

Lithium PMI issues on 1 page:

Plasma facing surface before discharge:

1. How to create reactive Li plasma facing surface ?
 - a. on C or on Mo substrate ?
 - how fast is Li intercalation in carbon ?
 - b. on divertor or on wall or everywhere ?
 - c. by Li evaporation or Li liquid fill or Li granule dropper / slapper or Li pellets or ...?
2. How to minimize reactions with H₂O in base vacuum, - minimize slag formation?
3. How to restore Li pumping after discharge, overnight / weekends, air ingress during argon vents.
 - replace Li or clean Li surface ?
4. How to clean porous surfaces during outages?
How to determine surfaces are clean ?

Surface during discharge:

5. What is optimal initial temperature ?
Should lithium be solid or liquid ?
6. How fast does surface saturate - diffusion of trapped D away from surface ?
7. How to avoid macroscopic Li transport, splashing.

8. Efficient D Fueling of plasma (avoid 'short circuit'):

- gas puff or clusters or pellets or NBI or CHI or

9. Diagnostics of Li pumping

- a. Local: H-alpha / LADA / LPs / MAPP.
- b. Global: use fast gas puff to measure recycling coefficient.
- c. Global: analyze particle balance,
- d. Global: RGA look for H rise ?

10. How to control of deleterious effects (e.g. arcing on RF antenna, Li UFOs) ?

11. How to suppress ELMS and also control impurity influx ?

12. Li heat flux issues:

- Marigoni / thermoelectric effect
Limit max temperature during discharge / ELMs ?
(463 mg-Li /m² evaporated in 1 ms at 800 C !)

Strategic Issues:

13. Can we rely on Li to control density in NSTX-U (not have cryopump) ?
14. How much machine time (run days) is needed / available to optimize above issues ?
15. Can plasma test stands help ?