# Minutes kick-off meeting PWIE SP X2 25-05-2022

Present: Pawel Gasior (IPPLM), Wojciech Gromelski (IPPLM), Monika kubkowska(IPPLM), Gennady Sergeinko (FZJ), Salvatore Almaviva (ENEA), Hennie van der Meiden (DIFFER), Alicia Marin Roldan (CU), Antti Hakola (VTT), Peeter Paris (UT), Indrek Jõgi (UT), Laura

**Hennie**

Hennie motivated and summarized the goals of the SP X2 project.
Announcements:

* Magnum(and accelerator)/PSI2 operational
* Tasks wherein LIBS is being used as a tool for analysis of tiles/samples from toroidal devices are moved to SP E (Jari Likonen)
* NRA analysis samples LIBS campaign done, but contradictions found between LIBS and NRA (influence seeding):

 - NRA: highest D retention with Ne seeding, lowest with He seeding
 - LIBS: highest retention N2, lowest He
Indrek, the structure of the sample is maybe the dominant parameter

Also doubts about given oxygen content 🡺 Investigation to be continued!

Comments **Antti** regarding samples for LIBS research (complemented with remarks from Antti after this meeting):

* It will be good to have a comparison of the D retention as a function of flux, by comparing GyM, Magnum and PSI-2.  Bulk samples could be used for this purpose.  Here the idea is not to focus specifically on retention but more on erosion and re-deposition of W upon exposure to different fluxes and different plasmas (He vs. Ar) while keeping the fluence the same.
* Nano-structured samples are redeposits simulating samples  Nanostructured samples are for studying the impact of surface morphology on sputtering (erosion) yields as well as how sputtering of such complex structures changes with time
* In addition, we aim at exposing reference layers simulating re-deposits (compact vs. porous vs. structured layers) that our Romanian and Italian colleagues will produce. These can be W or W-O. W-O samples are closer to redeposits  they are, indeed, not because of oxygen per se but because their structure and erosion characteristics appear to be close to what we see in tokamaks
* Be-O samples are relevant for ITER  We need to see to which extent the Be studies can be continued but at least the Be-O exercise we will complete. I also mentioned JET-relevant Be samples (simulating what we see on Tile 0, Tile 1 etc.) but this may not be relevant if the LIBS@JET project will stop
* If ITER will use Be or Boron is not known yet  true, and if they decide to switch to boron, all the PWIE plans need to be re-made

**Indrek – UT deliverables**

* LIBS campaign October 2022: retention is more strongly affected by coating than by gas mixture during exposure
* Besides other work: Analysis and publication of results with WEST (C4, C5, etc.) and JET samples

 ICFRM-21 conference presentation (Elodie Bernard as presenter)

**Jelena – ISSP UL deliverables**

Jelena was at the time of the meeting, will get slides later.

**Salvatore – ENEA deliverables**

Key aspects comparing LIBS under He flux or air for the Da- Ha lines are:

1. reduced spectral broadening in He which results in a better discrimination of the two nearby lines, although the SNR is reduced -> it is necessary to reduce the gate delay (from 4.25 ms in air to 2.0 - 2.5 ms in He).
2. higher emission intensity in Ar, but worst discrimination between Da- Ha. This is due to a stronger plasma confinement in Ar compared to He because of the heavier Ar atomic mass (mAr = 40 amu, mHe = 4 amu) and denser plasma plumes (Higher Te and ne).

**Alicia – CU deliverables**

See the slides

**Pawel – IPPLM deliverables**

Pawel showed the progress on machine learning application in LIBS. The accuracy in composition determination of CF-LIBS is very dependent on *T*e and other parameters.

* IPPLM will use experimental transmission data on simulated data. Investigation of the influence of set-up transmission on validation and training (quasi-experimental signals, bootstrapping)
* Attempts on ML classification and regression of experimental signals.

So far Hennie understands ML will be ready when it is needed

**Gennady– FZJ deliverables**

* Investigation of cluster formation in DP-ps-LIBS of graphite (for LAMIS application): catching clusters with different configurations (SP, DP355-1064 nm, DP 355-355 nm) and analysing cluster sizes
* Measuring D content of plasma exposed, pre-damaged tungsten samples with DP-ps-LIBS
* Investigation of influence of different gas atmospheres on DP-ps-LIBS parameters
* Continue the development of multi-pulse scanning ps-LIBS for:

Composition measurement in mix materials by CF-LIBS quantative analysis method

depth profiling hydrogen isotopes measurement

* Investigation of dynamical deuterium retention by ns-LIBS in different types of tungsten samples (annealed under different temperatures, pre-damaged, fiber-reinforced...) during and after plasma loading in PSI-2 under different fluences and plasma fluxes

**Arnaud Bultel – CORIA/CEA deliverables**

* Please write here the most important progress Arnaud

**Laura Laguardia – CNR guest**

See the slides

**In general**

No remarks