Poster session

Wade Karlsen, VTT

1 slide in 2 min each

P01

Magnus Göhran

European Spallation Source ERIC, Fagerström Industrikonsult AB

The European Spallation Source Active Cells Facility - Challenges in Construction - HOTLAB 2018

- Mechanical versus civil construction tolerances
  - 2 different worlds meet at the same location
- Re-bar design and casting sequences
  - 500 kg/m^3 re-bar, 1.3 m thick high density concrete walls
- Uneven concrete surfaces
  - Casting formworks shift and swell differently during casting
- Installation of cast in items in tight spaces
  - Clashes between cast in items and formworks

P02

Alex Wagner

United Kingdom Atomic Energy Authority

Size Reduction Equipment in the ESS Active Cells Facility

ESS ACF Size Reduction Equipment

Alex Wagner – UK Atomic Energy Authority

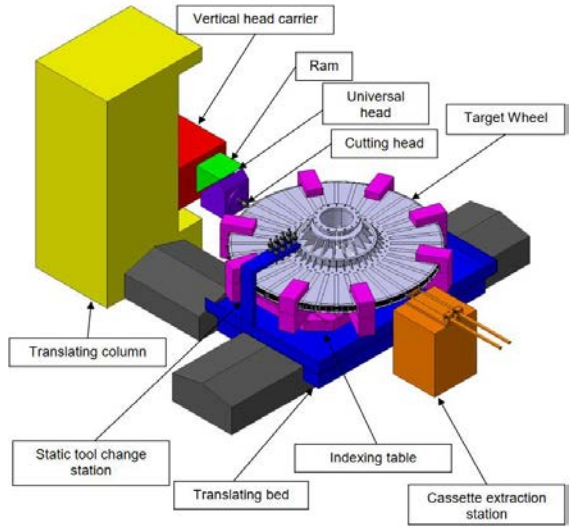
A variety of large radioactive components shall require size reduction and handling operations within the European Spallation Source (ESS) Active Cells Facility.

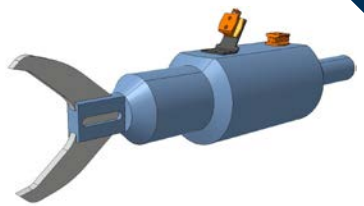
A systems engineering approach was conducted, producing a function-based set of requirements for various size reduction equipment. Size reduction equipment includes:

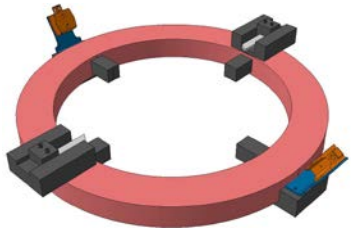
1. Machining Station (accepting tender submissions)
2. Shaft Cutting Station (tenders in review)
3. Auxiliary tools (shear cutter, orbital cutter, bolt removal tools)

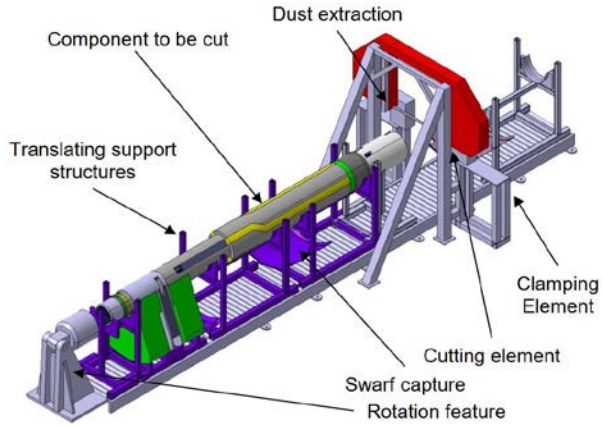
Main difficulties of cutting technologies required:

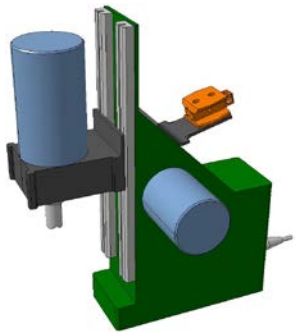
1. Radiation hardness and remote maintainability
2. Dry cutting (no coolant liquids)
3. Large cut depths and long cut paths











P03

Mika Helin

Platom Oy

PLATOM’s Expertise and Capabilities to Support Construction and Operation of Hot Cell Facilities

PLATOM's Expertise and Capabilities to Support Construction and Operation of Hot Cell Facilities

- Platom has 20 years of experience in delivering consultancy services, components and systems for nuclear industry in several countries
- The evaporation and waste treatment (EWT) box for radioactive waste water treatment from Hot Cell operations was delivered to VTT in spring 2018
- Earlier a drying cabinet for liquid waste volume reduction was supplied to Forsmark NPP
- These deliveries further expand the services Platom can offer to the international nuclear industry

PLATOM

P04

Akinori Sato

Japan Atomic Energy Agency

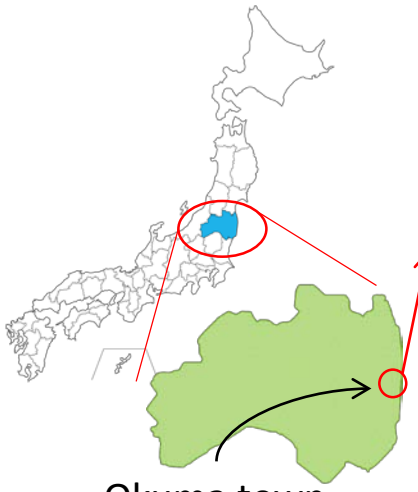
The preliminary study for safety design of JAEA's Radioactive Material Analysis and Research Facility "Laboratory-2" dedicated to fuel debris analysis at TEPCO's Fukushima Daiichi Nuclear Power Station site

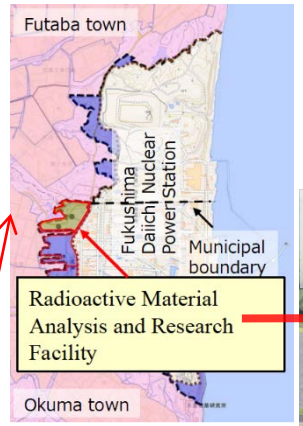
The preliminary study for safety design of JAEA's Radioactive Material Analysis and Research Facility "Laboratory-2" dedicated to fuel debris analysis at TEPCO's Fukushima Daiichi Nuclear Power Station site

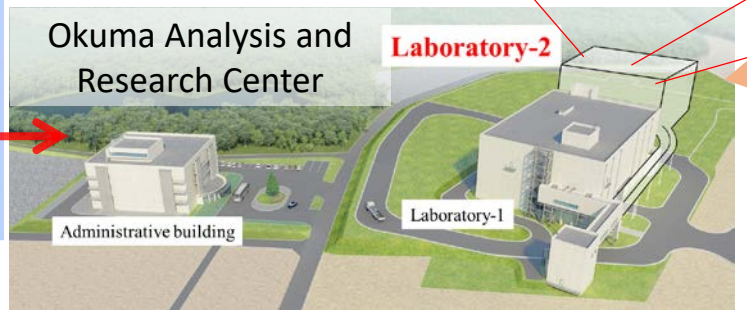
Akinori Sato*, Ichiro Kosaka & Naoya Kaji Japan Atomic Energy Agency(Okuma Analysis and Research Center)

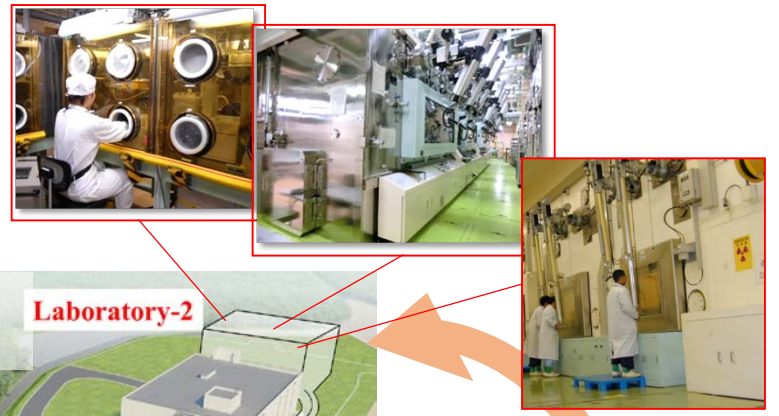
・In 2011 May, 1F accident occurred.

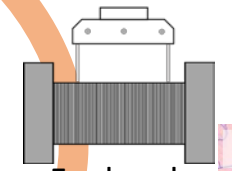
・According to Mid-and-Long-Term Roadmap for decommissioning of 1F NPS, fuel debris retrieval from the first unit will start in 2021.











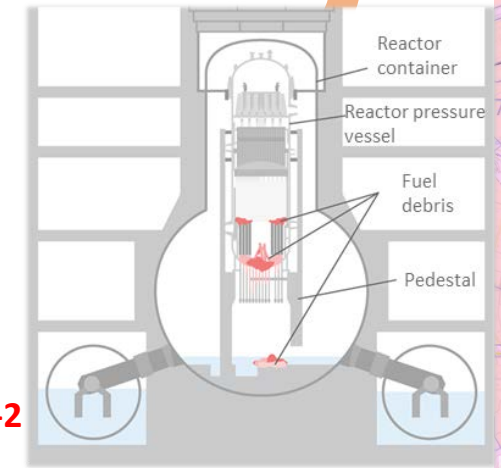
・JAEA is designing the Radioactive Material Analysis and Research Facility (**Okuma Analysis and Research Center**) adjacent to the 1F site.

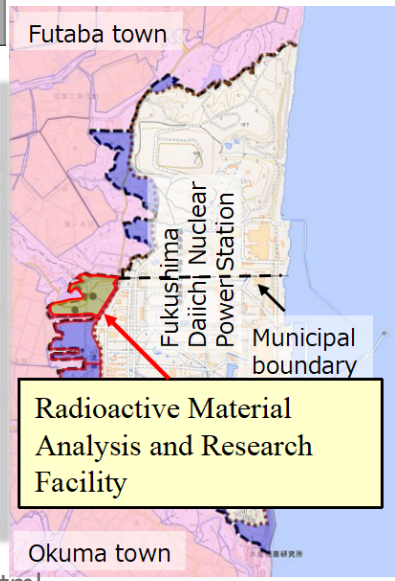
・In **Laboratory-2**, fuel debris is mainly handled and analyzed to characterize chemical and mechanical property.

・The practically conservative assumption is requested for the safety design.

The radiation shielding evaluation and the criticality safety evaluation

・Through the preliminary evaluations, **the feasibility of safety design of Laboratory-2 is implied**.





Source: http://www.tepco.co.jp/index-j.html

P05

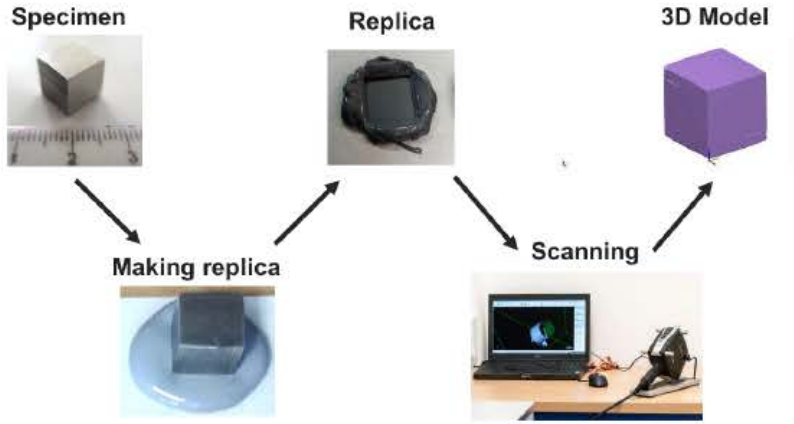
Ondrej Srba

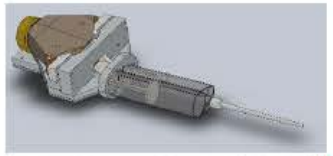
Research Centre Rez Ltd.

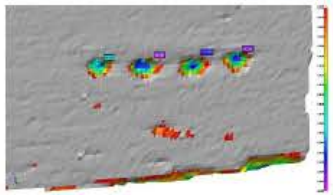
Preparation of experiments at CVR Hot-cell

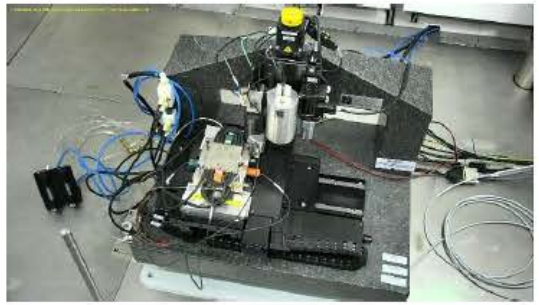
Preparation of experiments at CVR Hot-cell

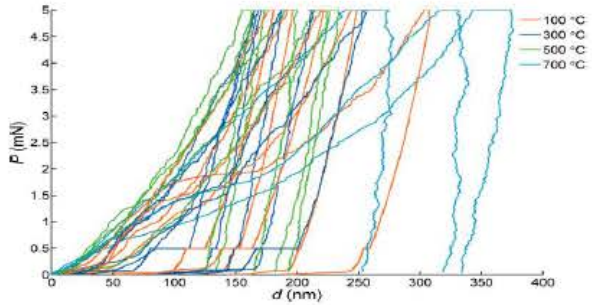
Ondřej Srba











P06

Laurent Velnom

European Commission, Joint Research Centre, Directorate for Nuclear Safety and Security

An overview of the Remote Handling solutions and equipment at JRC Karlsuhe`s Hot Cells facilities

An overview of the Remote Handling solutions and equipment at JRC Karlsuhe's Hot Cells facilities

L. Velnom, A. Busto, J. Marconato

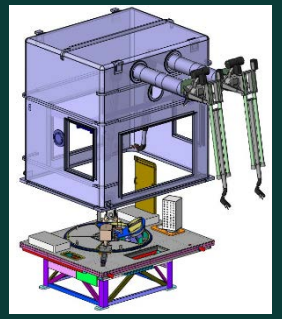
European Commission, Joint Research Centre, Directorate for Nuclear Safety and Security,
Postfach 2340, D-76125 Karlsruhe, Germany

The Radiochemistry Hot Cells

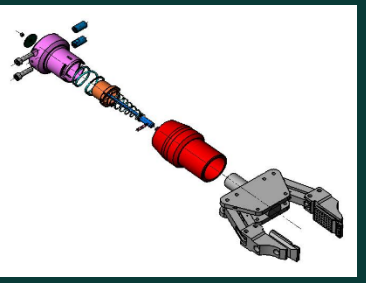
The 'Alpha-Gamma' intervention team within the unit Waste Management at JRC Karlsruhe develops, adapts and operates various Remote Handling technologies taking the highest care with respect to contamination monitoring and radioprotection regulations.

In total we operate and maintain about 90 Master Slave Manipulators (MSM) of various sizes and types together with several Robot arms for heavy duty or complex operations.

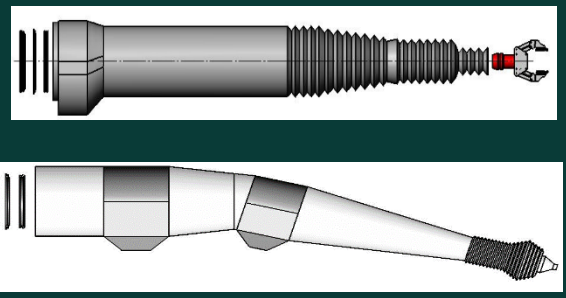
Heavy duty SAMM power manipulator



High Activity α steel cases with its two MSM'S .



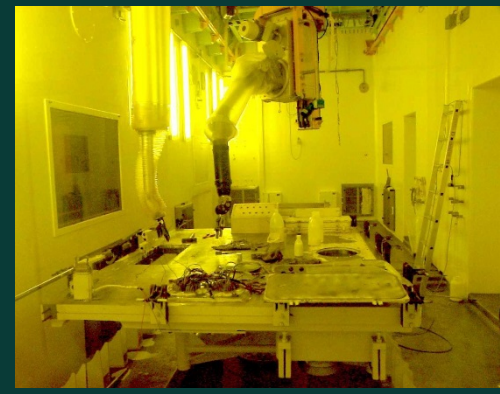
R&D on Grippers



Various types of engineered bootings

Minor Actinide Laboratory

Intervention on MA Lab HC



MA 23 with force feedback in Decontamination HC

55th Annual meeting – HotLab 2018
Helsinki, Finland

European Commission

P07

Patrik Sandström

Studsvik Nuclear AB

Self-threading electrical discharge machine - hot cell modifications and the first year of active machining

P08

V. Revka

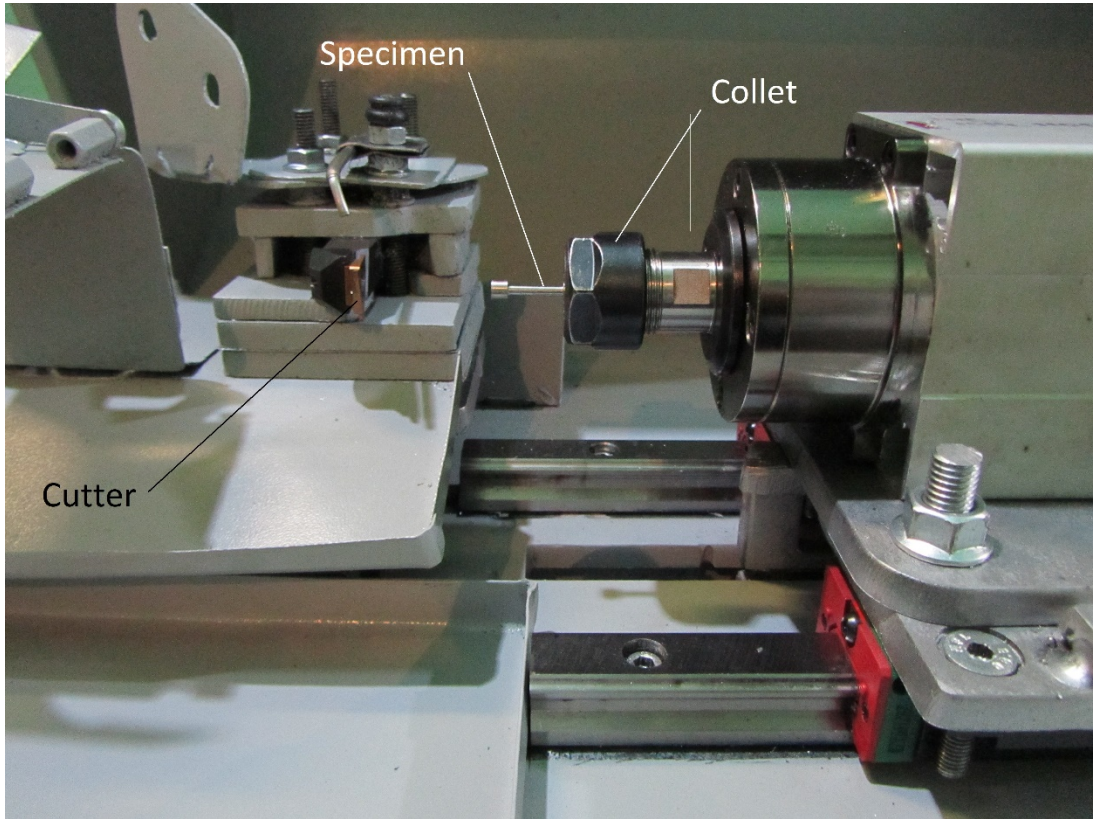
Institute for Nuclear Research

A remote technique for a preparation of tension test specimens from the irradiated round bars

A remote technique for a preparation of tension test specimens from the irradiated round bars (P08)

Volodymyr Revka
Institute for Nuclear Research, Kyiv, Ukraine

- ✓ Round bars have been put in the surveillance capsules instead of standard tension specimens (Rivne NPP-1)
- ✓ Preparation of tension specimens from irradiated round bars is needed
- ✓ A remote lathe with computer control has been developed
- ✓ A brief description of equipment
- ✓ Application of equipment for machining specimens



P09

Cameron Howard

Canadian Nuclear Laboratories (CNL)

Using Novel Small Scale Mechanical Testing to Link the Mechanical Properties and Deformation Mechanisms of High-Dose Activated Inconel X-750

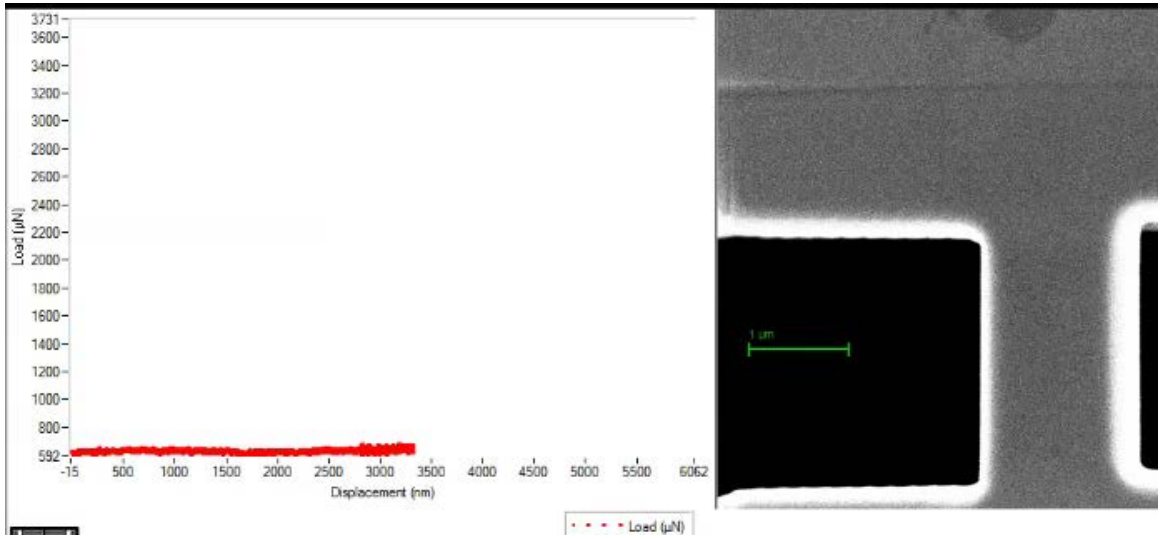
Using Novel Small Scale Mechanical Testing to Link the Mechanical Properties and Deformation Mechanisms of High-Dose, Activated Inconel X-750

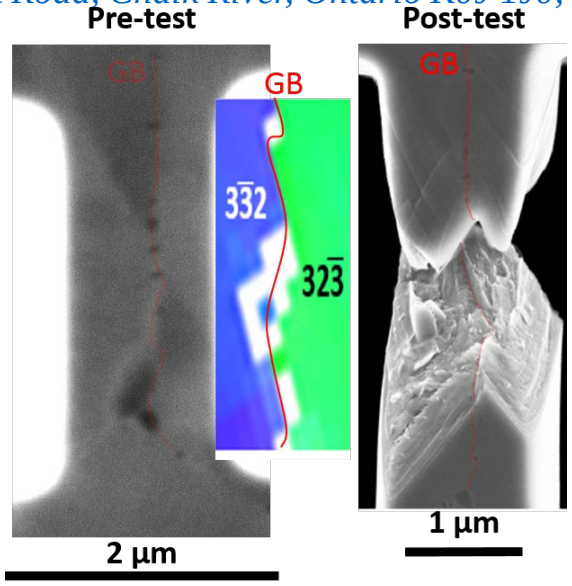
Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

Cameron Howard, Vineet Bhakhri, Chris Dixon, Heygaan Rajakumar, Clinton Mayhew, Colin Judge

Canadian Nuclear Laboratories (CNL), 286 Plant Road, Chalk River, Ontario K0J 1J0, Canada

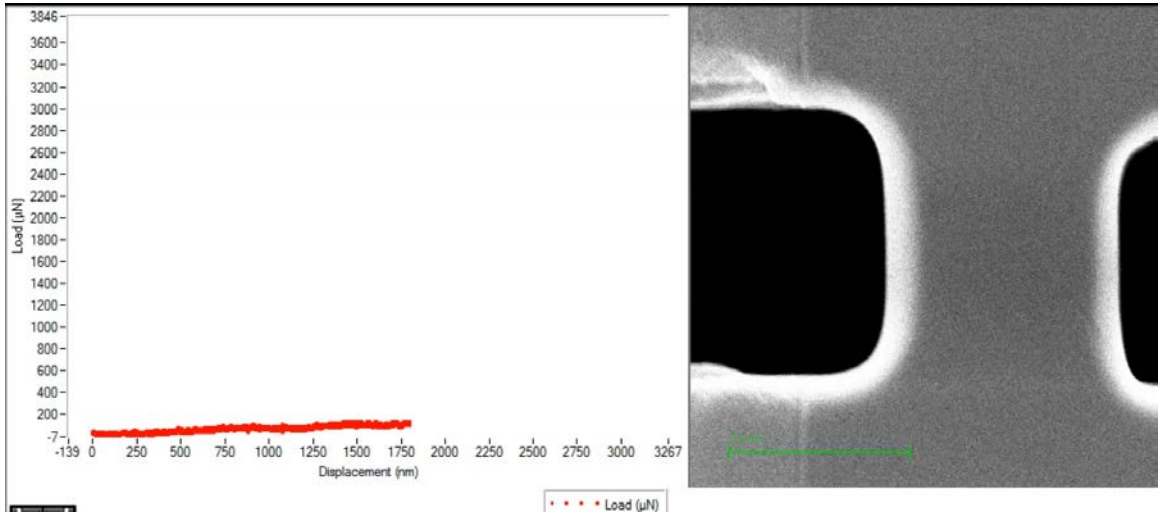
~20 dpa, T_{irr} = 300 °C

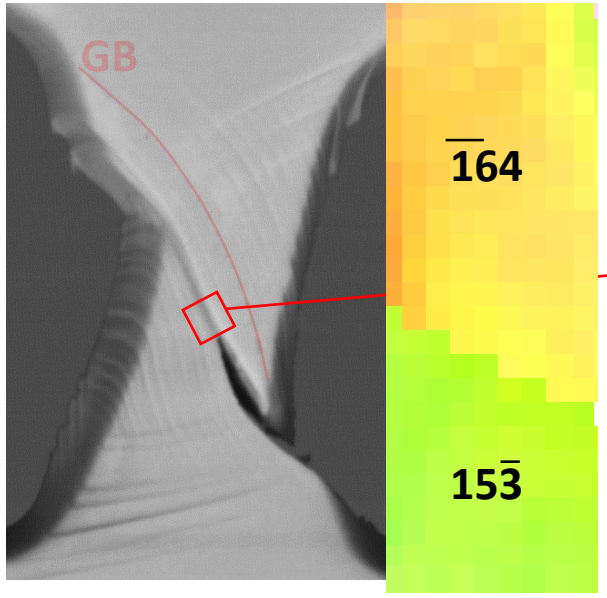




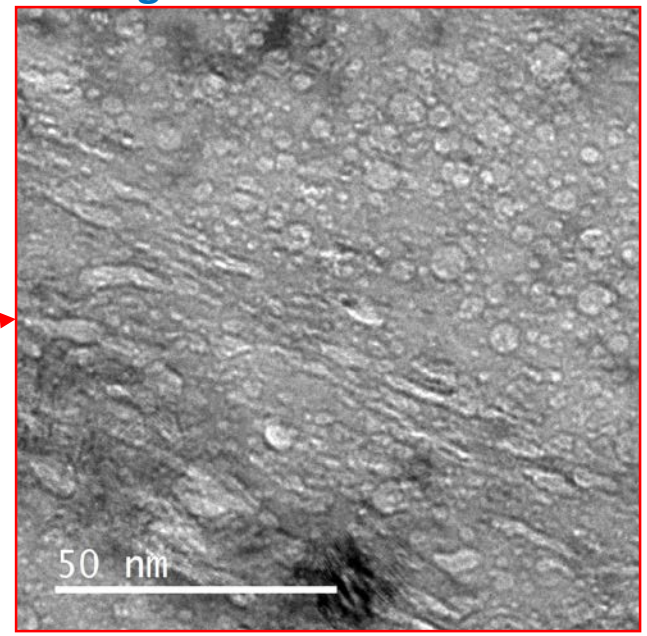
intergranular fracture

84 dpa, T_{irr} = 300 °C





trans-granular channel fracture



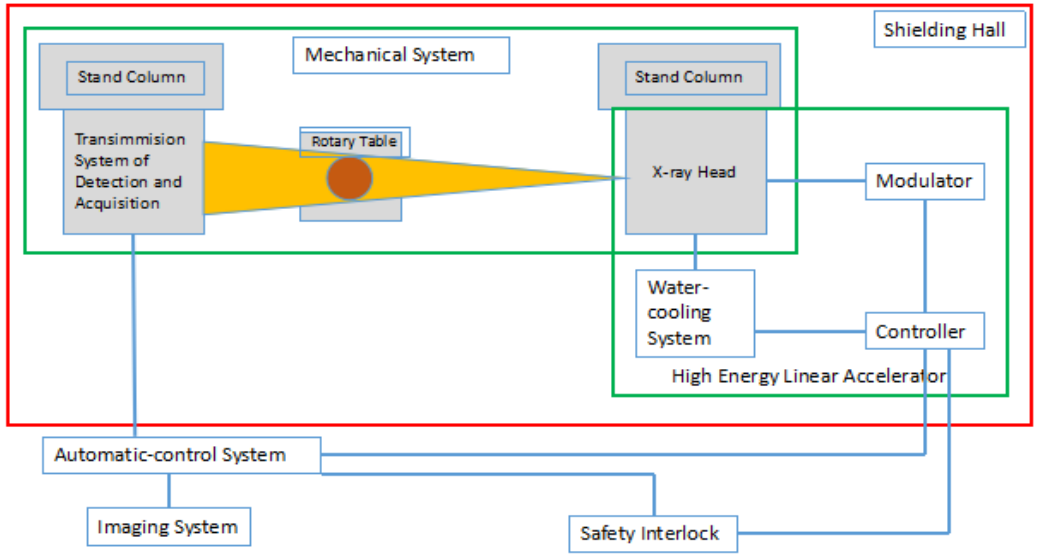
P10

ZHANG Xiang-yang

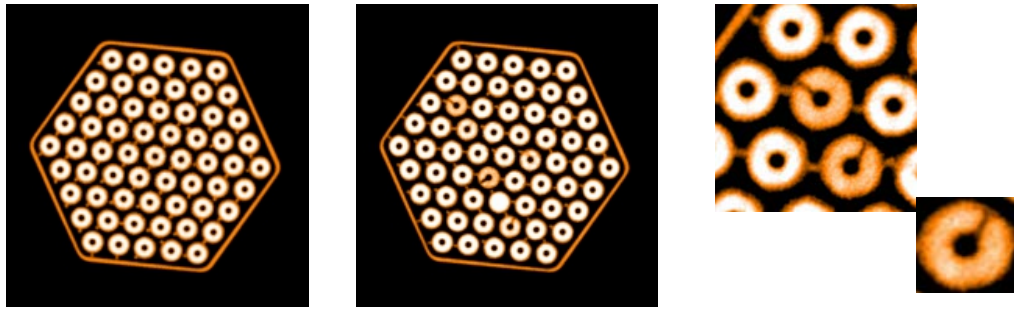
China Institute of Atomic Energy

High Energy X-ray Study on Nondestructive Detection of Fuel Assemblies

Nuclear fuel assembly is the core of the reactor , in order to further study the performance of the fuel assemblies , we have conducted nondestructive detection research of assembly with high energy X-ray for several years, and experimental detection device was developed.



Schematic diagram of system structure



Computered tomography image of simulated nuclear fuel assembly

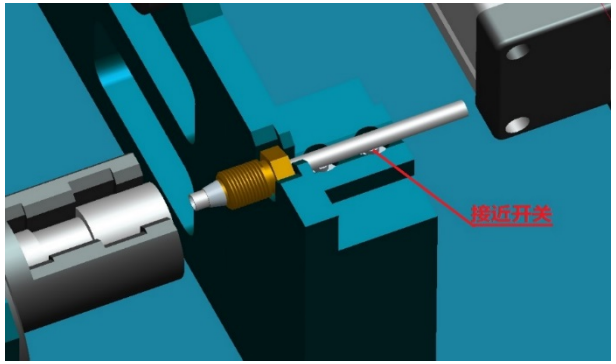
P11

Lei yang

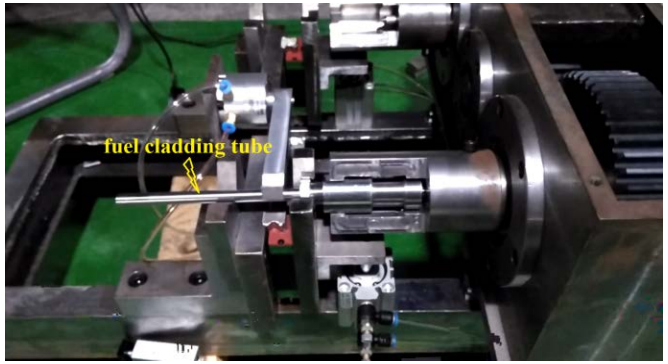
Nuclear Power Institute of China

Research on Closed-end Burst Testing of Irradiated Fuel Cladding Tube

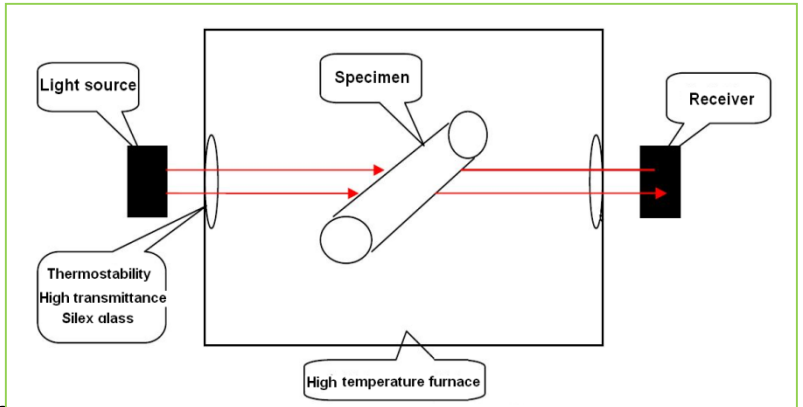
Research on Closed-end Burst Testing of Irradiated Fuel Cladding Tube



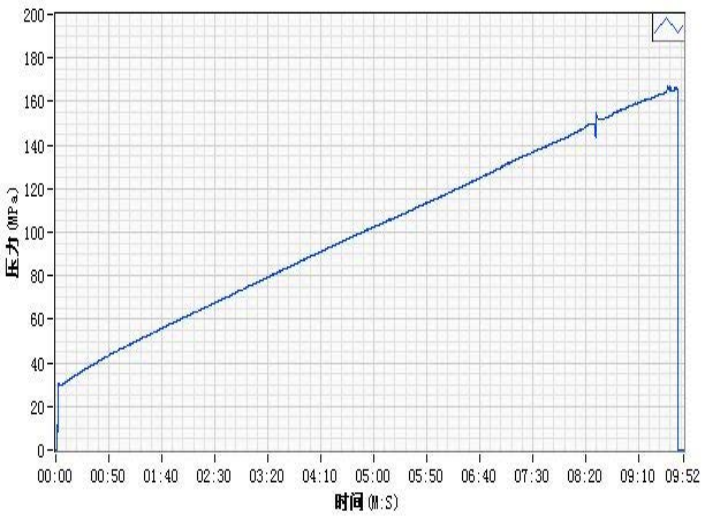
Designs for automatic loading



Automatic sealing and locking device

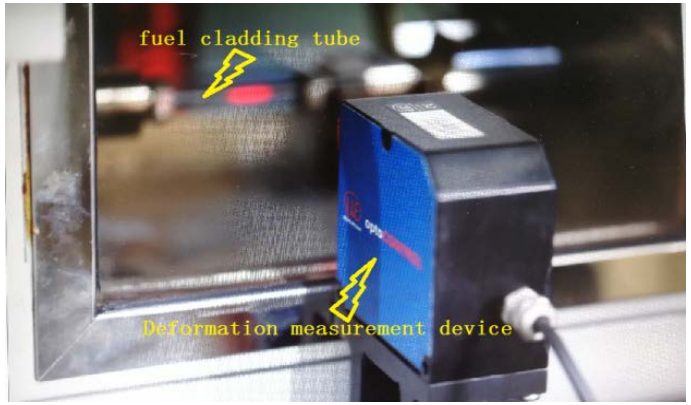


Measuring principle



The curve of pressure-time

Blasting pressure：
over 200MPa
Measurement accuracy：
5μm



Continuous deformation measurement device

P12

Guo li-na

China Institute of Atomic Energy

The research on oxide dispersion strengthened (ODS) ferritic steel by chemical method

P13

Kiho Kim

Korea Atomic Energy Research Institute

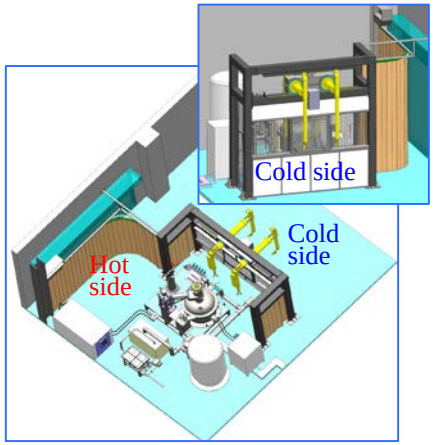
Remote Metal Fuel Slug Fabrication System Based on Injection Casting

P13

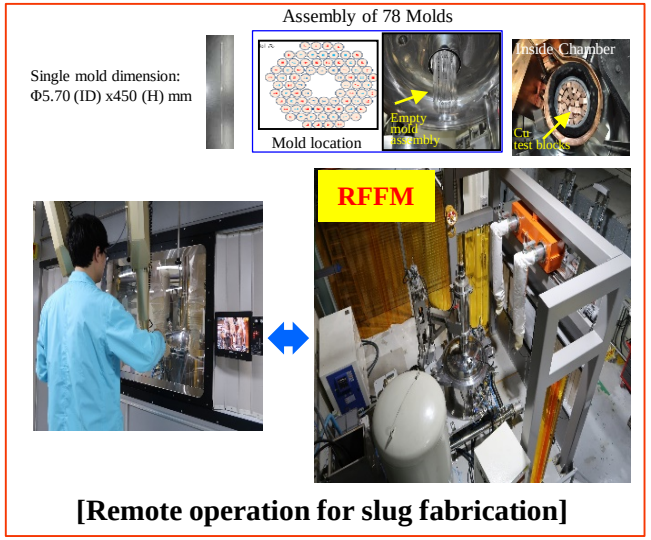
Remote Metal Fuel Slug Fabrication System Based on Injection Casting

Kiho KIM and Jeong-Yong PARK
Korea Atomic Energy Research Institute

- The Korea Atomic Energy Research Institute (KAERI) has been researching a technology for fabricating TRU (Transuranium) metal fuel using TRU ingot produced from Pyroprocessing.
- Such TRU metal fuel fabrication processes should be conducted in a fully remote manner at a hot-cell because of a nature of a radioactivity of TRU ingot. All the in-cell processes and equipment operations should be fully conducted using remote handling tools.
- To remote fuel fabrication technology development, we constructed the Remote Fuel Fabrication Mock-up (RFFM) located in the Fuel and Material Test Facility at KAERI this year.
- RFFM is an efficient means to test and verify an engineering-scale metal fuel fabrication using non-radioactive materials from the remote operation and maintenance viewpoint in advance before TRU ingots are used at hot-cell.
- RFFM consists of an engineering-scale metal fuel slug fabrication system and a remote handling system. The engineering-scale metal fuel slug fabrication system is one to fabricate metal slugs based on an injection casting. The remote handling system is a means to make the metal fuel slug fabrication possible in a remote manner.
- We demonstrate the constructed RFFM and its capability examined through the remote fabrication using copper conducted in RFFM. Remote copper slug fabrication results based on injection casting are also presented.



Full Scale Graphical Model of RFFM



[Remote operation for slug fabrication]

[After remote casting]

P14

Miho Suzuki

Japan Atomic Energy Agency

Sample preparation techniques for post irradiation examinations in the Reactor Fuel Examination Facility

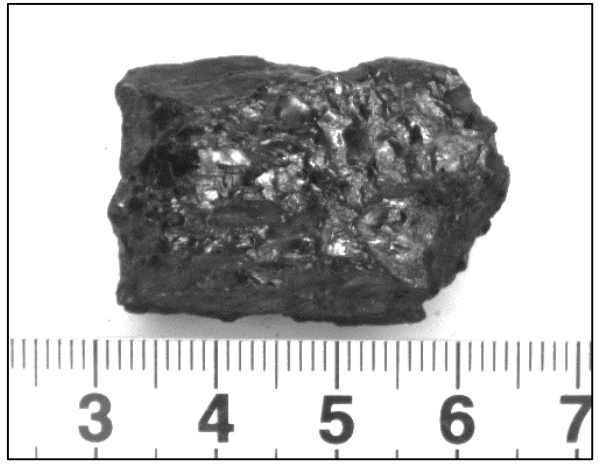
Sample preparation techniques for post irradiation examinations in the Reactor Fuel Examination Facility

Poster P14

M.Suzuki, Y.Kimura, M.Takano, N.Mita

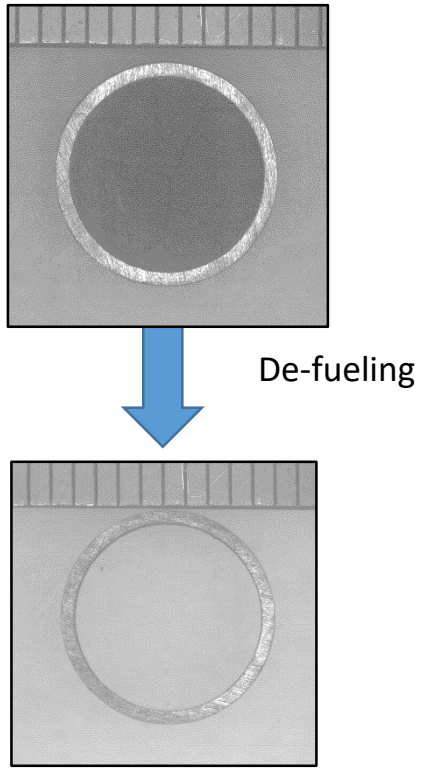
① Analysis for TMI-2 debris

How to hold the various shaped sample?



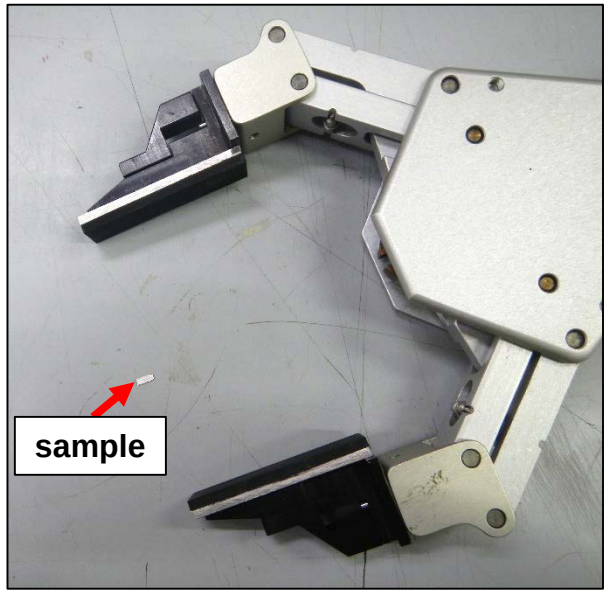
② Precise hydrogen analysis of cladding tube

How to remove the pellet without damaging the cladding tube?



③ SEM observation of small sample

How to stand a fragile sample?



Please visit Poster P14

P15

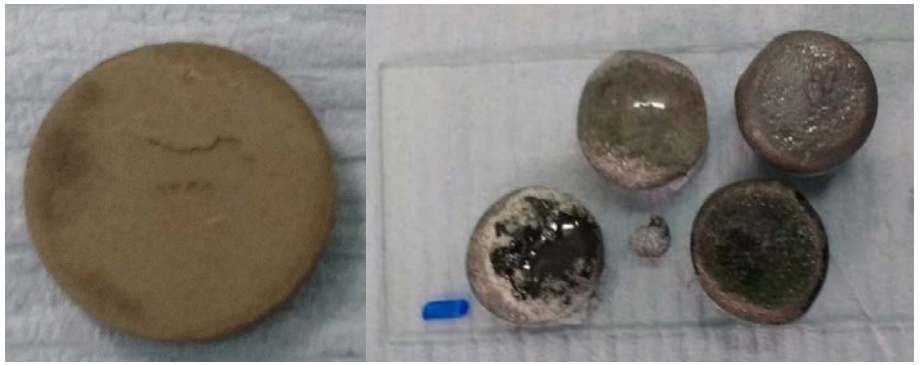
Ryan Devlin

National Nuclear Laboratory

Development of Laser Ablation Inductively Coupled Plasma – Mass and Optical Emission Spectrometry Methodologies for Elemental Analysis in a Medium Active Cell Environment

Development of Laser Ablation Inductively Coupled Plasma – Mass and Optical Emission Spectrometry Methodologies for Elemental Analysis in a Medium Active Cell Environment

Ryan Devlin[1], Clive Lythgoe[2] & Simon Chenery[3]
[1]National Nuclear Laboratory, Central Laboratory, Sellafield, Seascale, CA20 1PG, UK
[2]Sellafield Ltd, Sellafield, Seascale, CA20 1PG, UK
[3]British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, NG12 5GG, UK



P16

Anabelle Lopez

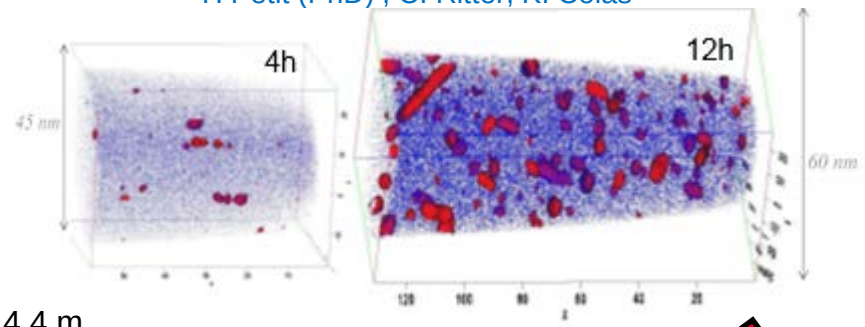
CEA-DEN, Service d'Études des Matériaux Irradiés, CEA, Université Paris-Saclay

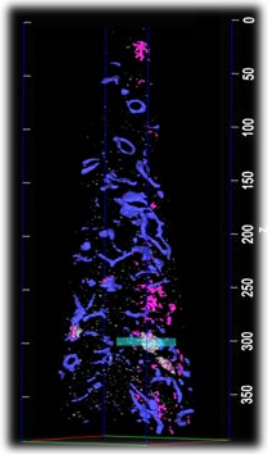
Nuclearization projects of a tomographic atom probe and of an electropolishing machine for researches on neutron irradiated materials at the atomic scale

Nuclearization of a Tomographic Atom Probe and an electropolishing machine for neutron irradiated material studies at the nanometric scale in CEA/Paris-Saclay LECI hotlab facility

Aluminum alloy (structural hardening) : MgSi clusters

T. Petit (PhD) , C. Ritter, K. Colas

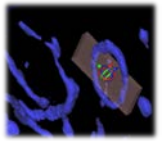


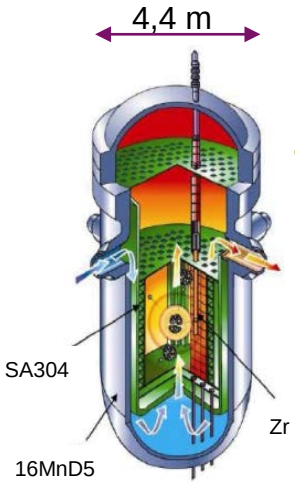


304L Stainess steel irradiated with Fe ions :

Segregation around dislocation loops

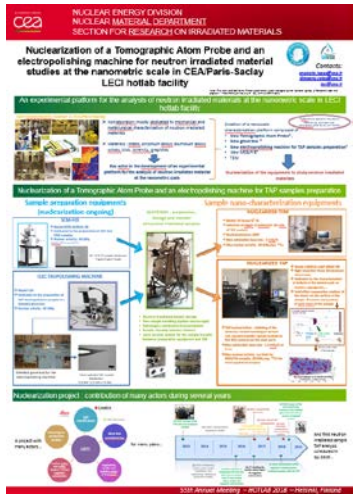
E. Paccou (PhD), B. Tanguy





The phenomena controlling materials behavior under irradiation are on the atomic scale → Impact mechanical behavior at the components scale → Essential to understand ageing of these materials and to improve the nuclear safety. So how?

With a **nuclearized** Tomographic Atom Probe and **nuclearized** sample preparation methods



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Nota :This work profited from a French government grant managed by the National Agency of Research under the program "Investments for the future" (ref. ANR-11-EQPX-0020

P17

Olivier Dugne

CEA, Nuclear Energy Division, Research Department on Mining and Fuel Recycling Processes

Nuclearized Raman microscope coupled with a hot-stage: new tool to study (U,Pu)O2-x fuel microstructure

New Raman microscope setup: L26, ATALANTE facility, France

Horiba© IHR-320 Raman spectrometer with 2 lasers: 532 nm & 660 nm

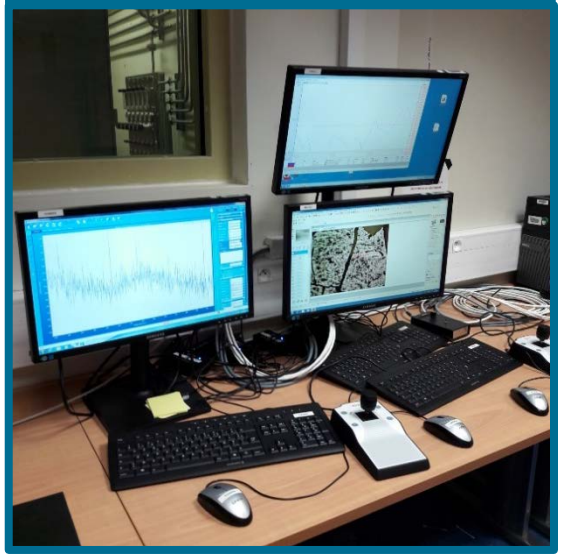
Confocal microscope equipped with 2 exchangeable turrets dedicated to:

- ***Ex situ*** microstructural observations (optical & Raman): equipped with 4 Olympus© objectives (x5 to x100). the micro-indenter device and a Raman calibration objective.
- ***In situ*** high temperature Raman experiment: equipped with 3 Mitutoyo© long working distance objectives (x5 to x50) and a Raman calibration objective.

Glovebox dedicated to µ-Raman

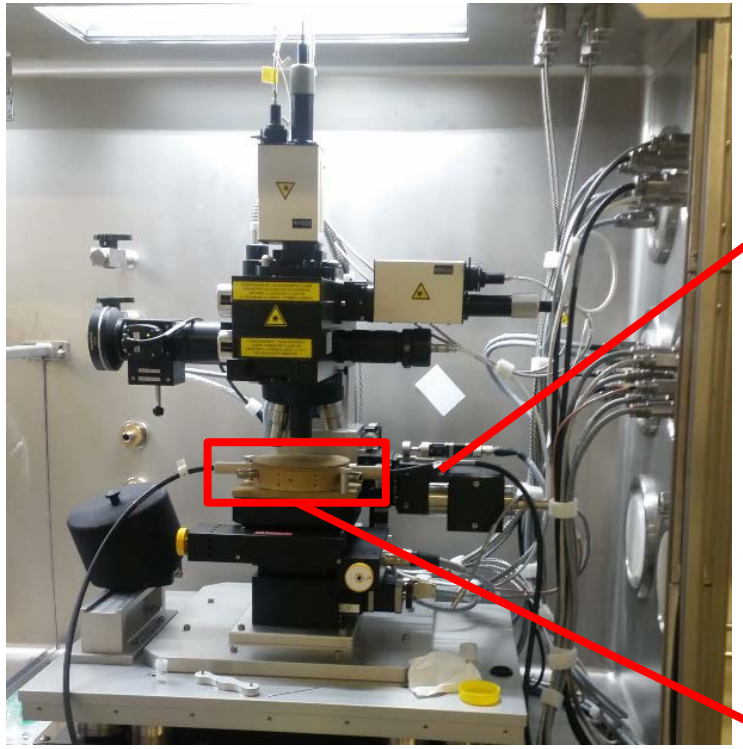
Confocal microsope

Remote control system



Motorized stages : x, y, z and sample rotation

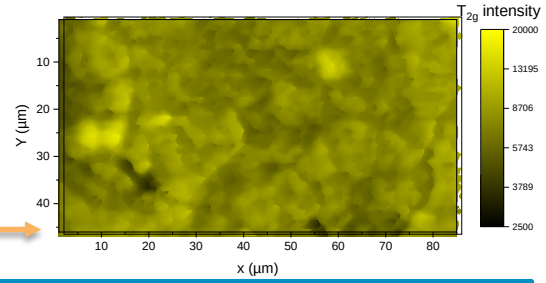
New Raman microscope setup: L26, ATALANTE facility, France



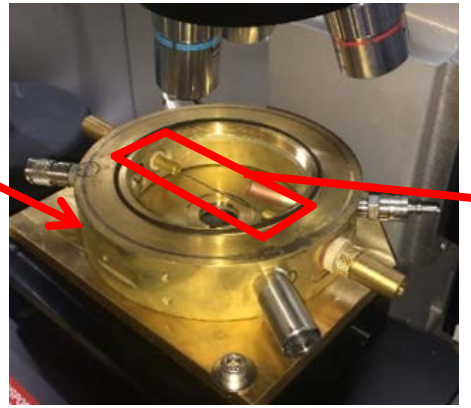
Ex situ experiments

- Imaging (optical & Raman)
- µ-Hardness (Vickers)

$(Ce_{0.85}Y_{0.15})O_{2-x}$ Raman map



In situ experiments



Heating wire

- Up to 2000°C
- Controlled pO_2
- Powders
- Sintered samples (1.5x2 mm^2)

See dedicated poster for details and illustrations

P18

Maho Iwasaki

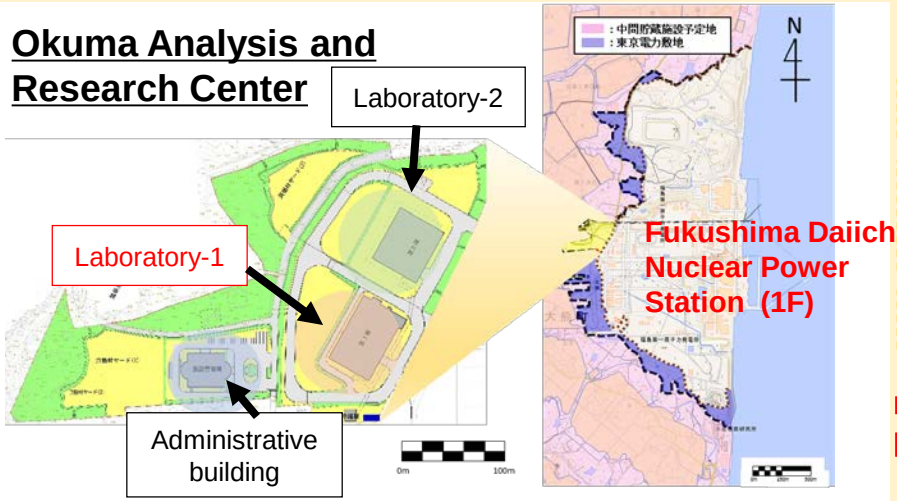
Japan Atomic Energy Agency

Application of ICP-MS to analysis of nuclear fuel debris and radioactive wastes

Application of ICP-MS to analysis of nuclear fuel debris and radioactive wastes

Maho Iwasaki[1,2], Soichi Sato[1,2]
[1] Japan Atomic Energy Agency, Ibaraki 319-1195, Japan
[2] International Research Institute for Nuclear Decommissioning Tokyo 105-0003, Japan

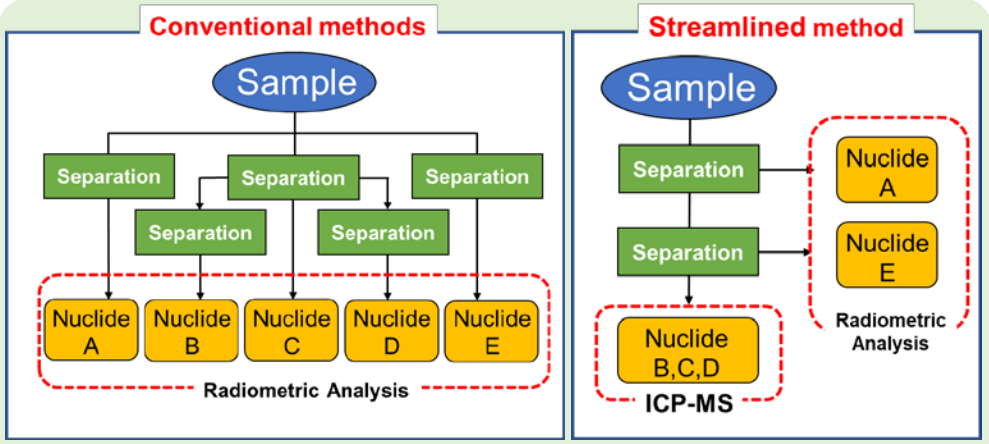
Okuma Analysis and Research Center



Our missions

- Set up facilities supporting the decommissioning of 1F.
- Perform analysis of radioactive waste samples and fuel debris from 1F.
- Samples are measured at laboratory-1 and laboratory-2.

At the beginning: 200 samples/year, 38 nuclides.



☑Complicated handling
☑Time-consuming

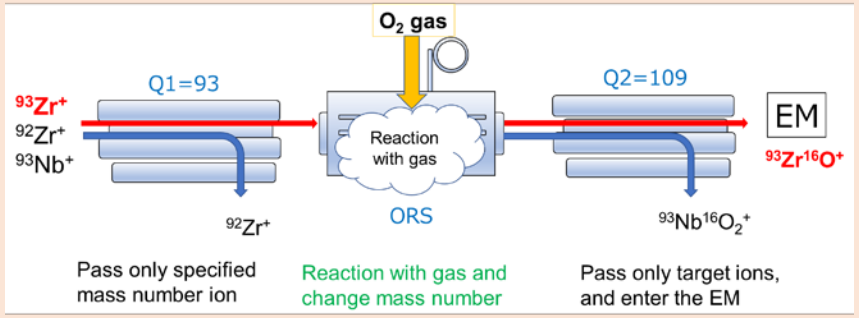
Low analysis capability

☑Easier handling
☑Shorter analysis time

High analysis capability

ICP-QQQ-MS(Agilent 8900)

Demonstration of Zr selective analysis



Q1: Quadrupole 1 (The first mass filter)
Q2: Quadrupole 2 (The second mass filter)
ORS: Octopole Reaction Cell System, collision/reaction cell
EM: Electron multiplier detector

Regarding Zr measurement, it is possible to eliminate the isobaric interferences using ICP-QQQ-MS with suitable “reaction gasses,NH_3 in He”.

P19

Guy Cornelis

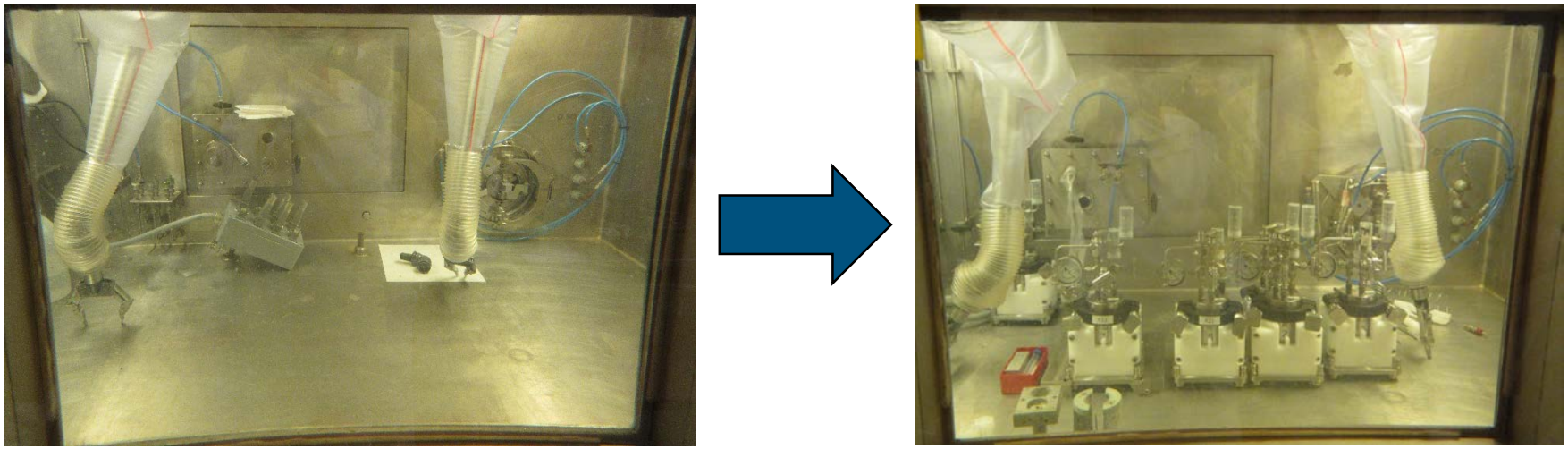
Nuclear Materials Science Institute, SCK•CEN

Design, development, and installation of hot cell instrumentation for Spent Fuel Autoclave Leaching Experiments (SF-ALE)

Poster P19

Radionuclide release from spent nuclear fuel under geological repository conditions is required for realistic safety assessment

- The FIRST-nuclides project with a primitive set-up, 2012 - 2015
- Fuel dissolution under fully controlled conditions, 2017 →



- How, when, why? See the poster for details!

P20

Stéphane Brémier

European Commission, Joint Research Centre, JRC-Directorate G – Nuclear Safety and Security

The Decommissioning and Waste Management programme of the European Commission Joint Research Centre

The Decommissioning and Waste Management programme of the European Commission Joint Research Centre

The programme aims to eliminate both historical and future liabilities at all nuclear sites of the JRC

JRC-Petten

High Flux Reactor

Auxiliary buildings & infrastructure

Since 1961

JRC-Geel

Accelerators Since 1965

Glove box laboratories, effluent water systems

JRC-Karlsruhe

Hot Cells, commercial and 'exotic' spent fuels

Glove box laboratories

Since 1965

JRC-Ispra

Since early 60s

2 Reactors & ancillary labs

Hot cells facility

Waste management

Liquid effluents, Cyclotron, legacy wastes…

The JRC Nuclear Decommissioning and Waste Management Programme was formally launched in 1999 (COM(1999)114, Council and European Parliament).

European Commission

P21

Petr Švrčula

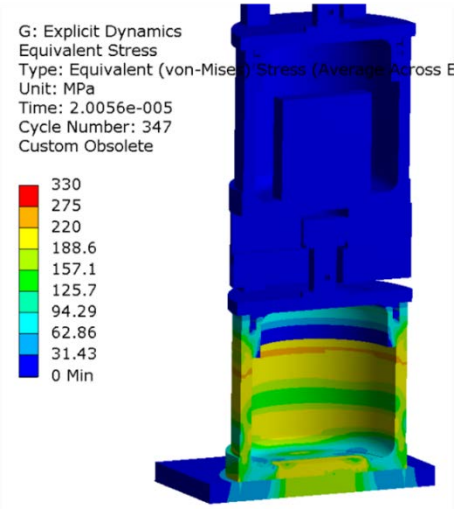
Research Centre Rez Ltd.

Transportation capabilities of hot cell facility

Transportations capabilities of the hot cell facility

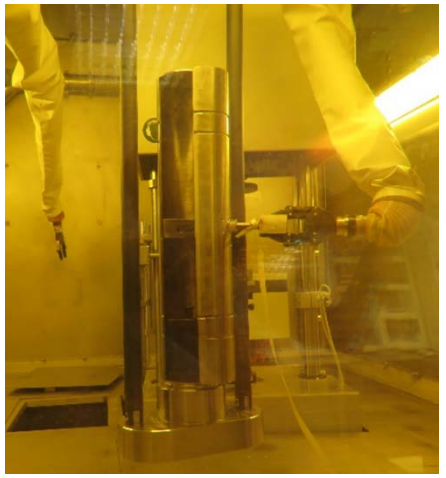
Petr Švrčula, Ondřej Srba, Maria Zimina

- Transport cask TERA 300 type B(U)
- Domestic and international transportation
- Shielding abilities 300 TBq of 60Co
- Horizontal and vertical loading



Impact deformation calculation

Capsule model



Inner canal operated in cell

TERA 300

P22

Amir Hushyar

Transnubel, Dessel, Belgium

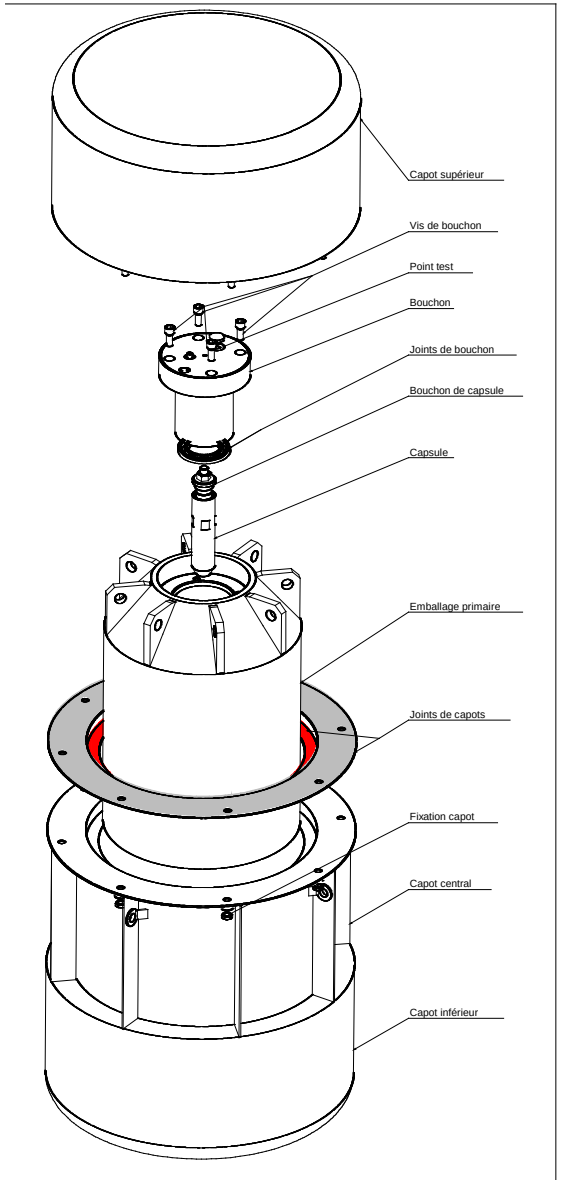
First transport campaign of new type B(U) packaging for hotlabs

TNB 170

- Allowed contents
  - fresh or irradiated UOX/MOX fuel
  - sealed or unsealed radioactive sources
  - neutron sources of type Xx-Be
- FANC license B(U)
- H/V loading and unloading
- Tilting, docking et extension tools

Dimensions	Outer Dimensions	Inner Dimensions
Diameter	600 mm	48 mm
Length	921 mm	201 mm

Empty Weight	592 kg
Maximum Load	2,5 kg



P23

Sunggeun Kim

Korea Atomic Energy Research Institute

Mechanical test of spent fuel at KAERI-PIEF