

Actinide targets at IPNO

E. Cottureau, N. Barré, M. Cheikh Mhamed, B. Hy, C. Lau, A. Özgümüs, B. Roussière, S. Tusseau-Nenez

**Unité mixte de recherche
CNRS-IN2P3
Université Paris-Sud 11**

91406 Orsay cedex
Tél. : +33 1 69 15 73 40
Fax : +33 1 69 15 64 70
<http://ipnweb.in2p3.fr>

Eurisol-Net meeting at CERN, June 27-28, 2011

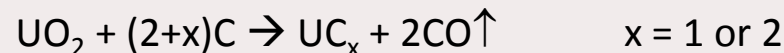
- **Collaborations**
- **R&D on targets**
- **Actilab**
- **Characterization of targets**
- **Release properties**
- **Long term heating**

- **Spiral2**
- **SC material lab of the University of Rennes**
- **MoU in progress IPNO - SPES**
- **MoU IPNO - TRIUMF**
- **ENSAR : Actilab, Eurisol-net**

- **ANR Priscus : not granted**

- **Synthesis and characterization of UC_x targets to increase the target density along with the release properties**

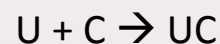
- carboreduction of uranium oxide



- carboreduction of uranium oxalate



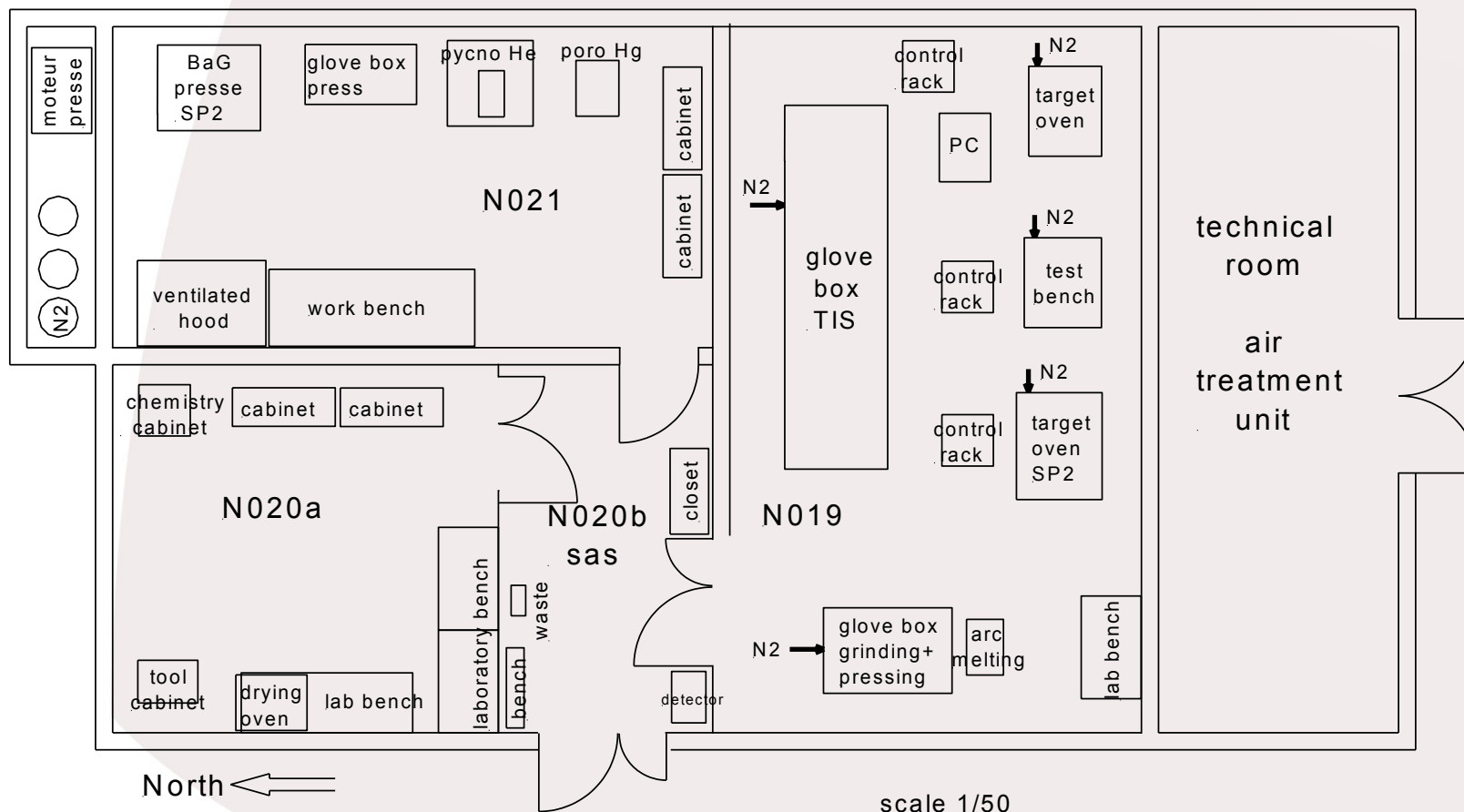
- arc melting of uranium and graphite



- **Investigation of other fission material**
 - carbon microfibers
- **Electrochemical treatment of Uc_x**
- **Extend the laboratory to prepare the targets for Spiral2 : construction to start in Sept 2011**
 - separate the activities dealing with uranium at room temperature and at 2000°C
 - addition of an air treatment unit

UO2, UCx room temperature

UO2, UCx high temperature

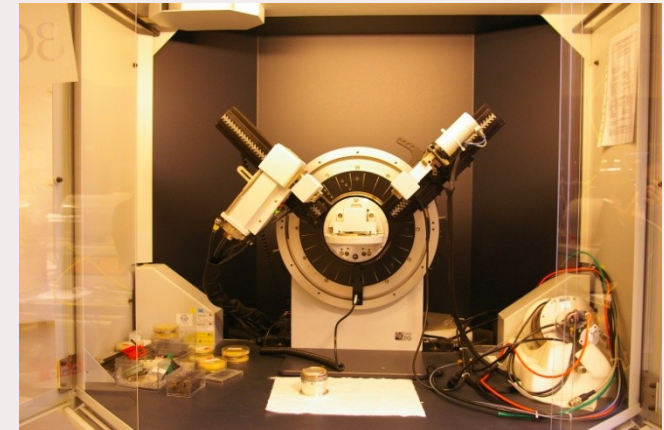


Added surface : ~ 70 m²

- **Investigation of other fission material**
 - common to LNL and IPNO
 - binders for pressed powder
 - sol-gel synthesis in complex fluid
 - nanostructure
- **Participation of IPNO in the tests of the UC target at Isolde**

CHARACTERIZATION OF TARGETS

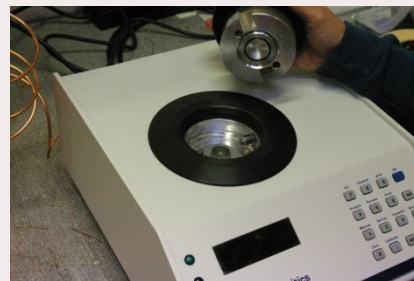
- Xray diffraction
- helium pycnometry
- hydrostatic weighing
- porosity
 - SEM
 - Hg porosimetry
- **release properties** : comparison of the activity present in irradiated pellets before and after heating by γ -spectroscopy



X-Ray Diffractometer



Hydrostatic weighing scale



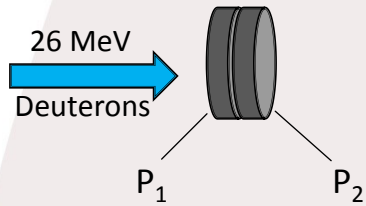
He pycnometer



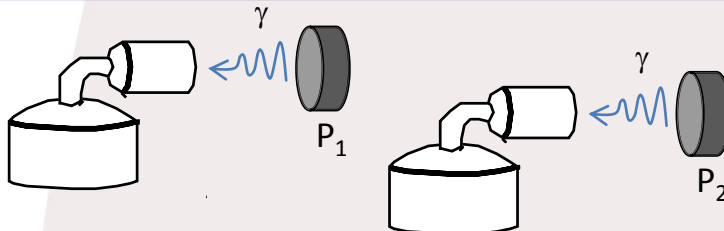
Hg porosimeter

RELEASE PROPERTIES

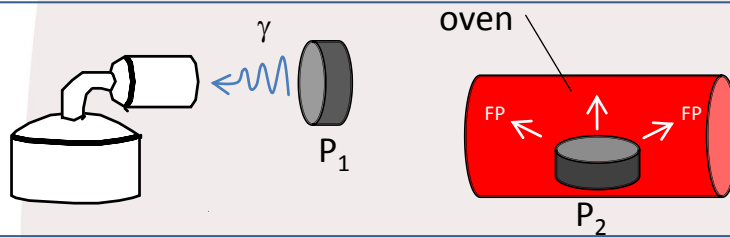
Step 1



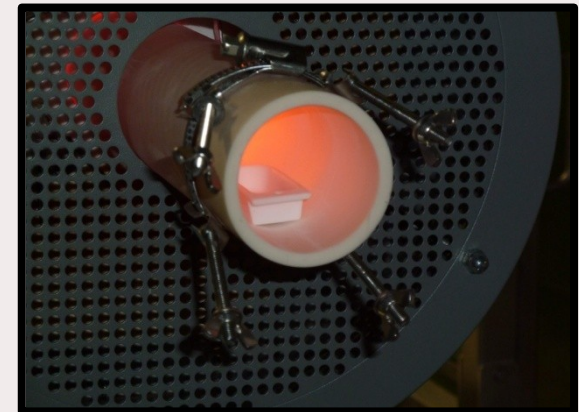
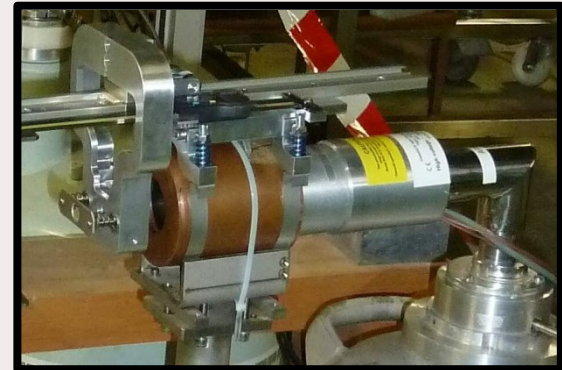
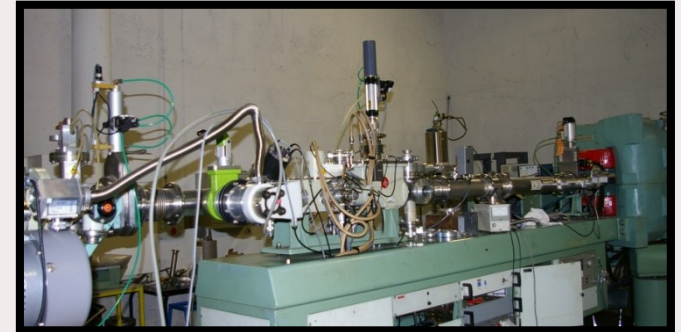
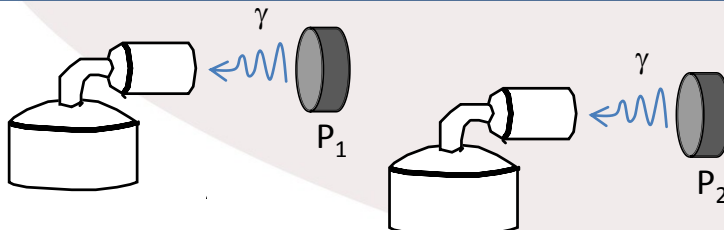
Step 2



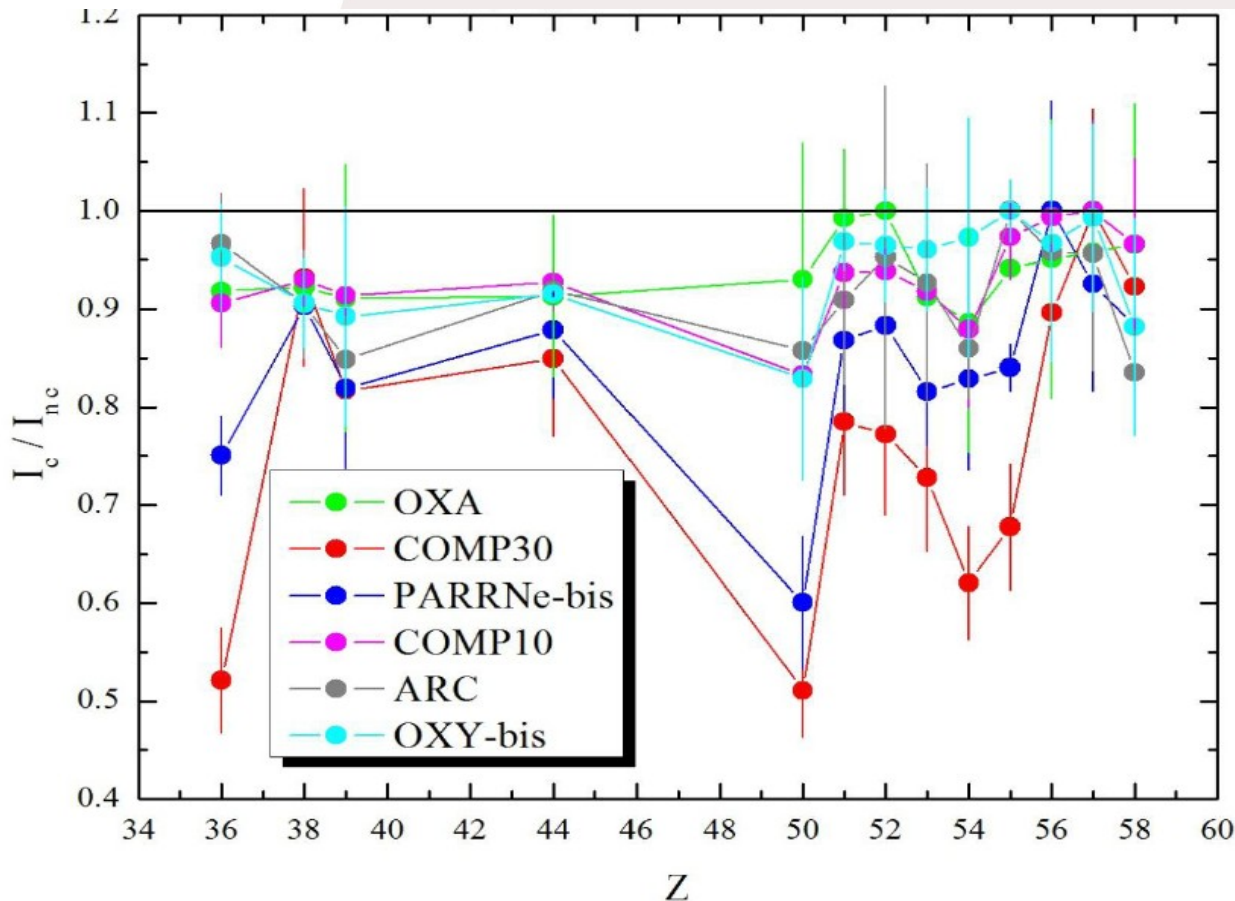
Step 3



Step 4

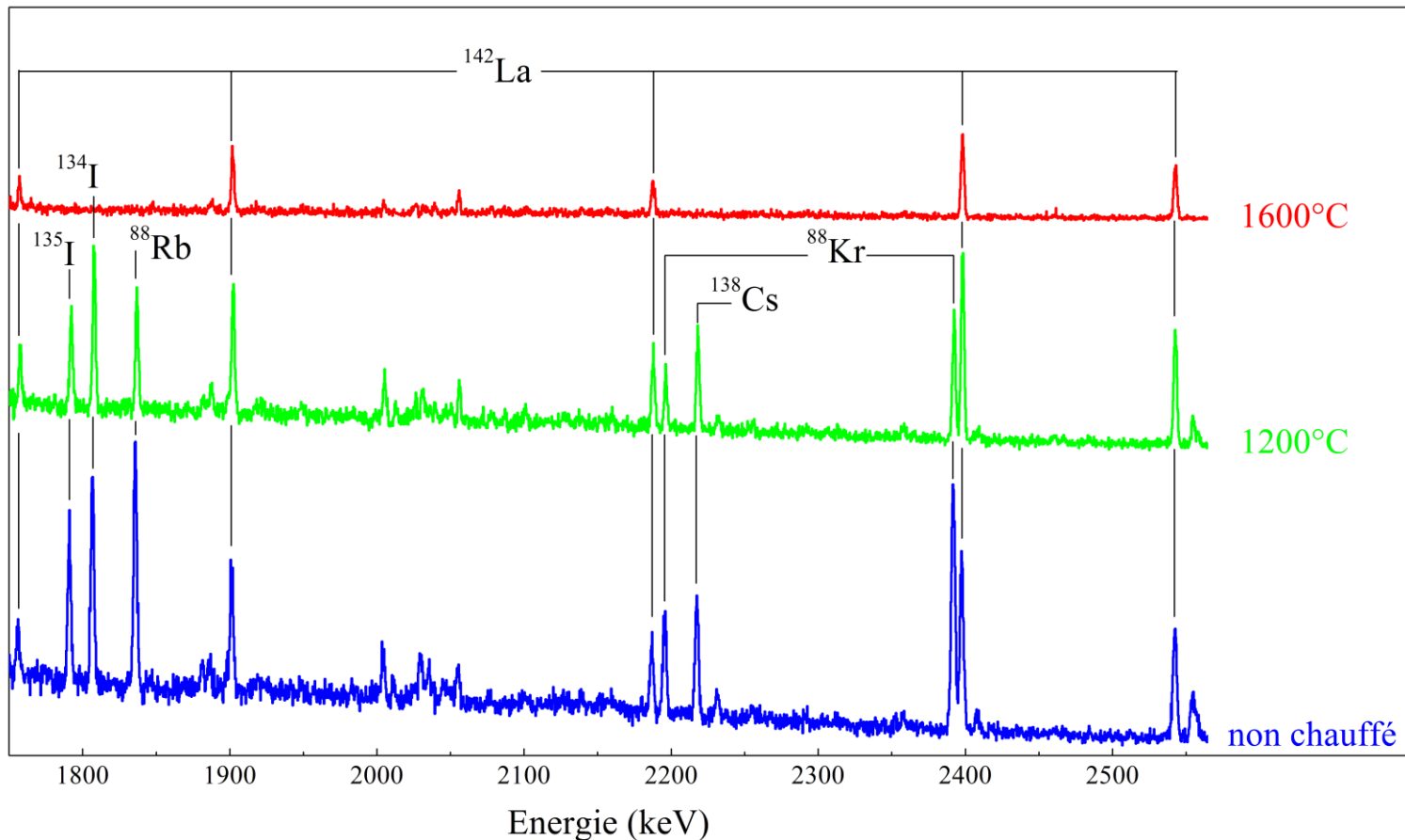


Release fraction of various prototypes of UCX pellets at 1200 °C



- X axis : atomic number of the elements
- Y axis : ratio of the g activities in the heated pellet and in the unheated pellet
- the smaller the ratio, the better the release

- Release properties of various prototypes of Uc_x pellets at 1600 °C



- **Release properties of various prototypes of UCx pellets at 2000°C**
 - oven under vacuum
 - chamber under development
- **On-line test of the selected material**

- Long term heating to study the stability of targets up to 420 hours
 - MEB studies
 - problem of reproducibility

THANK YOU