

POST-MORTEM MEASUREMENTS ON FUEL RETENTION AT JET IN 2007-2009 EXPERIMENTAL CAMPAIGN

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INTRODUCTION

- Safety limit for the inventory of tritium in the ITER is 1000 g → would be reached in less than **1000 full performance** ITER discharges without any cleaning effort.
- Determining deuterium retention in plasma facing components (PFCs) is crucial for the assessment of overall fuel inventory in the torus.
- A set of W-coated divertor tiles for erosion and deposition studies was installed prior to the 2007-2009 experimental campaigns.
- D retention in the divertor tiles 1, 3, 7 and 8 determined after the campaign using NRA and SIMS.

EXPERIMENTAL

- Four CFC MkII-HD divertor tiles exposed in 2007-2009 analysed using NRA, SIMS and optical microscopy.
- NRA: 2.5 MeV ³He⁺ beam, SIMS: 5 keV O₂⁺ beam

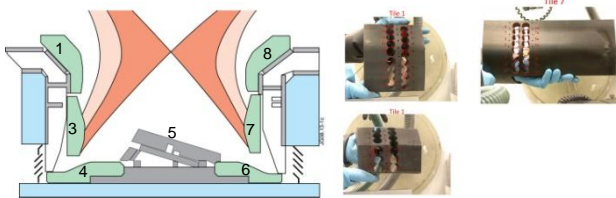


Figure 1. JET MkII-HD divertor and Tiles 1 and 7.

FILM THICKNESSES

Figure 2 shows film thicknesses measured with SIMS and optical microscopy.

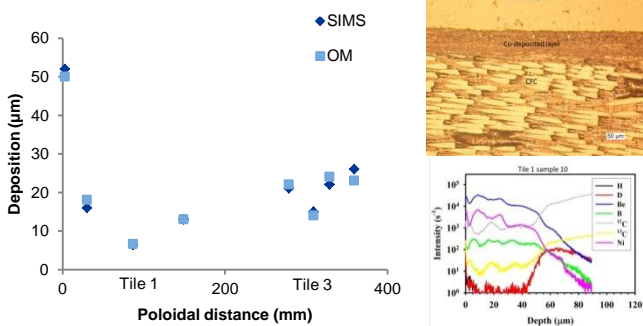


Figure 2. Thickness of co-deposited layers measured with SIMS and optical microscope (OM) and optical microscope image and SIMS depth profile from Tile 1 sample 10 (poloidal distance ~50 mm).

- **Thickest films at the top of Tile 1.**
- Thickness of co-deposited layers in Tiles 7 and 8 beyond the practical analysis depth of SIMS.

NRA RESULTS

Figure 3 shows the D/C ratio measured with NRA.

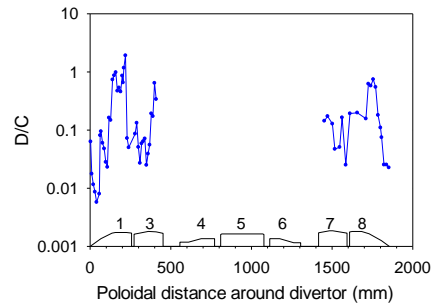


Figure 3. D/C ratio measured with NRA.

- Tile 1: D/C increases from the top of the tile towards the bottom reaching ~1.
- Tile 3: At the bottom of the tile the D/C ratio is the highest.
- Tile 7: D retention small.
- Tile 8: Highest amount of retained D on the top.
- Tiles 4, 5 and 6 will be analyzed later.

D INVENTORY IN 2007-2009

The total retained D amounts were obtained:

- assuming toroidal symmetry in deposition
- multiplying the area of the tile segment with the thickness of the co-deposited layer → volume of the deposited layer on each tile segment
- the density of the deposited layers is assumed to be 1 g/cm³.

The D amounts are summarized in Table 1.

Location	Amount of D (g)
Tile 1	2.0
Tile 3	0.6
Tile 7	0.4
Tile 8	1.0

Table 1. Amounts of D trapped in different areas of JET.

- **Largest D retention at the bottom of Tile 1.**
- D inventory at the Tiles 3 and 7 small.

CONCLUSIONS

- Heavy deposition at the top of Tile 1
- D mainly retained on Tiles 1 and 8.

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