



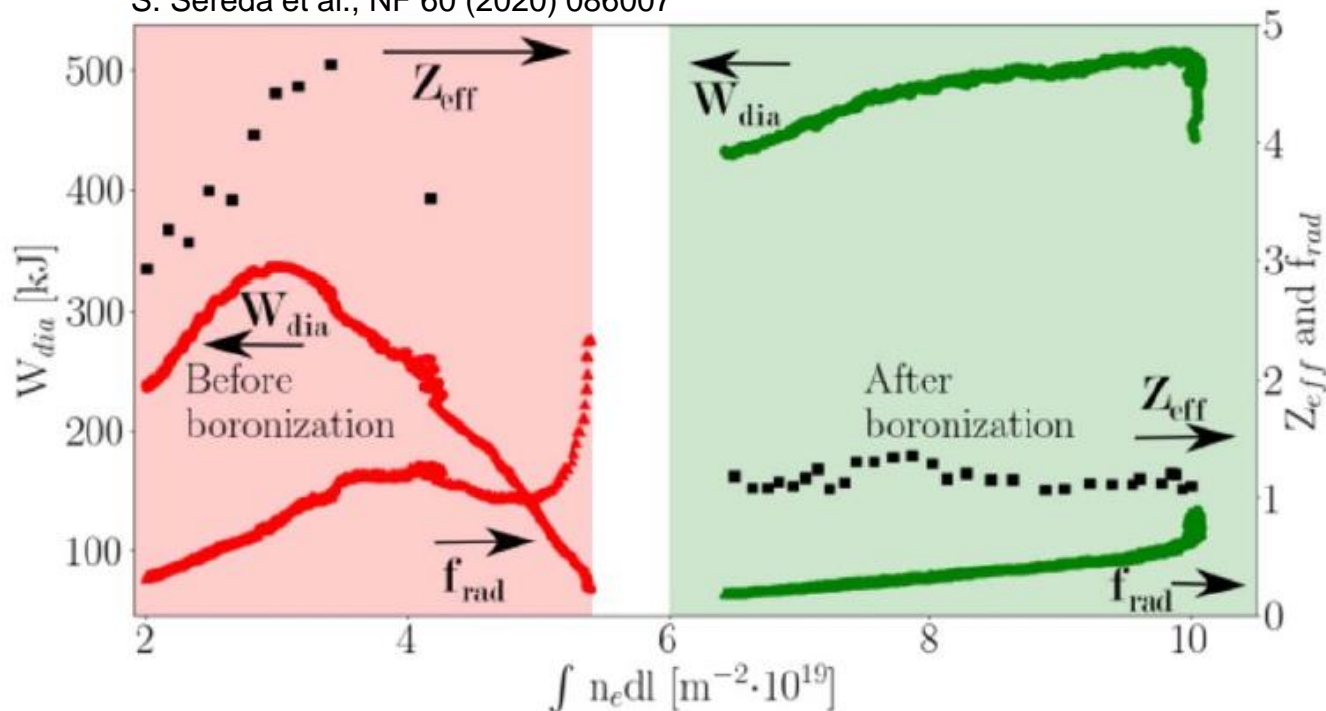
## Analyses of samples from W7-X



M. Mayer, M. Balden, C.P. Dhard, S. Elgeti, D. Naujoks  
MPI für Plasmaphysik, Garching and Greifswald, Germany

# Boronizations are key point to successful plasma operation

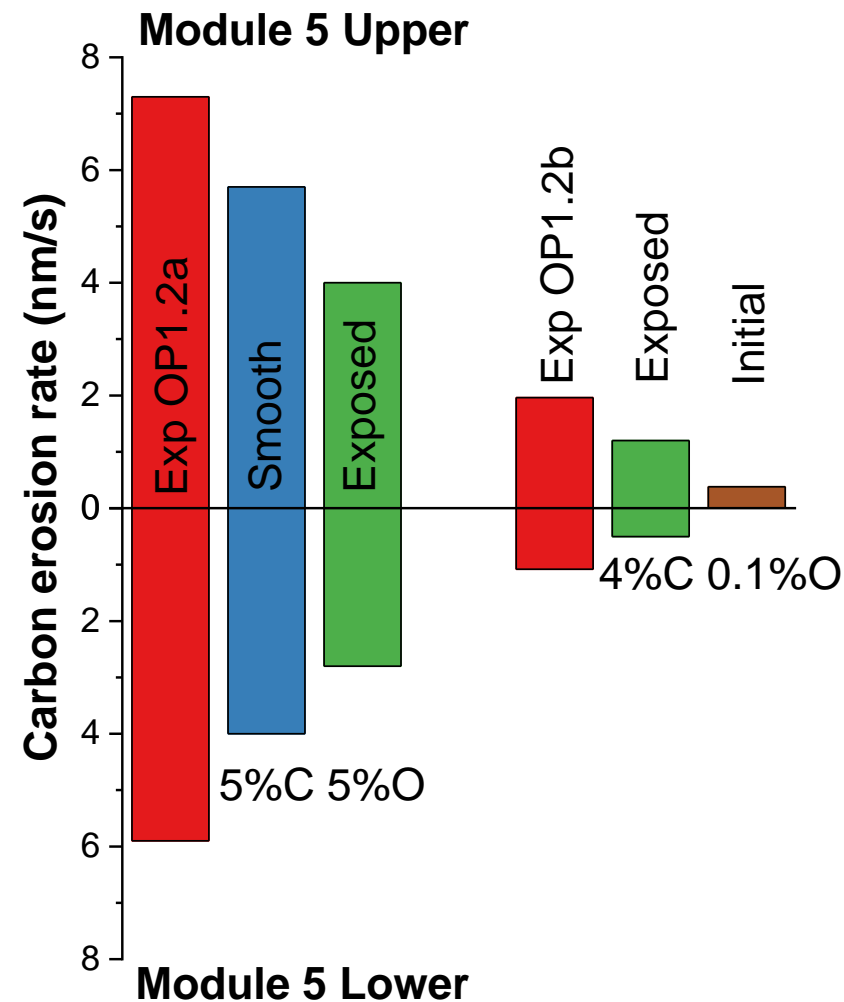
S. Sereda et al., NF 60 (2020) 086007



- Boronizations in OP1.2b resulted in decrease of O concentration by factor  $\sim 50$
- Decrease of O concentration results on decrease of TDU erosion by factor  $\sim 5$

→ Key point to successful plasma operation

## Peak erosion rate at TDU strike line



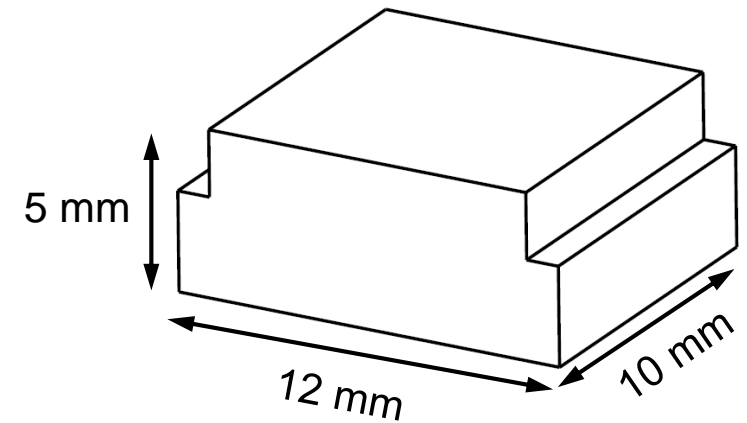
# Work in 2023: Sample exposures using multi-purpose manipulator in OP 2

## Samples: Material qualified, manufactured, pre-characterised

- Fine-grain graphite, polished and unpolished
- Aluminium
- Aluminium with 7 or 30 nm a-C:D

## Planned exposures with multi-purpose manipulator

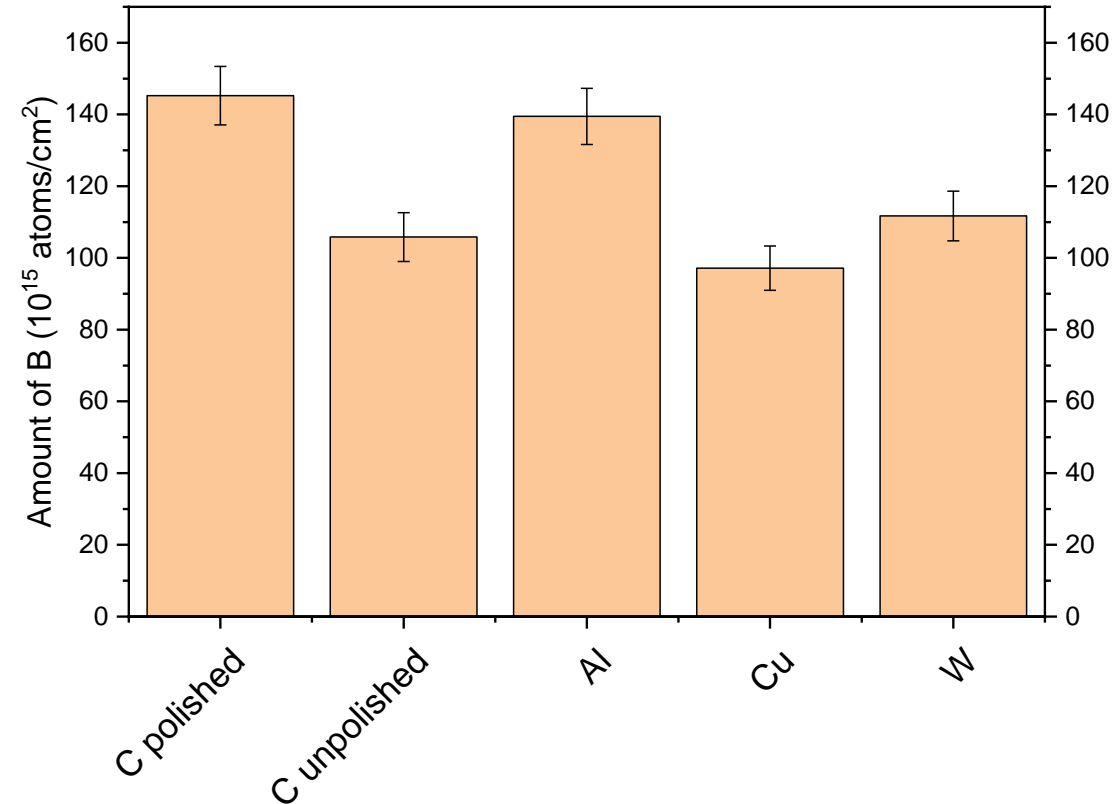
- (Carbon erosion during glow-discharge cleaning)
- Boron deposition during boronizations
- Carbon erosion during selected discharges in far scrape-off layer
- Hydrogen deposition and charge-exchange fluxes in selected discharges in far scrape-off layer
- Tungsten deposition and transport using laser blow-off



# Boronization on 4.2.2023



- Amount of B 10 – 15 nm
- No material dependence, about identical from C to W
- Thicker on polished surfaces than on unpolished  
→ ???
- Homoeopathic amounts of B have large effect  
→ Large surface area of 200 m<sup>2</sup> inside W7-X



# Midplane manipulator: Charge-exchange fluxes and energies



- Exposure of catcher plates (graphite, Al, ...) with midplane manipulator during plasma discharges
- Analysis of H content using ERDA

→ **Goal: Determination of neutral charge-exchange H-fluxes**

- Exposure of erosion samples with midplane manipulator during plasma discharges
- Aluminium coated with 7 or 30 nm a-C:D

→ **Goal: Erosion of C by charge-exchange H-fluxes**

# Samples inside W7-X in OP2.1 and 2.2

## Erosion of W at inner heat shield

- 18 inner heat shield tiles coated with W / 600 nm Mo / 100 nm W marker
- W marker layer thicknesses pre-characterized with RBS

### Goals

- Erosion of W at inner heat shield
- Deposition of B, C

## Deposition of B and C on baffle and inner wall

- Analysis of regular C baffle and inner wall tiles after OP2.1 and/or OP2.2
- Analysis with RBS (NRA if necessary, SEM/FIB if necessary)

### Goals

- Deposition of H, B, C

