

## Discussion of Priorities, Planning and Directions

### FESAC Materials Panel

Frontrunner is defined to get > 50% of resources.

W best high-Z material, definitely.

Bulk low-Z Be, C appear to be out of the question.

Some feel that W is the frontrunner, by this functional definition.

Some feel liquid metals, especially Li, are where the US should take a leading role.

Continue to be a leader in mixed materials and Be.

Continue to lead in ELM control and disruption mitigation.

Enhancement needed in lithium-plasma interaction.

Need more diagnostics of plasma edge for real-time measurements.

Better understanding of load requirements.

## **FNSF and PFC/PMI - 1**

Flexible foot-print, liquid/solid surface, realistic magnetic field, high-heat flux test facility/facilities are needed.

Integrate as many effects as possible, including plasma, as realistic as possible.

Need to consider international context, including access.

C-Mod has a lot more to contribute, in particular with hot-wall W.

If you want to include radiative dissipation of energy along B need 100 eV upstream. Parallel heat flux from upstream  $\sim 2 \text{ GW/m}^2$ .

Cheaper alternative to use  $\sim 30 \text{ eV}$ , lower parallel heat flux.

A small, long-pulse, high power DD device dedicated to PFC/PMI would vault US into the lead in PFC/PMI. Should be capable of testing multiple PFC approaches.

PFC community needs irradiation test data. A lot can be done with ion irradiation.

## **FNSF and PFC/PMI - 2**

Don't have data to answer the question as to whether neutron irradiation will affect PMI. May affect erosion through micro-structure changes - some results with high-energy ions on carbon - we don't know yet. There is a reasonable disconnect between neutron effects and surface effects. But neutron interactions certainly will affect PFC design, material and state (i.e., liquid vs. solid) choice.

EU does not plan on FNSF. Their Demo may be less ambitious than ours.

Some think 2 weeks / 30% are reasonable goals.

PMI/PFC challenges are Demo-class!

Cost may be ITER-class.

Needs to be able to change PFC components.

Core plasma parameters are very challenging, even ignoring PMI/PFC challenges. Very much a plasma physics experiment.

It also had better have adequate TBR.

Valuable data on synergistic effects of all kinds for fusion technology.

## **Neutron Materials Priorities**

Liquid PFC community should define what neutron-material studies are needed for its substrates.

Deployment pathways for PFCs need more definition - sequencing questions need to be answered.

## **From PFC-2012 Talks**

Need to address tokamak operation with W fuzz, including ELMs.

C-Mod hot divertor.

Need to work on Li items that are listed.

LM MHD: Marrying modeling with complex shapes and large deformations, thin layers hard to resolve. Big challenge. SciDAC-class effort is required. Needs to be challenged with experimental data. Code calculations of liquified W present related challenges

C-Mod can continue to contribute to melting metal first wall studies.

Snowflake has significantly more modest PF coil requirements than Super-X.

But they both need this study.

Do need to consider non-axisymmetric effects on first wall.

US can contribute to discussion on W divertor target in ITER.

Interested PFC group should inform US STAC members.