



WP PWIE SP B.2 & SP B.3, Kick-off meeting

Status of WEST samples availability in 2022 and plans for analysis in different labs

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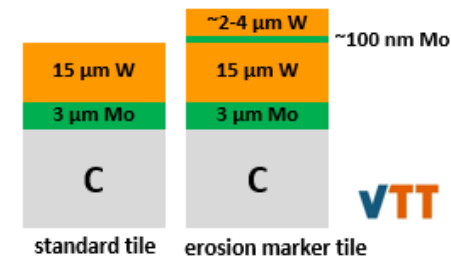
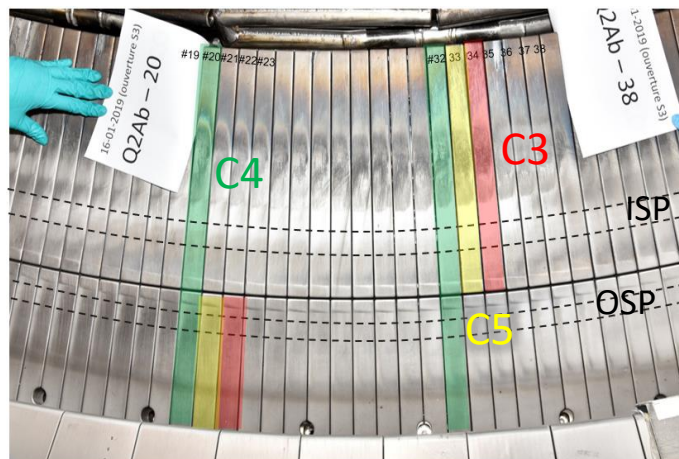


SP B.2 Material migration in toroidal devices

Task: Determine erosion, re-deposition, and fuel-retention patterns on WEST PFUs after C3, C4, and C5 campaigns: project coordination and surface analyses (CEA)

Deliverable D1: *erosion, re-deposition and fuel retention patterns on selected WEST PFUs after C3, C4 and C5 campaigns (2 PM)*

→ *Continuation of 2021 project on WEST marker tiles*



Current status and plans for 2022



		C3	C4	C5
Step 1 Preparation of marker tiles	In-situ maintenance, CEA			
	Radiation measurements, CEA			
	Storage and shipping, CEA			
	Update of the database, CEA			
Step 2 identification of areas of interest (NDT)	Visual inspection CEA , photos			
	Identification of the location of erosion - redeposition areas IPP Garching , SEM			
	Content of the deposits IPP Garching , IBA , EDX			
	Change of thickness of the erosion layers IPP Garching , SEM , FIB			
Step 3 More detailed investigation of fuel retention, deposit thickness, impurities content	Sample cutting VTT Finland , core drilling			
	Sample analysis Partner labs FP8 and FP9			
	JSI+UT			
	VTT+IST			
	VR+IPPLM			
	IAP			
RBI				
VTT+NCSR				
Step 4 Summary	Cross-analysis of the different results CEA			

[Plans for 2022 \(highlighted in yellow in the above table\)](#)

- Cross-analysis of the results obtained for C3 marker samples → CEA
- Analysis of C4 marker samples → the different labs (IAP, IPPLM, IST, JSI, NCRSD, RBI, UT, VTT, VR)
- Identification of areas of interest of the C5 marker tiles → CEA + IPP MPG

Analysis of C4 marker samples



Schedule and sample distribution for C4

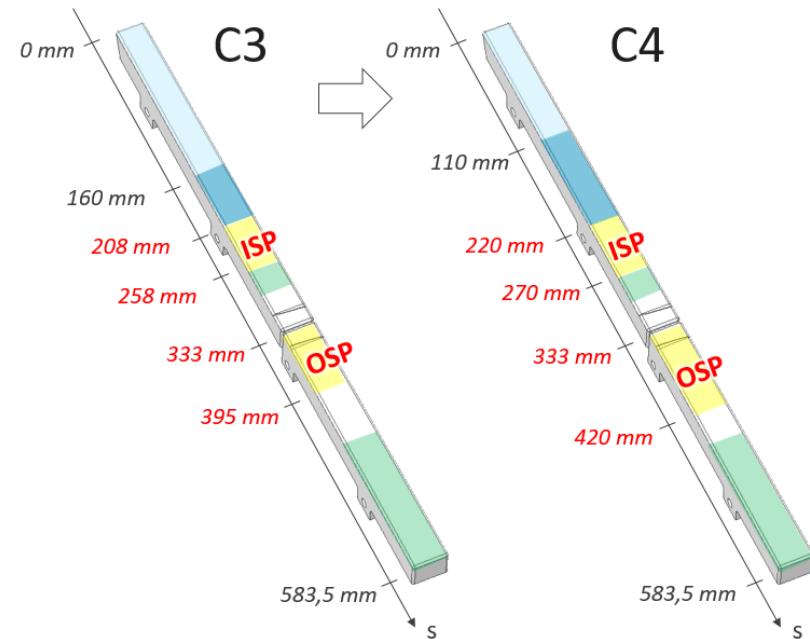
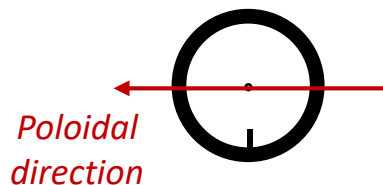
- two C4-marker tiles (32i and 22o) cut into small samples by VTT (jan. 22)
- a total of 28 samples delivered to the labs in February 2022
- sample distribution : same as for C3 samples
- Atlas images available on request (→ M. Balden)
- 2 spare samples

Differences between C3 and C4 samples

- expansion of the area with thick deposits
- shift of the ISP erosion area
- expansion of the OSP erosion area

Advice & requirement for the C4 sample analysis

- Sample surface cleaning (feedback from C3 samples) : use a dust blowing ball if necessary (but do not use air duster)
- For the measurement points :
 - in the poloidal direction only
 - with 's' coordinate for each point

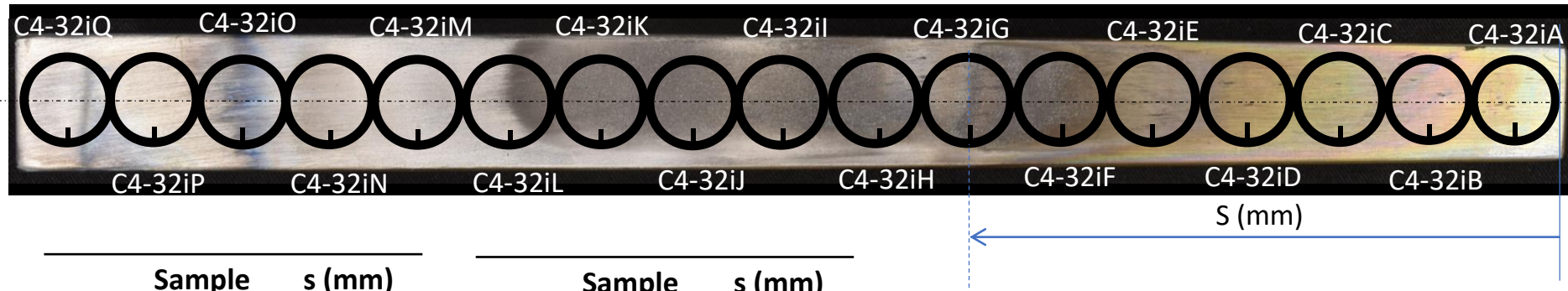


Coordinates of the samples from the inner tile



Private Flux
Region (PFR)

High Field
Side (HFS)



	Sample name	s (mm) from HFS
Some deposition	C4-32iA	12,5
	C4-32iB	31
	C4-32iC	50
	C4-32iD	69
	C4-32iE	87,5
	C4-32iF	106
Strong deposition	C4-32iG	125
	C4-32iH	144
	C4-32iI	162,5
	C4-32iJ	181
	C4-32iK	200

	Sample name	s (mm) from HFS
EROSION dominated	C4-32iL	219
	C4-32iM	237,5
	C4-32iN	256
Thin deposit ion	C4-32iO	275
	C4-32iP	294

C4 samples

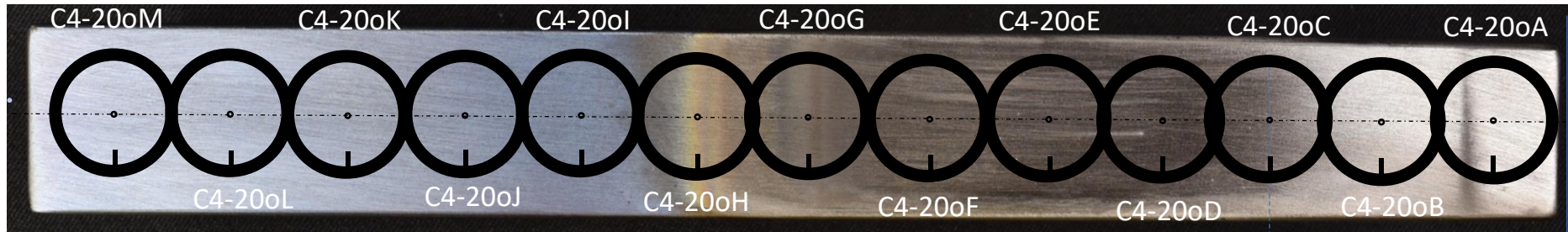
Outer diameter of the sample = 21mm
Inner diameter of the sample = 17mm

Coordinates of the samples from the outer tile



Low Field
Side (LFS)

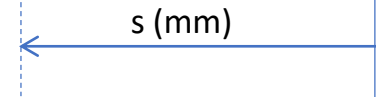
Private Flux
Region (PFR)



	Sample name	s (mm) from PFR	s (mm) from HFS
EROSION dominated	C4-20oA	12,5	340
	C4-20oB	31	358,5
	C4-20oC	50	377,5
	C4-20oD	69	396,5
	C4-20oE	87,5	415
	C4-20oF	106	433,5
Some deposition	C4-20oG	125	452,5

	Sample name	s (mm) from PFR	s (mm) from HFS
Some deposition	C4-20oH	144	471,5
	C4-20oI	162,5	490
	C4-20oJ	181	508,5
Thin deposition	C4-20oK	200	527,5
	C4-20oL	219	546,5
	C4-20oM	237,5	565

C4 samples



Outer diameter of the sample = 21mm
Inner diameter of the sample = 17mm



SP B.3 Characterization of plasma-exposed materials

Task:

1/ Carry out post-exposure analyses of selected PFUs from WEST Phase 1: project coordination and surface analyses (CEA)

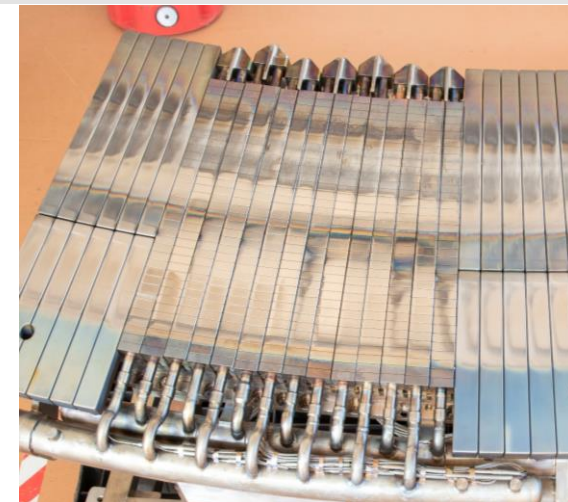
2/ pre-characterize selected PFUs for Phase 2: project coordination and surface analyses (CEA)

Deliverable D1: *database on ageing, erosion and fuel retention behavior of selected WEST PFUs (2 PM)*



1/ Carry out post-exposure analyses of selected PFUs from WEST Phase 1 : project coordination and surface analyses

Post-mortem characterization of a large variety of plasma-exposed components (15 ITER-like PFUs, >100 W-coated CFPs)



Step 1: non destructive tests on full components at CEA – **done in 2020+2021**

Step 2: radiation control procedures for shipping PFC outside CEA – **on going 7/15 PFUs**

Step 3: full component analysis - **beginning of 2022 on PFU WECN001**

Step 4: strategy for PFU cutting and discussion for sample distribution – **on discussion for WECN001**

Step 5: PFU cutting at CEA - **planned for spring/summer 2022**

Step 6: post-mortem characterization program with lab. involved - **2022 and beyond**

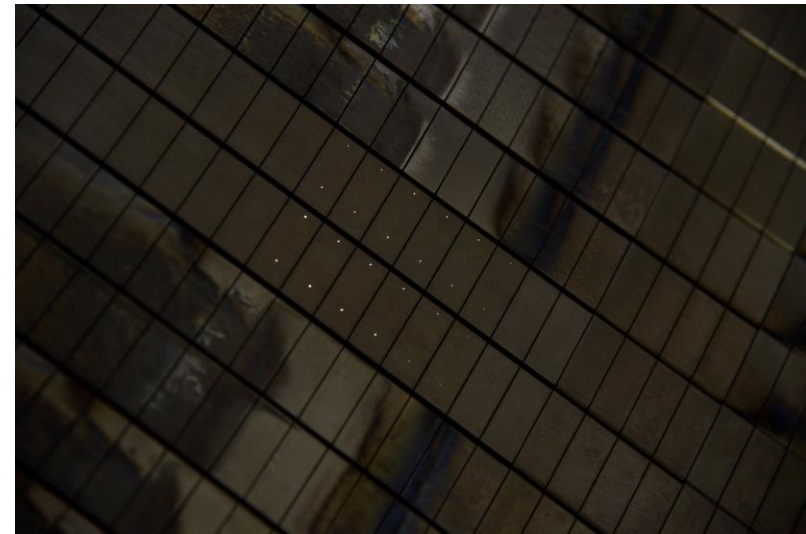
2/ Pre-characterize selected PFUs for Phase 2: project coordination and surface analyses

WEST phase 2 planned to start at the end of April 2022 with C6 campaign

↳ **pre-characterization of PFCs was performed in 2021**

WEST pre-characterization activities include:

- 4 PFUs dedicated to the erosion evaluation *CEA*
- 1 pre-damaged PFU *FZJ+CEA*
- roughness measurements *CEA*
- emissivity measurements *IUSTI*



ITER-like PFUs dedicated to the erosion assessment installed in WEST for C6