Session IV. Lithium Laboratory Test Stands

J.P. Allain: Lithium-based surfaces controlling Fusion plasma behavior at the plasma-material interface

- Introduced "over-arching" theme of session – importance of laboratory experiments and confinement device experiments that complement each other
- Provided "historical review" that included research on liquid lithium and tin-lithium sputtering and effect of implanted hydrogen in *decreasing* lithium sputtering – stressed importance of "stable" flowing liquid lithium to mitigate effects of oxygen segregation to surface, high heat loads, etc.
- Lithium on graphite (Li on C) not expected to be "active" because of intercalation - laboratory experiments and molecular dynamic simulations needed to explain why surface chemistry and changes in morphology lead to "unexpected" effectiveness of Li on C on variety of confinement devices

C.N. Taylor: Deciphering energetic deuterium ion interactions with lithiated ATJ graphite

- X-ray Photon Spectroscopy (XPS), Ultraviolet Photon Spectroscopy (UPS), and Ion-Scattering Spectroscopy (ISS) used to compare Li-coated NSTX tiles with carbon surfaces exposed to Li under controlled conditions
- Certain XPS peaks observed only after D bombardment of Li on C in laboratory – need for cleaning NSTX tiles before similar spectra are seen indicates importance of "in-situ" (MAPP) analysis

T. Abrams: Investigation of LLD Test Sample Performance Under High Heat Loads

- NSTX Liquid Lithium Divertor (LLD) samples with and without lithium on surface exposed to 30 keV neutral beam with power densities ≥1 MW/m^2 for up to 5 s – LLD constructed with thin Mo + stainless steel "liner" on thick Cu plate
- No macroscopic damage observed – consistent with LLD heat load response governed by thermal mass of copper substrate

B.V. Kuteev: Lithium technologies for edge plasma control

- "Droplets" of lithium ablate in SOL, migrate to divertor, and collected there to close cycle
- "Rotary" feeder for lithium flow rates up to 2 x 10^{21} atoms/second shown to be compatible with OH and OH+ECRH plasmas – reduced hydrogen recycling observed with decrease of D_β signal and increased electron density

A.B. Martín-Rojo: Electrical characteristics of lithium surfaces exposed to a plasma

- Laboratory experiment to study relationship between surface conditions and sputtering includes capability of biasing surfaces with different coatings
- Anomalous negative current is detected at slightly negative bias on lithium and lithium-hydrogen surface but not under boronized-lithium conditions

B. Rais: Lithium particle detector for fusion applications

- Electrostatic dust detector developed with increased size and sensitivity
- Laboratory calibration showed sensitivity of 14 ng/cm^2 for lithium – possible prototype for ITER Be detector

S. Jung: Laboratory investigation of an effect of lithium on ICRF antenna in DEVeX

- Divertor Erosion and Vapor Shielding eXperiment (DEVeX) facility built to study erosion of ICRF antenna with lithium deposited on surface

N.R. Murray: Capillary wicking of lithium on laser-textured surfaces

- Addresses need to fabricate and characterize new kinds of plasma-facing components that optimize liquid lithium coverage and retention

J. R. Timberlake: NSTX liquid lithium in-vacuo delivery system

- Addresses need to develop efficient techniques for filling plasma-facing components with liquid lithium