

Surface Science Collaboration

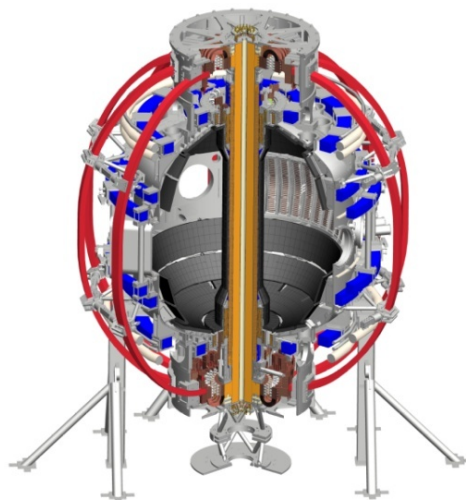
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Fundamental surface science of PFCs for improved plasma performance in NSTX-U

Timetable of Activities. Year 1:

- Synthesize and characterize Li-C deposits. (*Surface Science and Technology Laboratory (SSTL)*)
- Migration of impurities through solid and liquid Li films (*SSTL*)
- Elementary rates of adsorption, scattering, and recombination for interactions of D_2 , D atoms, and D^+ ions with Li-C deposits (*SSTL*)
- *Collaboration to operate MAPP. (Check with JP ???)*
- *High resolution X-ray photoelectron spectroscopy (HR-XPS) at Laboratory for Surface Chemistry (LSC) to elucidate surface chemistry of Li/ B MAPP samples.*

Year 2:

- Temperature dependence of deuterium uptake and retention in mixed Li-C deposits (*SSTL*)
- Compare experimental results to quantum-classical MD calculations by Predrag Krstić
- Synthesis and characterization of Li/O/B/C deposits (*SSTL*)
- Li wetting on TZM and stainless steel (*Scanning Auger Microprobe (SAM)*)
- Bulk oxidation of oxidized lithium layers (*SULI project 2014*)
- *Surface spectroscopy to complement MAPP analysis*

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Year 3:

- Temperature dependence of deuterium uptake and retention in Li/O/B/C deposits (*SSTL some preliminary results already*)
- Removal of oxidized lithium layers by reactive gases (*SSTL*)
- Li wetting on TZM and stainless steel (*SAM some preliminary results already*)
- *Surface spectroscopy to complement MAPP analysis*

Year 4:

- Expand the characterization and surface chemistry studies to more complex mixed deposits (*SSTL*)
- Effect of D, O, and C on the wetting and adhesion of Li (*SAM*)
- Surface science studies of Sn and Sn-Li alloys (*SSTL*)
- *Surface spectroscopy to complement MAPP analysis*

Plans for 2015 run

- Use HR-XPS and other spectroscopies to elucidate chemistry of lithiated and boronized samples.
Do beneficial Li / B effects correlate with Li / B surface density ?
- Need samples exposed by MAPP. Can transport samples to SSTL and LSC in Ar atmosphere.
- Initially day long exposure. Can correlate with individual discharge conditions when probe drive is automated.
- Piggy back for the most part.
- Low triangularity discharges preferred to increase flux on MAPP.
- Plus analysis of coupons and tiles retrieved at end of campaigns.