Erosion, deposition, and fuel retention profiles on selected WEST wall tiles GDOES, XPS, X-ray measurements (IAP)

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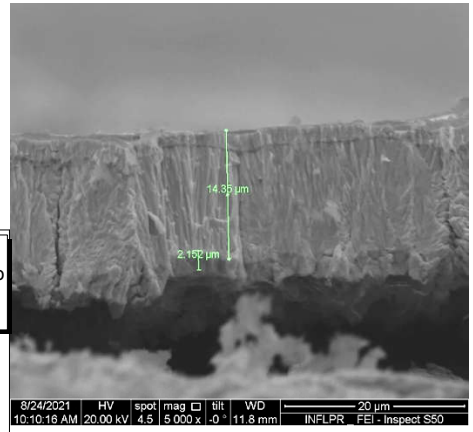
GDOES measurements:

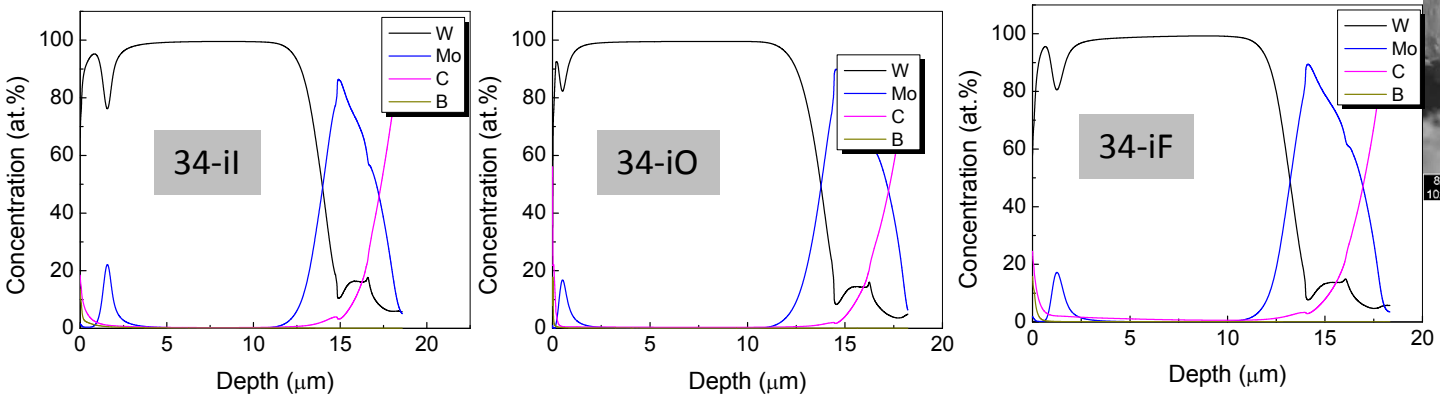
6 cored samples were analyzed by ***GDOES*** (Glow Discharge Optical Emission Spectrometry):
C3-34iI; C3-34iO; C3-34iF and C3-22oI; C3-22oM; C322oA

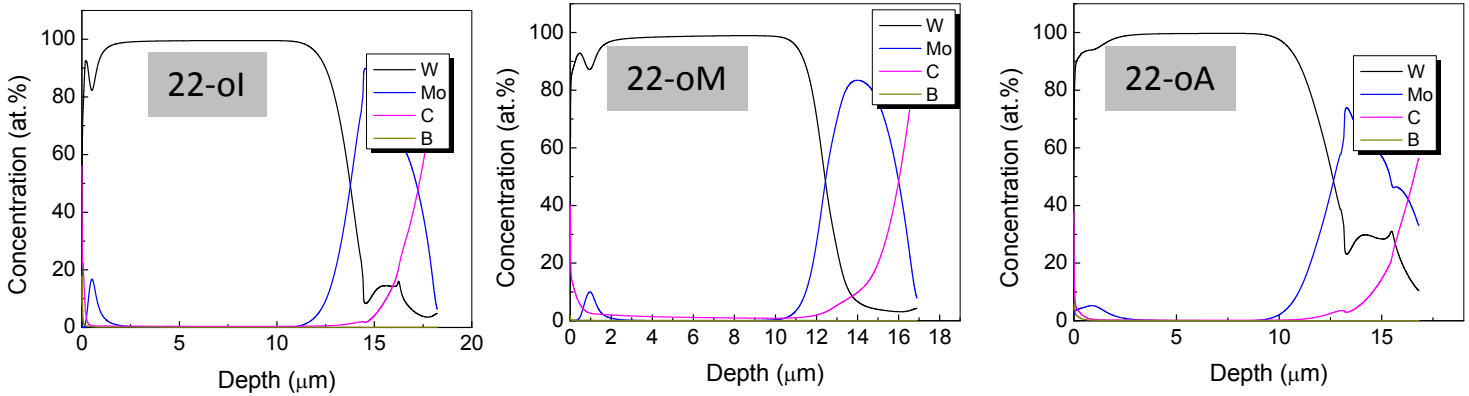
Results:

- a Mo/W/Mo/W layout observed (the outer Mo layer of ~ 0.5µm, the outer W layer of ~1.5µm)
- B identified on the surface of the cored samples



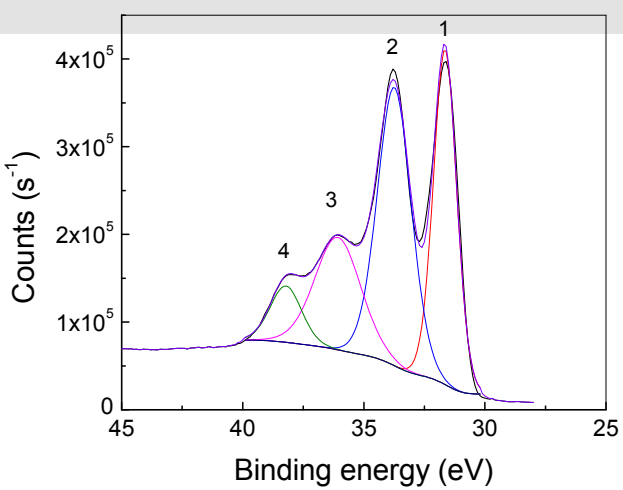
SEM of a Mo/W marker exposed to WEST plasma

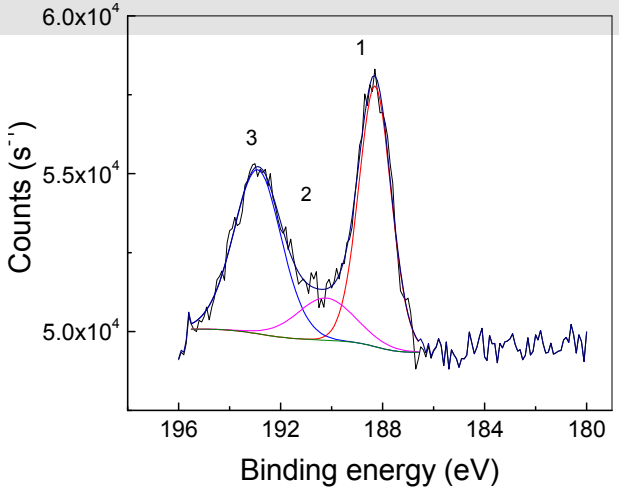




GDOES depth profiles of the analyzed samples

XPS measurements and summary:





W 4f detailed spectrum (a) and respectively B1s detailed spectrum for the sample C3-34iO (b)

***XPS* measurements:**

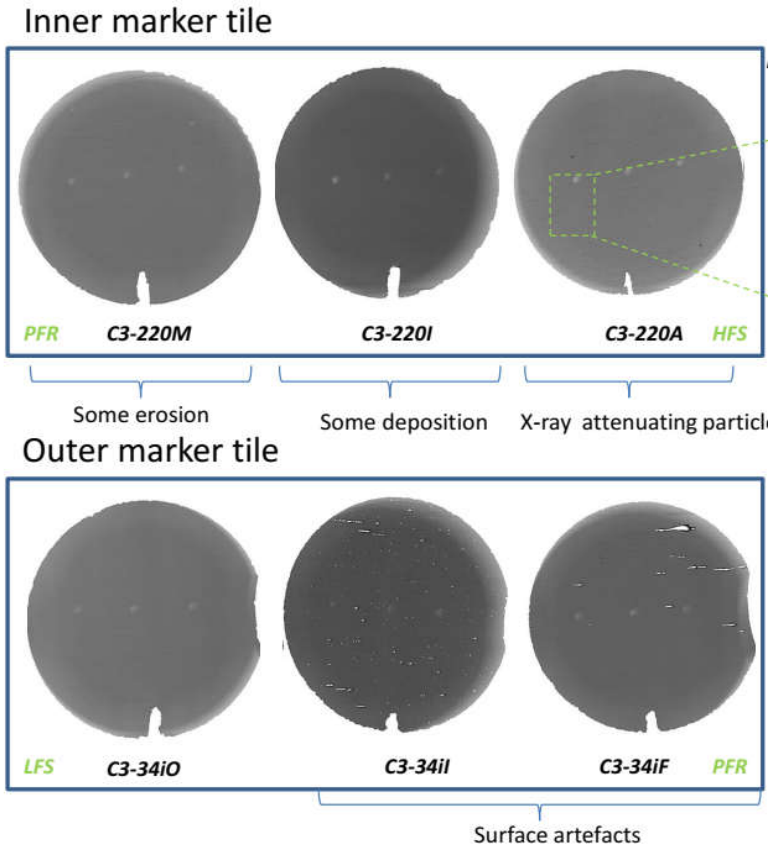
- W metallic W 4f7/2 and W 4f 5/2 transitions (31.5 eV and 33.6eV) along with oxide W components (36eV and 38.2eV)
- B1s transition has 3 components: pure B (component 1 at 188.3eV), B sub-oxide (component 2 at 190.2eV) and oxide at 192.9eV)

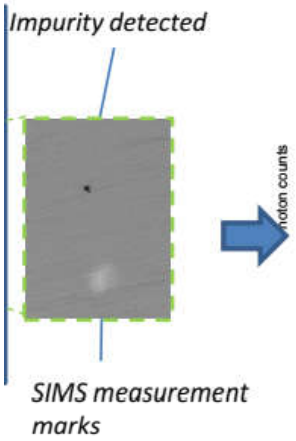
***Summary*:**

Sample id	*XPS* measurements				*GDOES* measurement	*Position of second Mo to surface*
	W (at.%)	**C** (at.%)	**O** (at.%)	**B** (at.%)	**B** (at.%)	
C3-34il	16.78	24.62	36.78	21.82	13.72	1.2
C3-34iO	24.48	26.99	33.23	15.3	17.7	0.35
C3-34iF	16.92	33.91	39.28	9.89	15.65	0.9
C3-22oI	29.32	13.01	53.14	4.54	5.61	0.6
C3-22oM	50.73	14.53	33.91	0.82	1.42	0.65
C3-22oA	51.03	19.64	22.1	7.23	5.91	0

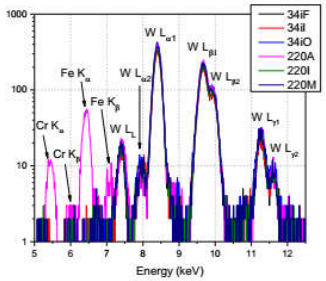
X-ray microradiograph and XRF :

Digital Microradiograph





Surface contimination overview via microbeam X-ray fluorescence (microXRF)



C3-220A: Cr 0.88 ± 0.1 and Fe 2.54 ± 0.1 (wt.%).

Conclusions

- Relatively simple alternative to other inspection methods
- Ability to evidence surface impurities or dust particles
- No need for sample preparation

*High resolution X-ray microradiographies (*13.3 µm/pixel*) of samples retrieved from WEST*
Surface contaminant on C3-220A; delaminations on C3-34iI & C3-34iF; SIMS marks visible.