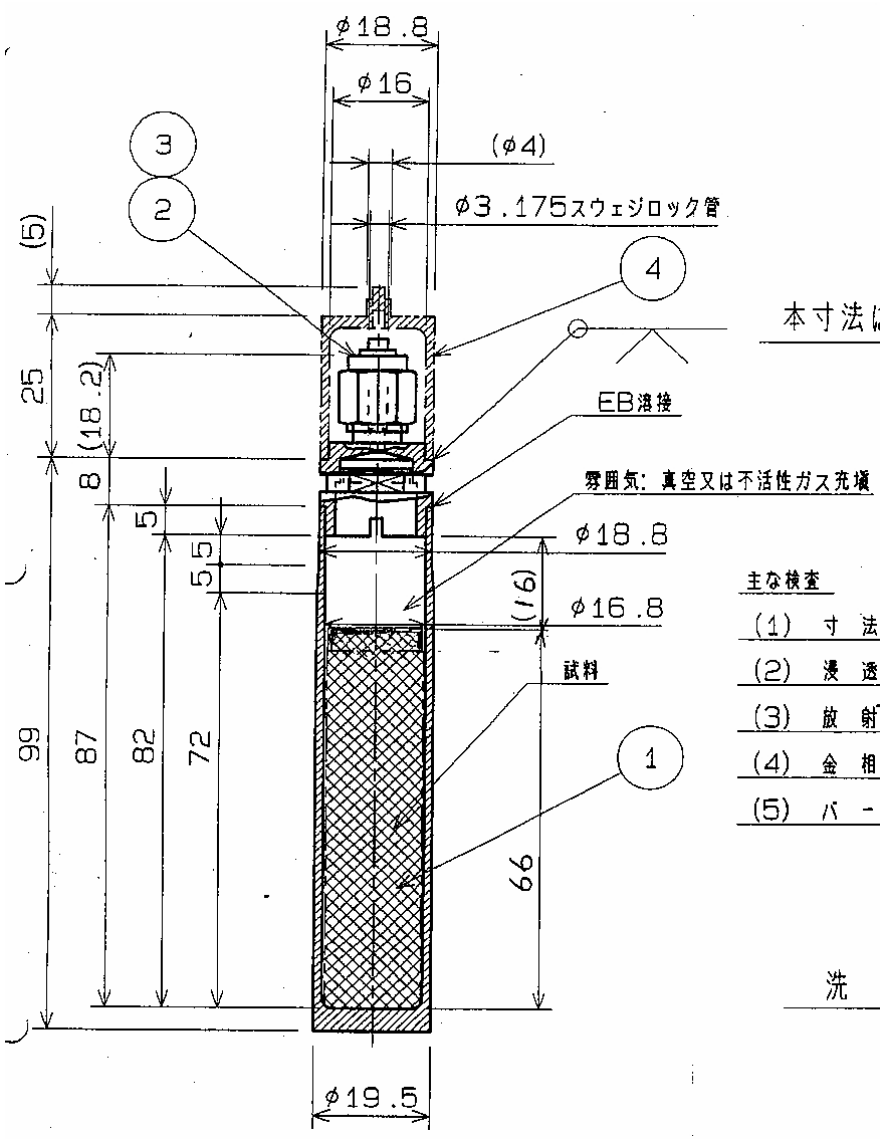
Irradiation plane in JOYO, 2002-2003



Capsules for vanadium-alloys-only

Irradiation will start from October, 2002

450ºC capsule



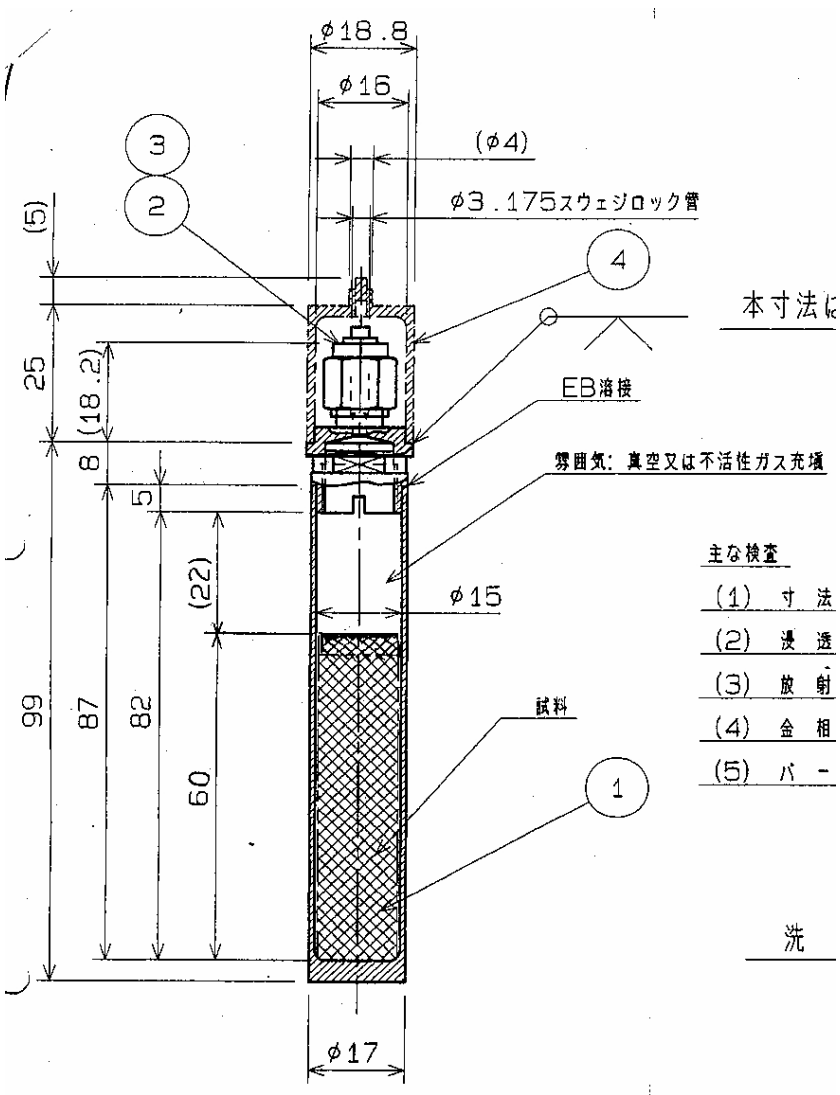
450C capsule

Four conditions

•Each two capsules for Creep and 1/3CVN, respectively.

16.8cc for irradiation volume

600,750ºC capsule



600ºC capsule

Two conditions

- Loading Creep specimens
- No loading 1/3CVN specimens

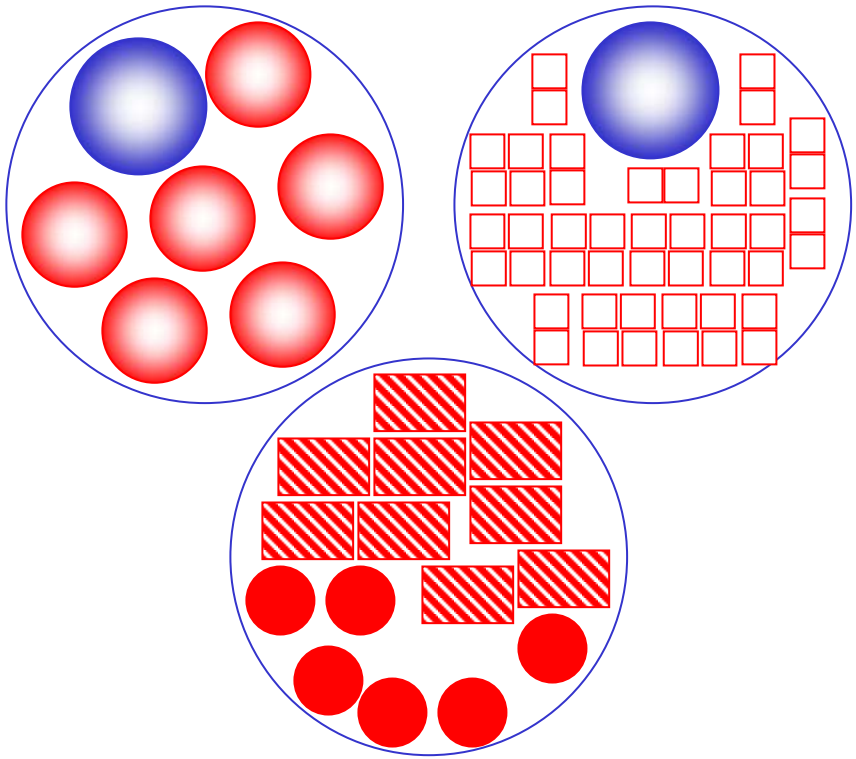
750ºC capsule

- Only TEM and tensile specimens

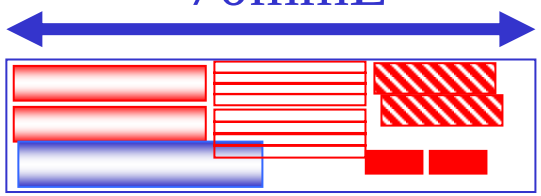
9.3cc for irradiation volume

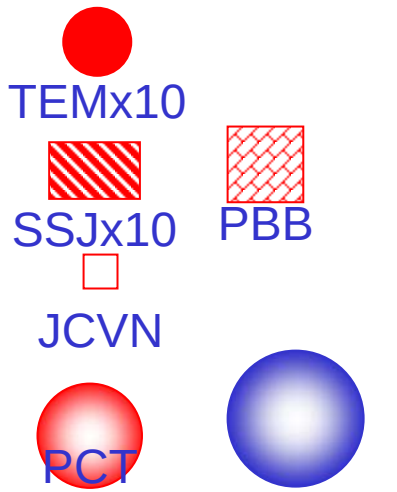
450ºC capsule for Creep

OD19.5→ID17.5



Creep : 6
1/3CVN : 0
1.5CVN : 48
SSJ : 90-100
TEM : 120

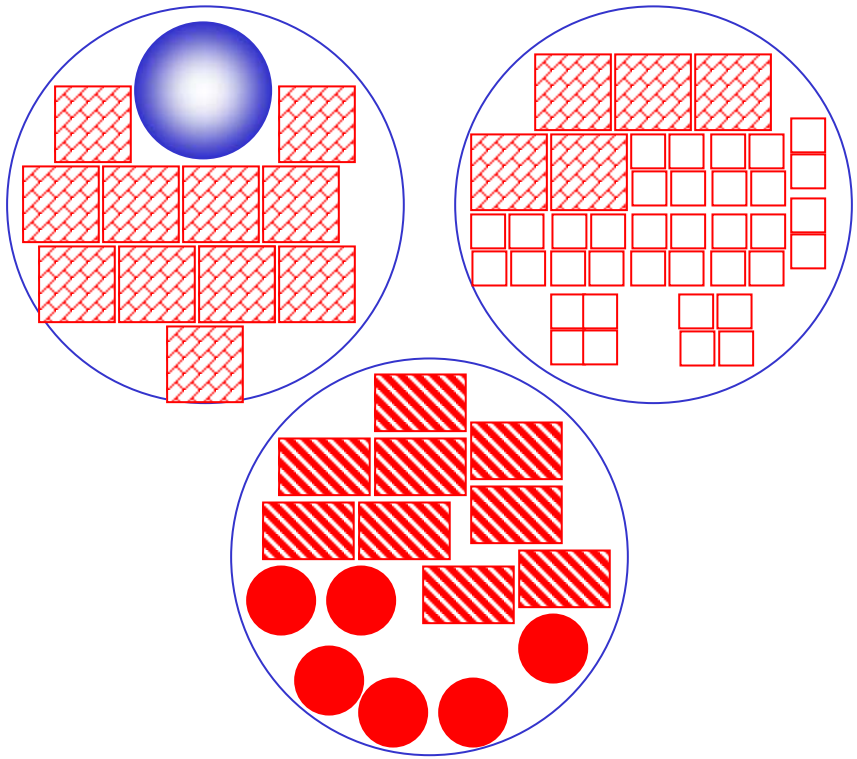




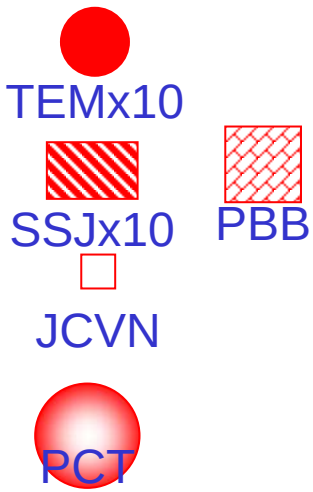
17.5mm ID 70mm L (16.8cc)

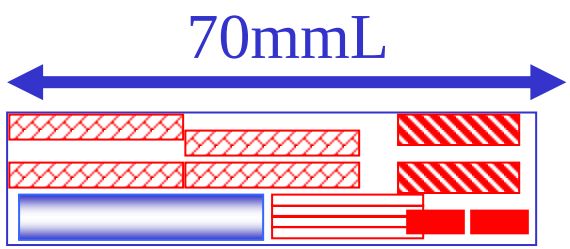
450ºC capsule for 1.5CVN

OD19.5→ID17.5



1/3CVN : 15
1.5CVN : 36
SSJ : 90-100
TEM : 120

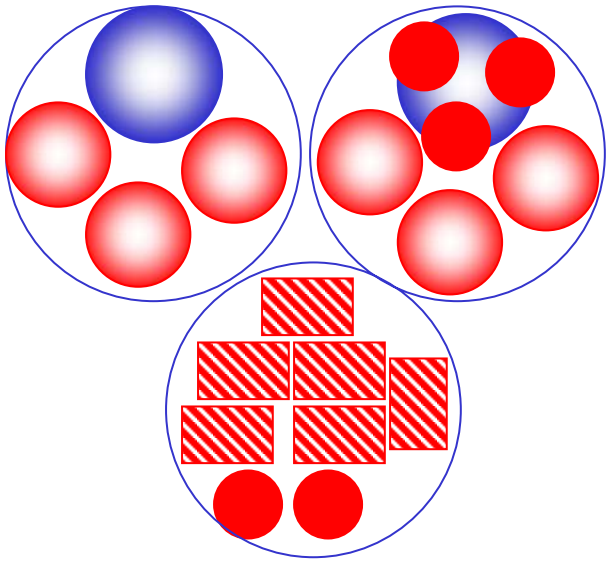




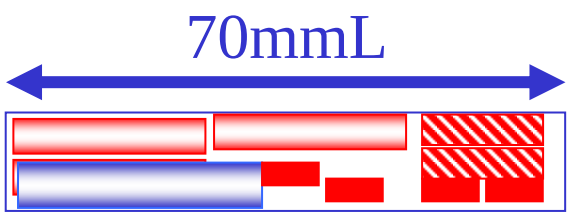
17.5mm ID 70mm L (16.8cc)

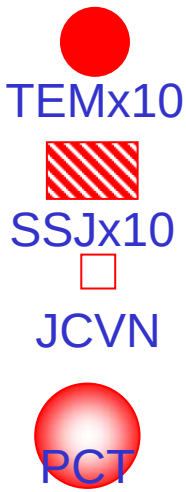
600ºC capsule for Creep

OD15.0→ID13.0



Creep : 6
SSJ : 70
TEM : 100

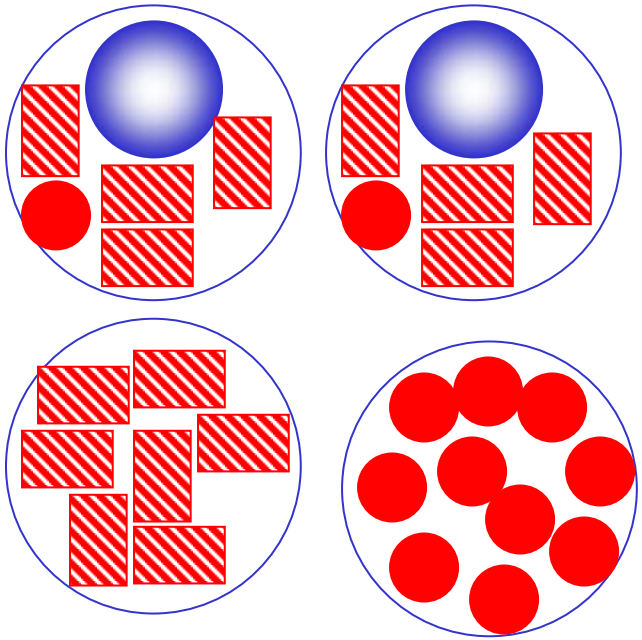




13.0mm OD 70mm L (9.3cc)

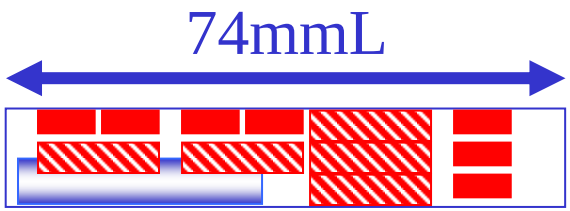
750ºC capsule for Creep

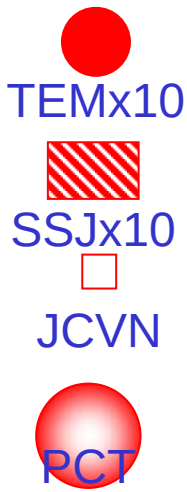
OD15.0→ID13.0



SSJ : 150

TEM : 140





13.0mm OD 70mm L (9.3cc)

Expected Specimen Matrix

Irradiation Condition				Estimated number of specimens				
Capsule Raw	Capsule No.	Neutron Dose ($x10^{25}n/m^2$)	Irr. Temp. (°C)	Creep	1/3CVN	1.5CVN	tensile	TEM
MNTR-6	59	1	450		15	36	100	120
MNTR-6	62	3	450	6		48	100	120
MNTR-0	53	9	450		15	36	100	120
MNTR-0	55	30	450	6		48	100	120
MNTR-0	49	1	600	6			70	100
MNTR-0	56	30	600	6			70	100
MNTR-6	58	0.8	750				150	140
MNTR-6	64	8.5	750				150	140

The ratio of specimens to Liq.Na ≈ 30-40%

Estimated oxygen concentration in V-alloys that all amounts of oxygen in a capsule are absorbed into V-alloys

0 wppm Free oxygen in SUS of capsules → 40-60 wppm O increase

50 wppm Free oxygen in SUS of capsules → 1800-3000 wppm O increase

0 wppm Free-O case may be available because O in SUS is trapped in precipitates.

Summary

A program for neutron irradiations with sodium bonding is planned in Japan.

- The reactor planned for neutron irradiations is JOYO in JNC.
- The irradiation program will start in fall 2002.
- Irradiation temperature : 450, 600, 700ºC (to adjust with ALiVE irradiation)
- Irradiation dose : 1 – 30 x 10^{25} n/m^2

- The main purposes of the program are
  - ✓Creep behavior at high temperatures (>450ºC)
  - ✓Impact property at 450ºC using 1/3CVN specimens
  - ✓Irradiation behavior of welded specimens
  - ✓Irradiation behavior of highly-purified V-4Cr-4Ti (NIFS-H1,2)