

The 4th Irradiation Test of Dry Process Fuel in HANARO

, , , , ,

150

. 1 3

, 2 SIMFUEL,

3 DUPIC SIMFUEL DUPIC

가 . 3

1 . SIMFUEL

DUPIC 2 3

OR5

Abstract

The 4rd irradiation test of dry process pellet using non-instrumented rig is being performed in the HANARO research reactor. Among the three mini-elements for the 4th irradiation test, the element #1 is dedicated to the extended irradiation of the DUPIC pellets irradiated in the 3rd irradiation test, the element #2 and #3 are used for the comparative analysis on the in-core behaviors of simulated DUPIC fuel and actual DUPIC fuel. For these purposes, the irradiated rig of the 3rd irradiation test was disassembled in a hot cell to select the element #1. Also the SIMFUEL that is fabricated in the DUPIC laboratory is welded by laser in a

welding chamber and the DUPIC fuel that is remotely fabricated in DFDF is welded by a laser method as done in the second and third irradiation tests. The rig was remotely assembled using a rig assembler and loaded into the OR5 hole. Since June 2002, the 4th irradiation test is being performed.

1.

1990 (DUPIC : Direct Use of Spent PWR Fuel in CANDU Reactors) 가

2001, DUPIC 가 2001 가 (KISTEP)

2002-2006 가

가 [1,2].

DUPIC 가 1 DUPIC OR4 (Rig) 1999 8 4 1999 10 4 2

DUPIC 2 OR4 2000 5 10 2

[1].

DUPIC SPND(Self Power Neutron Detector) 3 DUPIC 2001 6

8 가 가

HALDEN 가 2000 7 2

가

4 4

3

2.

DUPIC 1998 1 2
 . 2001
 DUPIC SPND
 2
 3
 4 가 .

2.1

2 2.7 mm
 가 3
 2 3
 [1.4].

- Guide : 3 seating ring
- Lower endplate : Guide arm 3
- Outer tube : Guide arm 3
- Lower support tube : mini-element assembly 3
- Housing support : cooling block
- Upper support tube : mini-element assembly 3
- Upper endplate : ("DUPIC 02-004")

2.2

4 2
 . 2 10

가가 . 4
 10% 3 4
 가 .

3. DUPIC

DUPIC
 1 1986 3.21 %, 25 cm
 35,502 MWD/MTU .
 , 5
 ,
 10.5 mm, 11.4 mm .
 DUPIC 2 3
 200 mm, 12.12 mm zircaloy-4 (0.66 mm) .
 1 가 500W Nd:YAG
 4 mini-element mini-element
 4 mini-element X-ray
 2 2 mini-element ,
 2 가 (Al2O3)
 space block, 5 , space block
 He
 [3].
 SEU,
 , IMEF

4. DUPIC

3 mini-element IMEF M1 M6
 pardirac mini-element 2
 mini-elemlent . 2 3

4.1 Element assembly

Element assembly 3 mini-element 가 .
4 , 1 2 mini-element 2
3 SIMFUEL 3 1 DUPIC mini-element .
lower housing housing supporting cooling block
, mini-element handle
mini-element lower housing
Mini-element jig가 .
Element assembly housing nut 10 kgf.cm .

4.2 DUPIC

M6 element assembly pardirac
M1 cell , DUPIC .
support tube , element assembly
, element assembly
tube 가 [8]. support
grapple head lock grapple head
clampling nut set screw
[9].

4.3 DUPIC

IMEF M1 DUPIC cask
Pool M1 pool
pool 가

5.

5.1

4 1 3 mini-element ,
3
가 6,000 MWd/tHM 가
DUPIC
DUPIC DUPIC
OR5 4
24 MW, 3,000
MWd/tHM 가
DUPIC [1.6]. 4

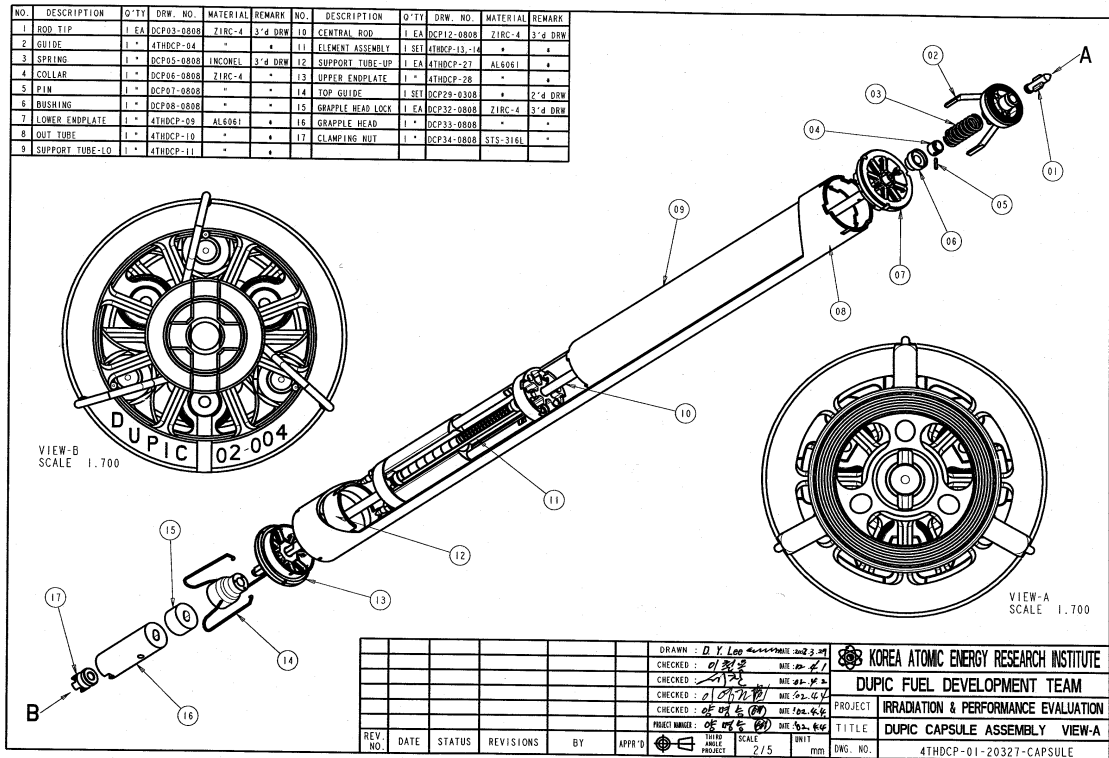
5.2

4 3 semi-
cask
가
2002 6 13 OR5
6 4 3
14 1

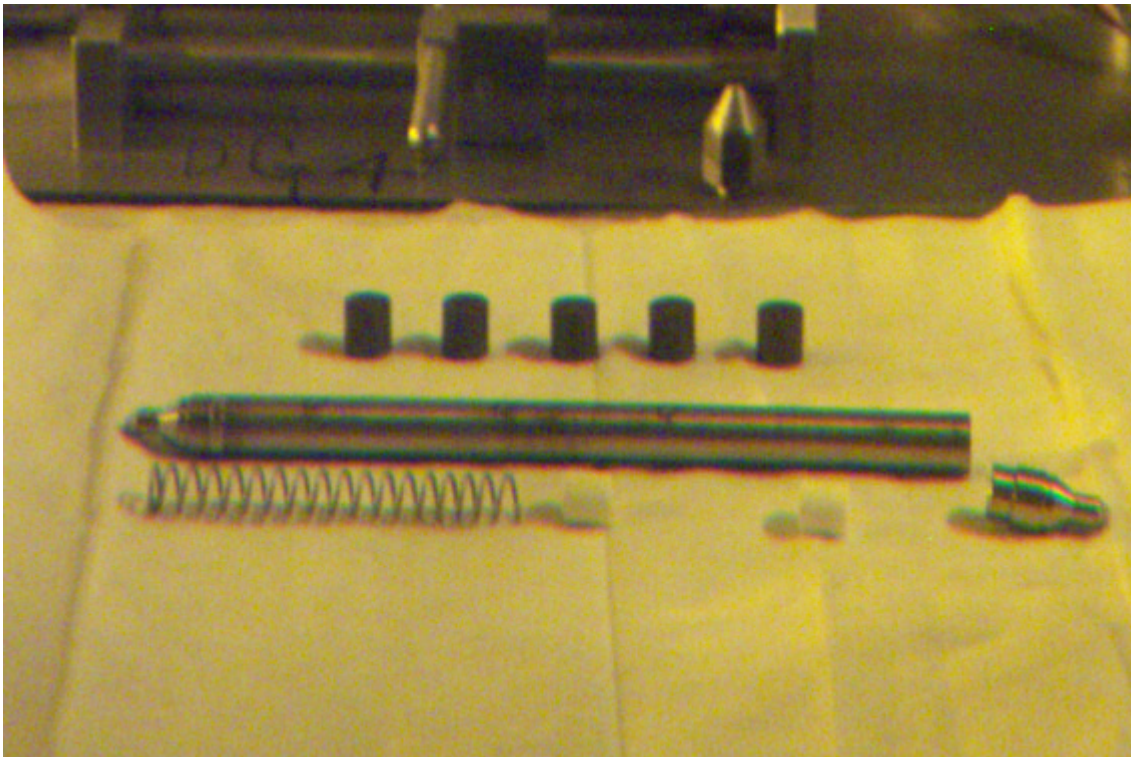
6.

4 1
3 , 2
SIMFUEL 3 DUPIC SIMFUEL DUPIC
가 3
1 , 가
SIMFUEL
DUPIC 2 3
OR5 3,000
MWd/tHM 2002 6

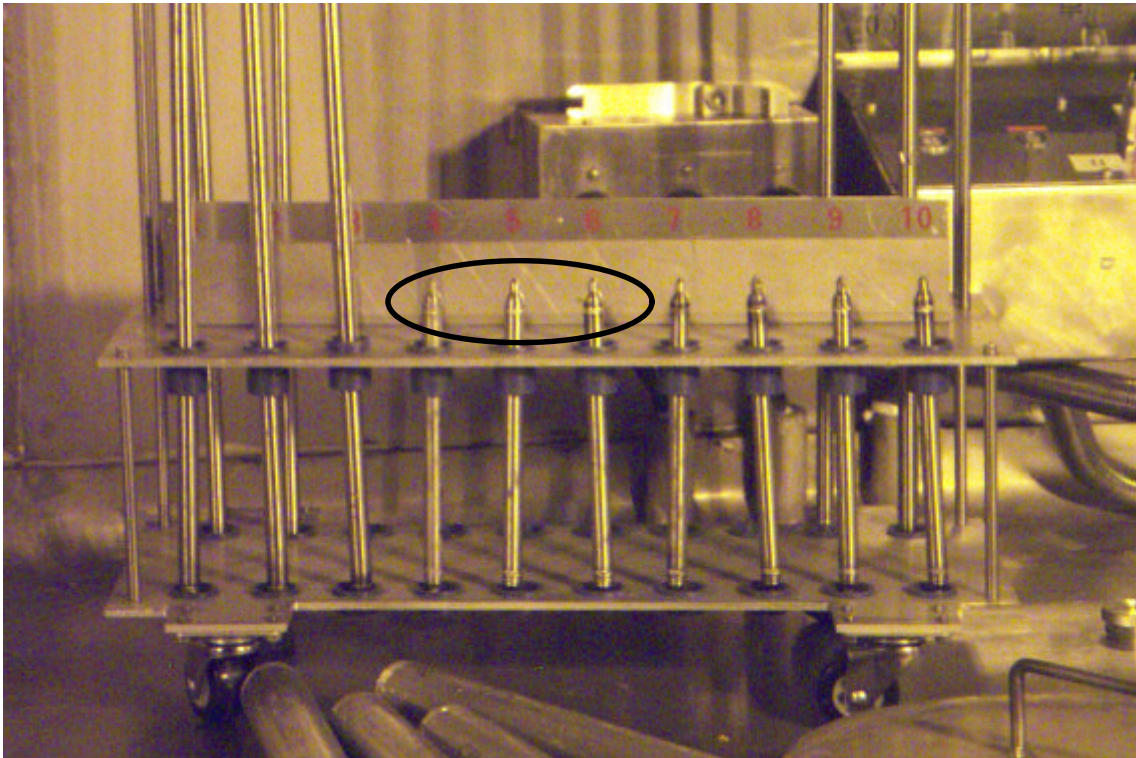
- 1.1 ., DUPIC , KAERI/TR-1484/2000, , 2000.
- 1.2 ., Thermal neutron flux measurement using the DUPIC SPND instrumented Rig, , 2002.
- 1.3 , DUPIC Irradiation Test Rig-003 , KAERI/TR -1810/2001, , 2001.
- 1.4 , , , QD-02-01, 2002.
- 1.5 , DUPIC , , QR-02-04, 2002.
- 1.6 , 4 가 , KAERI/TR-2201/2002, , 2002.



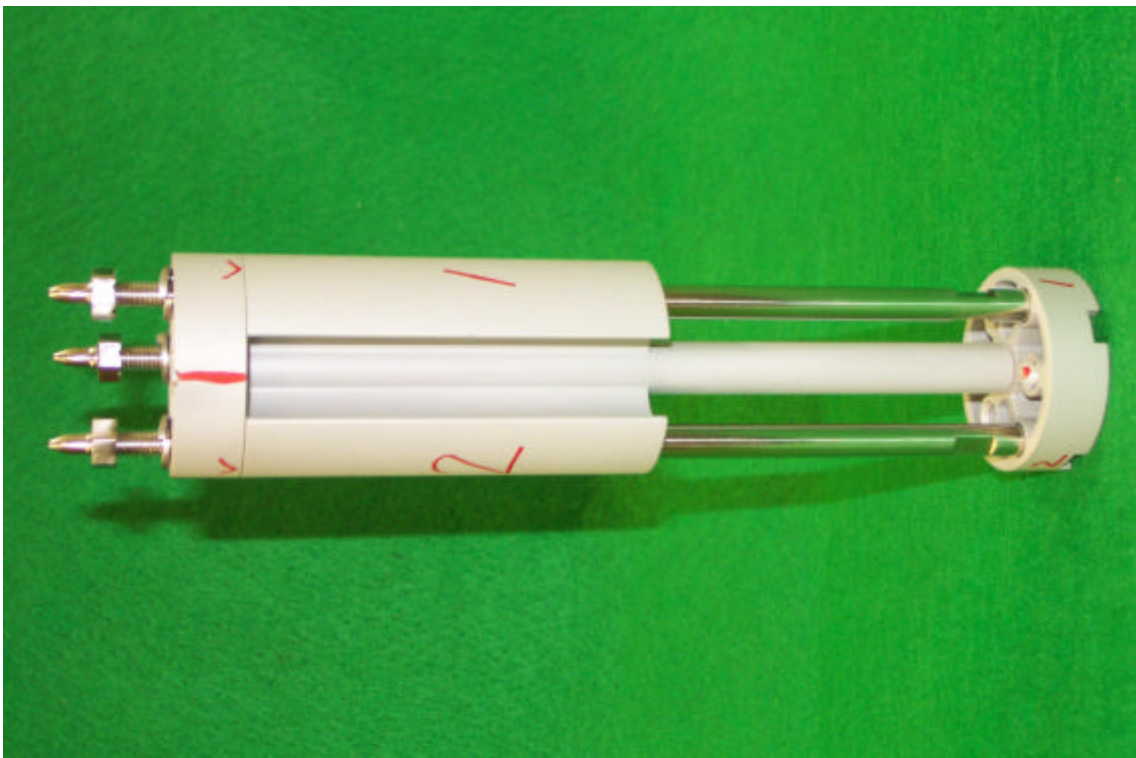
1. 4



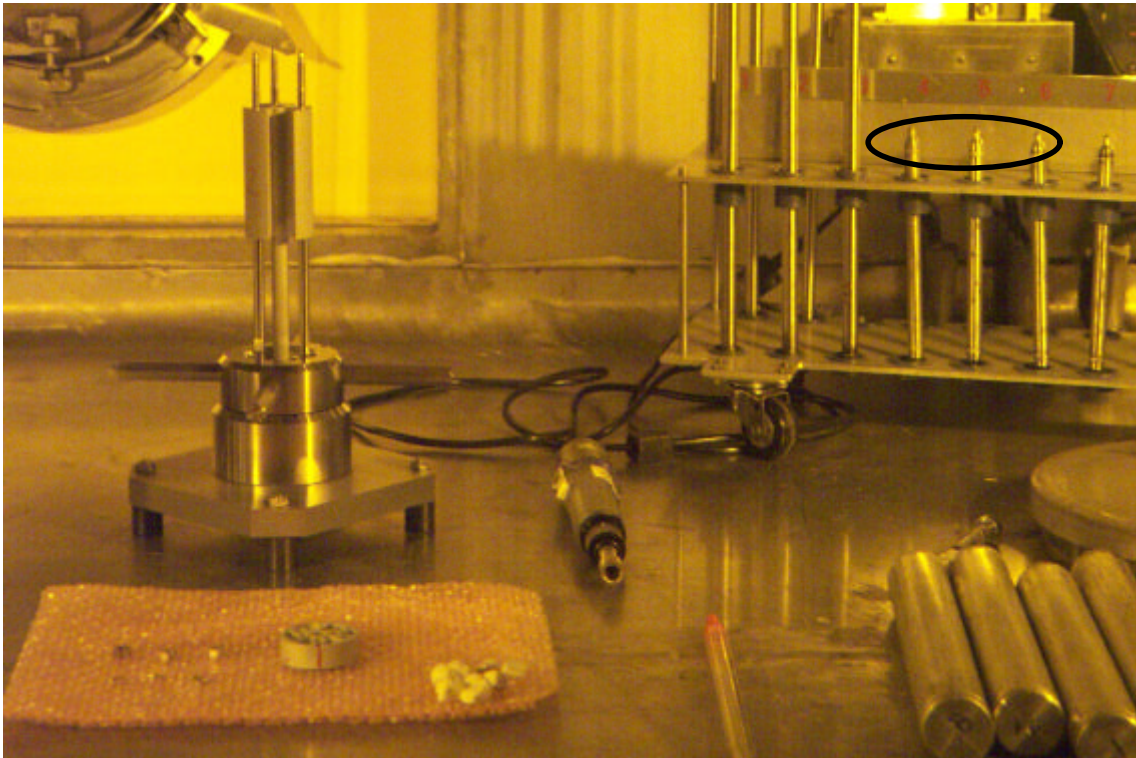
2. DUPIC mini-element



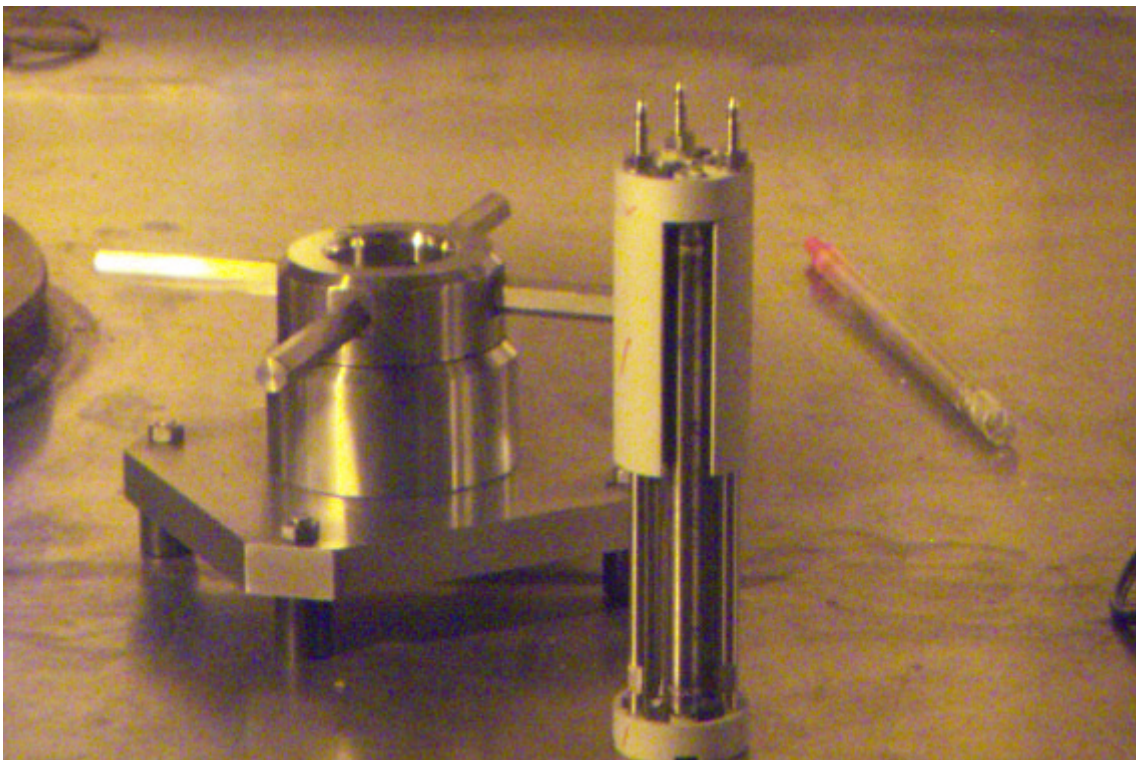
3. Mini-element



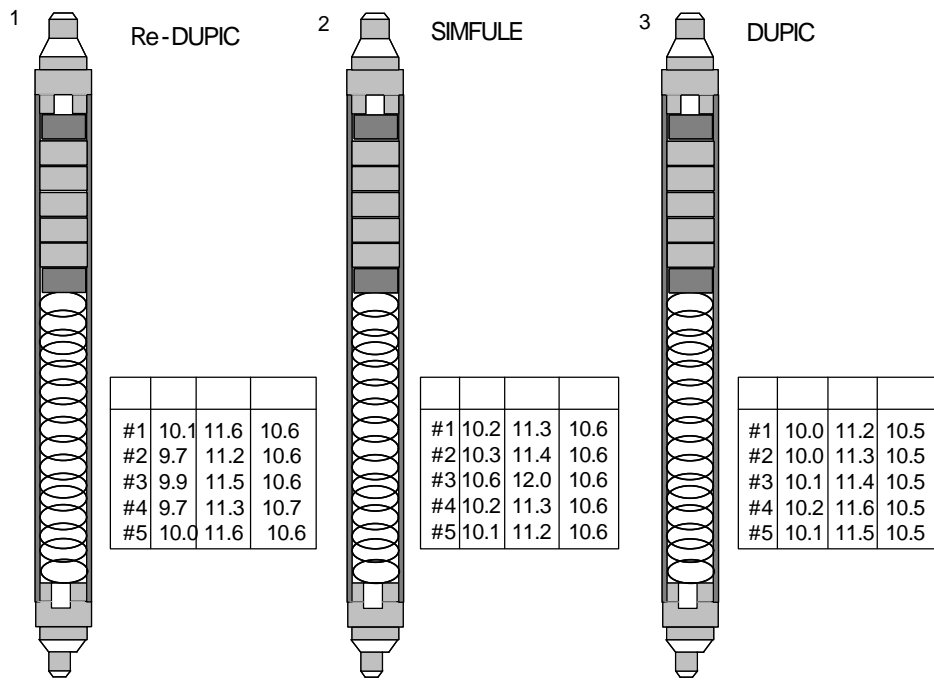
4. Element assembly



5. Element assembly

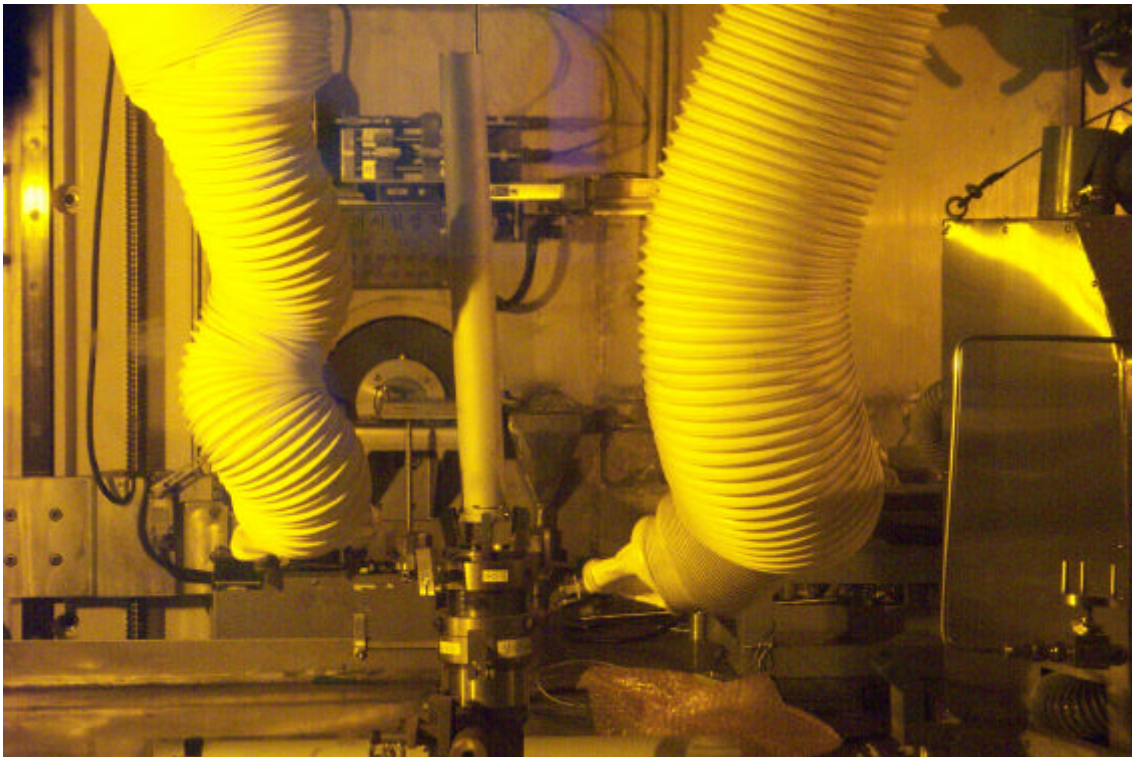


6. Element assembly

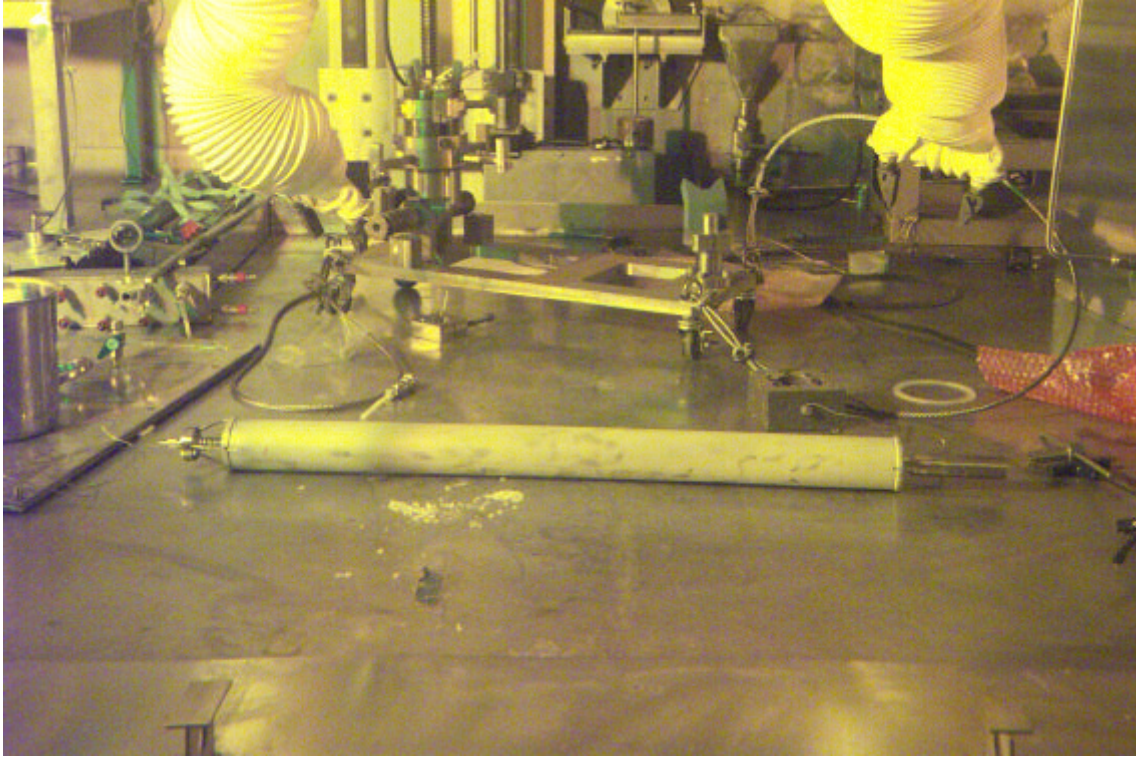


Mini-element (4)

7. 4 mini-element



8.



9.