# WP PWIE SP B – follow-up meeting on W and B samples

## Minutes 10 July 2025

### Sample exposures (both W and B reference layers) in linear machines

* No representative from MAGNUM-PSI but comments obtained beforehand via email
  + *Samples produced in MAGNUM are all different from each other and the number of samples becoming available will be limited*
  + Re-deposited W layers are still interesting for analyses in the participating labs – whatever is available; thickness estimates needed before shipment
    - **Change to Master Excel** 
      * Selected samples (2-3) to MPG (Martin) for FIB and microscopy
      * Selected samples (2-3) to VTT (Antti) for SIMS
      * Selected samples (2-3) to IST (Rodrigo) for IBA
    - Exposure programme for other samples – see below, target fluence 0.5×1025 m-2
* PSI-2 and GyM exposures of W samples pending for decision of exposure parameters, so far only one nanocolumnar sample exposed in GyM; parameters to be transferred also to MAGNUM
  + Decided to use the following exposure parameters
    - Ar plasma – consider D2 plasma only later
    - 60-80 eV; target fluence 0.5×1025 m-2, estimated ½ hour in PSI-2 and 1 day in GyM
    - GyM experiments to be initiated before the shutdown of the machine for upgrades
  + Concentrate on already existing W nanocolumnar samples – distributed in 2024
  + New samples to be produced from autumn onwards but best to wait for the outcomes of the present exposures before taking actions 🡪 also unexposed references to be produced
  + **Change to Master Excel**: microscopy analyses to be made by IPPLM (Elzbieta)
* Exposures of different B samples also pending decision of proper exposure parameters
  + PSI-2 exposures already done – copy the recipes to other machines (GyM)
    - D2 plasma, 40-100 eV
    - Low fluence due to layers being thin: 70 s exposure time already destroys coatings
  + GyM exposures to be completed before shutdown but tailor the fluence such that something would be left of the coatings
  + **Change to Master Excel**:
    - New set of B coatings, thickness ~100 nm
    - Exposure to low fluences (PSI-2 <1 min, other machines TBD) to avoid damages and delamination of the coating

### Dust and LIBS samples

* New samples needed to focus on delamination studies at oblique angle of incidence as well as at different speeds for the dust particles
  + **Change to Master Excel**:
    - ENEA-CNR: 6 new samples, nanocolumnar W as before
    - Samples to be produced by ENEA-POLIMI (David) in the autumn
* All LIBS samples also measured and *in situ* experiments on MAGNUM-PSI completed
  + Request for new compact and porous W layers as well as some thick B layers
  + **Change to Master Excel**:
    - 3 new samples each: compact W layers (ENEA), porous W-O layers (ENEA), compact thick (5 mm) W layers (IAP), and pure thick (5 mm) B layers (IAP)
    - In addition, 2 references of each sample type to be produced to IPPLM and NCSRD
  + Action on Antti to clarify the status of 2024 LIBS samples – have they been shipped to the next lab for analyses?

### Other requests for W samples

* IST – request for thick W layers for D implantation studies 🡪 **change to Master Excel** with 3 extra samples
* **Change to Master Excel**: remove all the analyses related to re-deposited W layers and replace them with the list above

### Boron samples and their production

* Roughly half of the labs completed their share of the “round-robin exercise”, status as follows
  + VR – done
  + IAP – done
  + FZJ – samples produced for PSI-2 studies but not yet for round-robin exercise
    - List of expected samples to participating labs re-iterated 🡪 action on Antti
    - Preferred additional analyses XPS, SIMS and Raman
    - B layers already sent to DIFFER for the requested investigations
  + VTT – work to be started after the summer
  + ENEA – work to be started after the summer
  + DIFFER – samples expected in the autumn
* **Change to Master Excel**:
  + Add the FZJ 🡪 DIFFER boron samples on the list
  + Remove DIFFER MAGNUM-PSI samples from the list
  + Change the FZJ lines to reflect XPS, SIMS and Raman
* Boron samples for annealing and Raman investigations – first batches produced and analyzed
  + Puzzling results obtained from B+D samples 🡪 exercise to be repeated with pure B samples
  + Especially samples annealed at 500°C show strange features (cracks, dust production,…)
  + Raman signals extend down to ~1 mm and interpretation of boron oxides is not trivial; boric acid can be observed almost everywhere but most dominantly B + D
  + **Change to Master Excel**: add corresponding rows to the matrix w/o deuterium but retaining annealing procedures
* Decided to store boron samples in vacuum or inert gas (e.g., Ar) after their exposures and analyses

### Specific points on boron samples and their analyses

* Request for additional B layers for follow-up investigations – **changes to Master Excel**
  + CIEMAT – pure B and B+D layers for SIMS – 100 nm and 5 mm by IAP
  + IST – additional pure B layers (100 nm) by IAP
* Agreed to repeat all the analyses in ~2 month interval after storage in air

### Mirror samples

* All mirrors exposed (on AUG and W7-X) and many of the analyses completed 🡪 to be sent to EPFL
* Sample shipping decided to be done via storage in inert gas 🡪 argon