



## SP B.3: Characterization of plasma-exposed materials

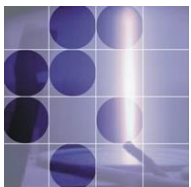
**Task:** Determine erosion, deposition, and fuel retention on selected wall tiles from AUG and WEST

**Deliverable:** Surface analyses of selected AUG and WEST wall tiles

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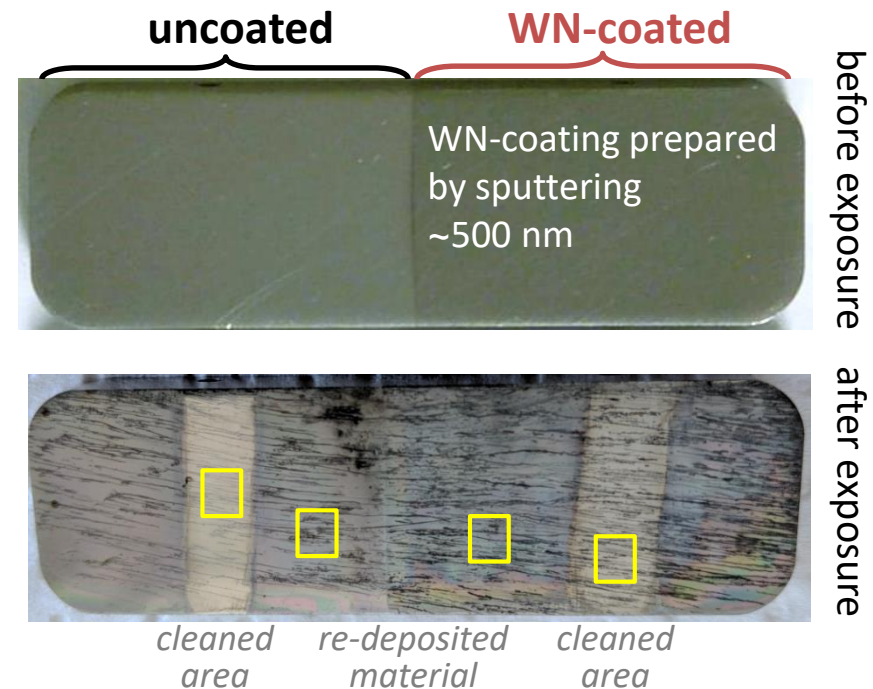
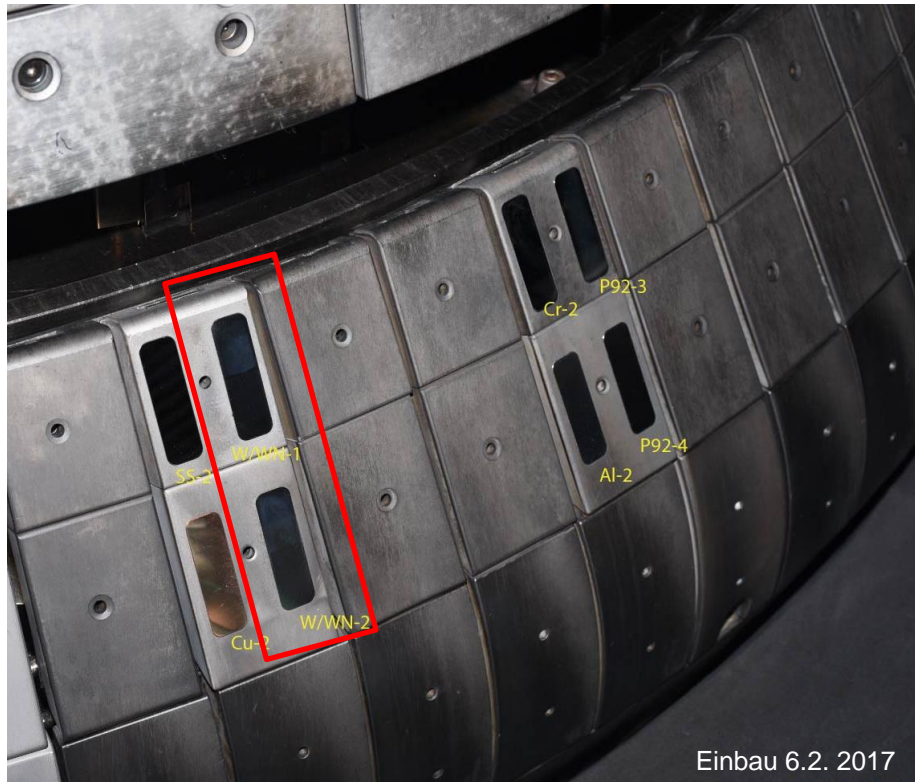


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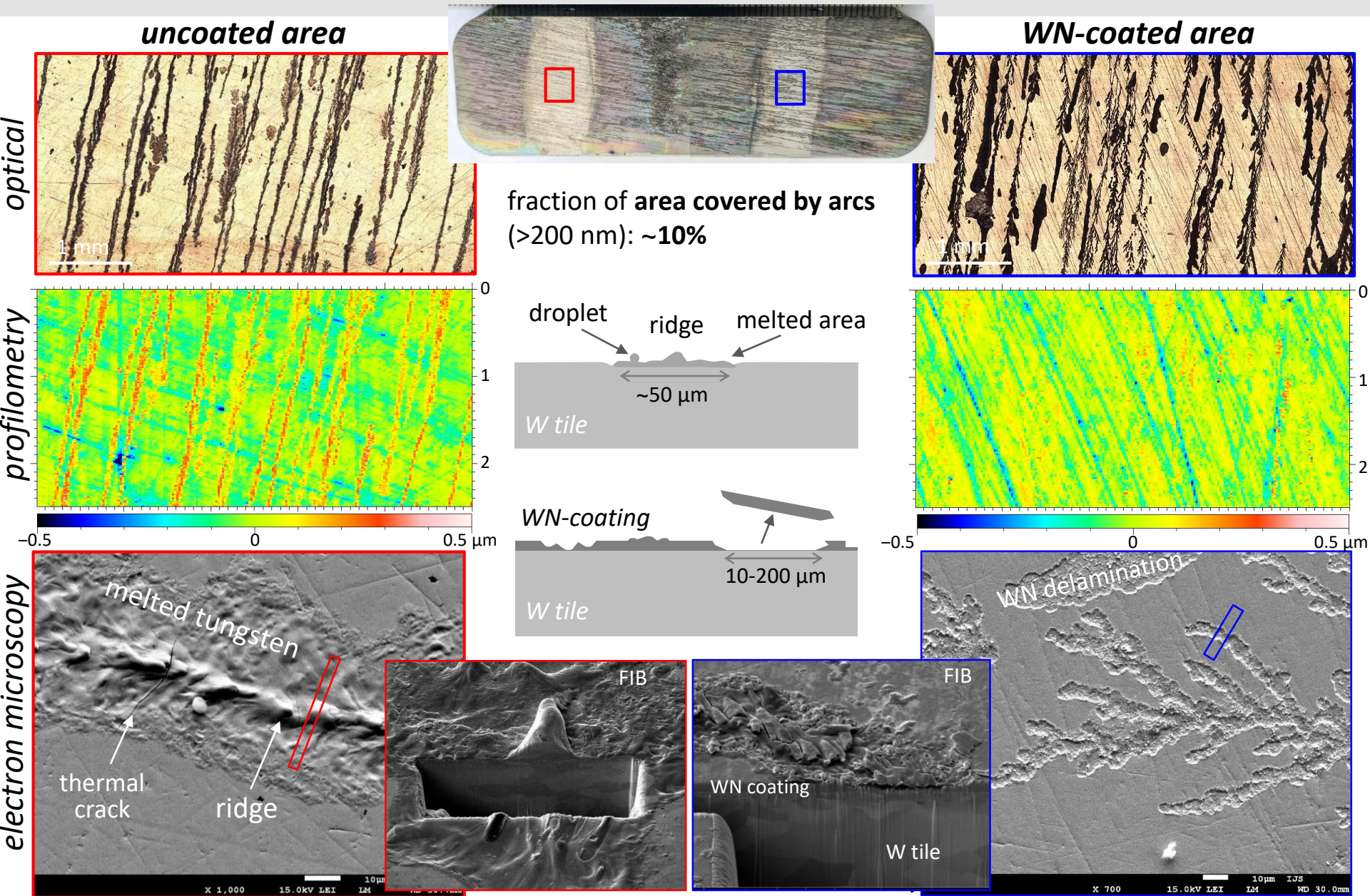
# Previous work within WP-PFC (SP5.7)



- **Task:** Analyze arcing patterns on tungsten and WN-coated tungsten wall tiles that were exposed in AUG in 2017
- **Outputs:** JSI prepared WN-coatings and performed the surface analysis by SEM/FIB, optical microscopy and profilometry



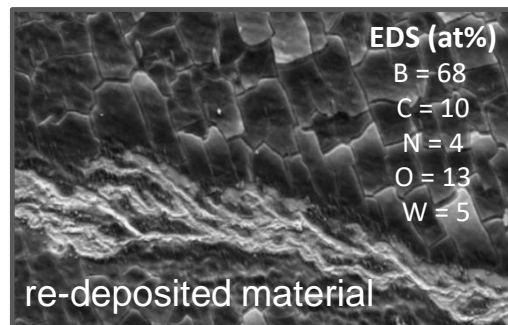
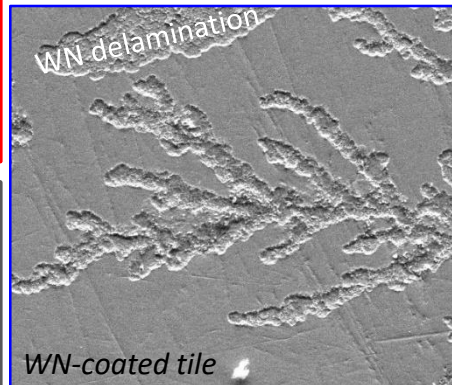
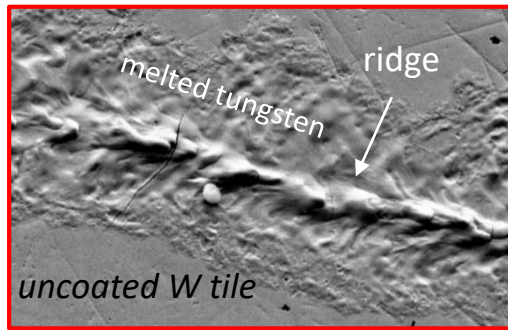
# Surface analysis of W and WN-coated tiles



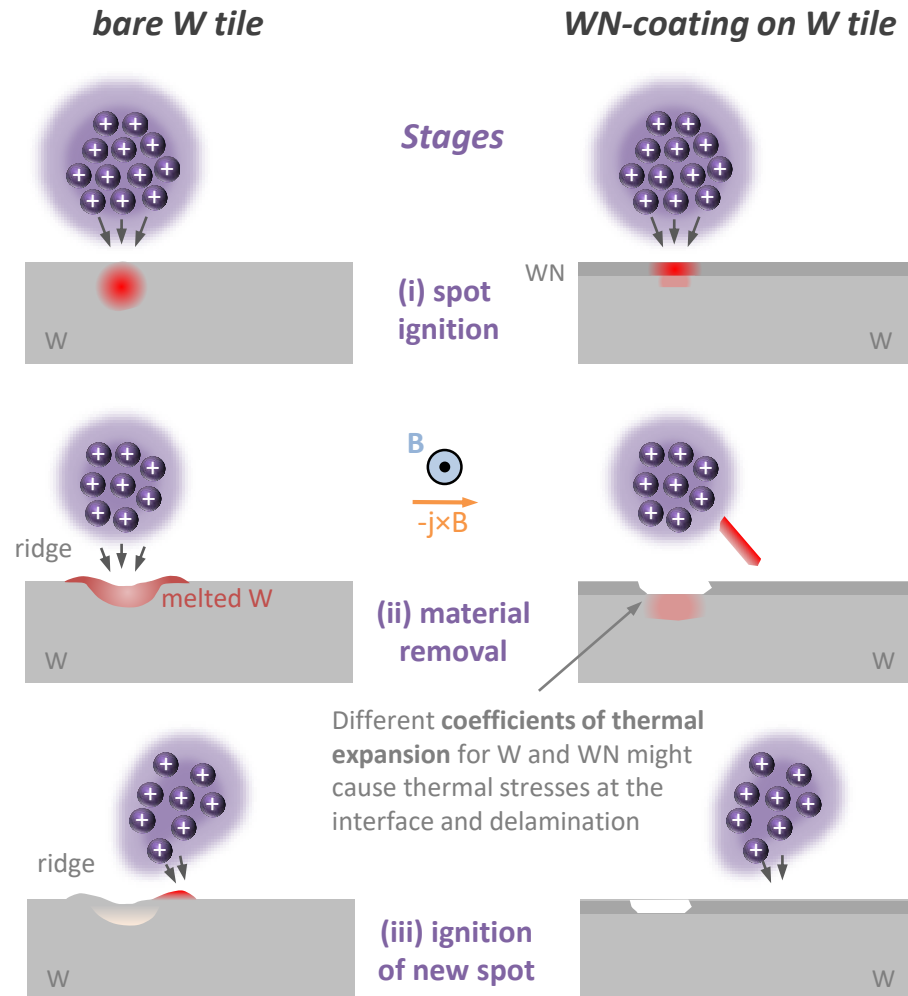
# Key findings



- **arc traces cover** around **10%** of the surface area
- on **uncoated W tile** arcing causes W melting and formation of ridges in the center of arcs traces
- on **WN-coated area** arcing mainly causes delamination of the WN-coating
- on **deposited material** arcing removes large parts of deposits due to poor adhesion



## Possible mechanisms of arc evolution



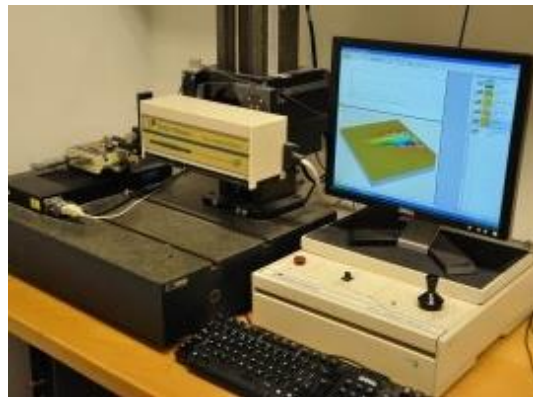
# Plans and capabilities for SP B.3 tasks



## *Project plans for 2021 (and 2022)*

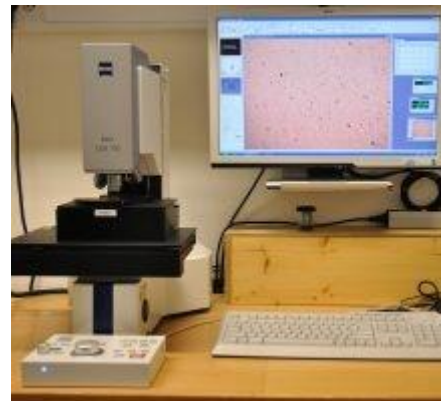
- Perform surface analysis by SEM, OM and profilometry of plasma exposed **tile materials** (e.g. Cu, Cr, SS) from AUG, WEST or other linear plasma devices
- Identify possible **relevant coating materials** (e.g. metal nitrides, oxides or carbides) to be deposited on selected tile materials
- Plan for the **deposition** of selected coatings by reactive magnetron sputtering
- Analyze **arcing patterns** on **uncoated and coated parts** of tiles in a similar way as it was performed in WP-PFC SP 5.7

*stylus profilometer*



Taylor-Hobson, Talysurf

*optical microscope*



Zeiss Axio CSM 700

*SEM/FIB*



FEI HeliosNanolab 650

*magnetron sputtering*



CemeCon, CC800/9