

Structure of the Fusion Materials PI Meeting — July 25-29, 2016

General Chairs – Ferguson & Clark

Technical Chairs – Katoh & Wirth

	Monday, July 25	Tuesday, July 26	Wednesday, July 27	Thursday, July 28	Friday, July 29
Venue	UTK	UTK	UTK	ORNL	ORNL
AM 8:30 to 12:30	Introduction, Goals <i>(Clark)</i> Structural Materials : Institutional Overviews ORNL & UTK, LLNL, PNNL, UCLA, UCSB : International Collabs. : Blanket/FW Design Needs	Composites and Other Materials SiC/SiC -Needs and Issues -Integration w/ other programs Cu & Innovative Materials <i>Discuss collaboration,</i> <i>directions, priorities</i>	Tungsten -Needs and Issues -US Activities -International Activities -Advanced Tungsten Options <i>Discuss collaboration,</i> <i>directions, priorities</i>	Introduction, Goals <i>(Clark)</i> Plasma Material Interactions : Institutional Overviews UCSD, ORNL, SNL, GA/DIII-D, UIUC	Tungsten as a PFC -D/He in W issues -Neutron/ion beam/plasma damaged W -Response of W to plasma <i>Discuss collaboration,</i> <i>directions, priorities</i>
Lunch			Poster Session	Juergen Rapp–Lunch talk Proto-MPEX	Doug Kothe-Lunch talk Exascale Applications
PM 1:30 to 5:30	Conventional and Advanced Steels -Needs and Issues -Alloy dev. & modeling -Property & data needs -International Interactions <i>Discuss collaboration,</i> <i>directions, priorities</i>	Simulating the Effects of the Fusion Environment -Theory & Modeling -Irradiation programs -PIE capabilities -International Collaborations -US Collaborations <i>Discuss collaboration,</i> <i>directions, priorities</i>	OFES Perspective on Program Integration <i>(Clark)</i> Integrated Materials Session -Structural Needs -PFC Needs -Spanning the Gap -FNSF needs Liquid Metals as PFCs -Review of Past Efforts -Technical Challenges -Discussion of Critical Issues	Institutional Overviews (Cont.) UT-K/SciDAC, INL, GIT, MIT, PPPL, LLNL International Collabs. and Devices <i>Discuss collaboration,</i> <i>directions, priorities</i>	Liquid PFC R&D (continued) -PPPL, ORNL, UT-K, UIUC, SNL -Technology Issues -Liquid Systems -Deployment Issues -Identification of milestones <i>Discuss collaboration,</i> <i>directions, priorities</i> Action Items & Closing Remarks <i>(Clark)</i>
Even.	Free	Free	Workshop Dinner Near UTK	Free	

Administrative Assistant – Elliott

Technical Assistant - Wiffen

Agenda for Monday, July 25, 2016

University of Tennessee, Knoxville

Day 1 -- 8:30 to 5:30

8:30 -- 10 min	<i>Welcome</i>	Wirth	
8:40 -- 10 min	Introduction and Overview	Clark	
	<i>Overviews</i>		
8:50 -- 45 min	ORNL & UTK	Katoh, Zinkle/Wirth	
9:35 -- 15 min	LLNL	Rudd	
9:50 -- 30 min	PNNL	Kurtz	
10:20 -- 20 min	<i>Coffee Break</i>		
10:40 -- 30 min	UCLA	Ghoniem <i>and</i> Marian	
11:10 -- 20 min	UCSB	Odette	
	<i>Interactions</i>		
11:30 -- 30 min	International Collaborations	Katoh	
12:00 -- 30 min	Blanket/FW R&D Needs	Morley	
12:30	<i>Lunch</i>		
	<i>Conventional RAFM Steels</i>		
1:30 -- 25 min	Issues for developing and qualifying RAFM steels	Odette	
1:55 -- 20 min	Current US program activities	Katoh	
2:15 -- 20 min	Status of the world programs	Kurtz	
	<i>Advanced Steels</i>		
2:35 -- 20 min	Bainitic steel development	Y. Yamamoto	
2:55 -- 20 min	ODS/NFA steels	Hoelzer	
3:15 -- 20 min	CNA steels	Tan	
3:35 -- 20 min	<i>Break</i>		
4:05 -- 65 min	<i>Discussion Session</i>		

	What experiments do we need?		
	How do we get maximum value out of experiments in progress?		
	How can we get greater benefit from our domestic and international collaborations?		
5:15 -- 15 min	<i>Steel session summary</i>	Odette	
5:30	<i>Close session</i>		

Agenda for Tuesday, July 26, 2016

University of Tennessee, Knoxville

Day 2 -- 8:30 to 5:30

	<i>SiC Composites & Ceramics</i>	<i>Potential speaker</i>	
8:30 -- 20 min	Needs and Issues for Composites and Monolithic Ceramics	Katoh	
8:50 -- 20 min	Transmutation Effects – Calculations & Simulations	El-Guebaly w/ PNNL	
9:10 -- 20 min	Joining Composites	Henager	
9:30 -- 20 min	Irradiations Effects at High Doses	Koyanagi	
9:30 -- 20 min	Magnet & Diagnostic System Materials	Edmondson	
	<i>Copper and Innovative Materials</i>		
9:50 -- 20 min	Copper Alloys for Structural Uses	Snead	
10:10 -- 20 min	MAX, BMG & HEA	Zinkle	
10:30 -- 20 min	<i>Break</i>		
10:50 -- 65 min	<i>Discussion Session</i>	(All Participants)	
	What experiments do we need?		
	How do we get maximum value out of experiments in progress?		
	How can we get greater benefit from our domestic and international collaborations?		
11:55 -- 15 min	<i>Session Summary</i>	Henager	
12:10	<i>Lunch</i>		
	<i>Simulating the Effects of the Fusion Environment</i>	<i>Potential speaker</i>	
1:10 -- 20 min	Characterizing the DT Fusion Environment	El-Guebaly	
1:30 -- 20 min	Modeling Radiation Damage - Microstructures	Wirth	
1:50 -- 20 min	Modeling Radiation Damage - Mechanical Properties	Ghoniem	
2:10 -- 20 min	STIP - FMITS - MTS	Kurtz	
2:30 -- 20 min	Ion Irradiations and Ion Implantation	Marian	
2:50 -- 20 min	The Role of Multiple Effects/Interactions in a Fusion Environment for Component Design	Morley	
3:10 -- 20 min	HFIR Irradiation and In-situ Capabilities	McDuffee	
3:30 -- 20 min	PIE Facilities and Advanced	Edmondson	

	Characterization Tools		
3:50 -- 20 min	Break		
4:10 -- 65 min	Discussion Session	(All Participants)	
	What tools and experiments do we need?		
	How do we get maximum value out of experiments in progress?		
	How can we get greater benefit from our domestic and international collaborations?		
5:15 -- 15 min	Session Summary	Ghoniem	
5:30			

Agenda for Wednesday, July 27, 2016

University of Tennessee, Knoxville

Day 3 -- 8:30 to 6:30

	<i>Status of Tungsten R&D</i>	<i>Potential speaker</i>	
8:30 -- 15 min	Needs and Issues for W and other Plasma Interactive Materials	Snead	
8:50 -- 25 min	Status of World Programs	Henager	
9:10 -- 20 min	US & Japanese Collaboration Matrices – ORNL, TITAN and PHENIX	Geringer	
9:30 -- 20 min	Effects of Irradiation on W & W Alloys	Hu	
	<i>Materials Development</i>		
9:50 -- 30 min	Improving Properties of Tungsten	Odette	
10:20 -- 20 min	<i>Break</i>		
10:40 -- 20 min	Composite & Graded Materials	Katoh	
11:00 -- 60 min	<i>Discussion Session</i>	(All Participants)	
	Advanced material design strategies, composites, advanced manufacturing?		
	What experiments do we need?		
	How do we get maximum value out of experiments in progress?		
	How can we get greater benefit from our domestic and international collaborations?		
12:00 -- 15 min	<i>Tungsten Session Summary</i>	Edmondson	
<i>Integrated Materials Community Session</i>	<i>Potential speaker</i>	<i>Integrated Materials Community Session</i>	
12:15	<i>OFES Perspective on Program Integration</i>	Clark	
12:30 – 2:00	<i>Lunch & Poster Session</i>		
	<i>Integrated Materials Community Session</i>	<i>Potential speaker</i>	
2:00 – 20 min	Structural Needs and Objectives	Kurtz	
2:20 -- 20 min	PFC Needs and Objectives	Doerner	
2:40 -- 20 min	Spanning the Gap between Structural Materials and PFC's	Zinkle	
3:00 -- 30 min	FNSF/Design Team Overview and Material R&D Needs	Kessel	
3:30 -- 20 min	<i>Break</i>		

	Liquid PFM R&D		
3:50 - 40 min	Liquid Metals as Plasma Facing Components: Progress and Prospects	Jaworski (or PPPL alternate)	
4:30 - 20 min	Review of liquid metals design studies in APEX & ALPS	Nygren	
4:50 - 20 min	Technology development for liquid metal divertors: corrosion and Tritium retention	Snead/Merrill	
5:10 - 30 minute	Discussion - path towards developing roadmap of critical R&D to address the limiting issues of liquid metal PFCs		
5:45 - 15 min	Session summary of Liquid PFMs	Wirth	
6:00 - 30 min	Closing discussion		
	How can we get greater benefit from our structural materials & PFC community integration? How do we better utilize both domestic and international collaborations? What are program elements that are missing (High heat flux testing)? What capabilities are needed to complete research goals?		
6:30	Adjourn at move to dinner		
7:00	Dinner		

Agenda for Thursday, July 28, 2016

ORNL

Day 4 -- 8:30 to 5:30

8:30 -- 10 min	<i>Welcome</i>	Ferguson	
8:40 -- 10 min	Introduction and Overview	Clark	
	<i>Overviews</i>		
8:50 -- 50 min	UCSD	Doerner/Tynan	
9:40 -- 50 min	ORNL (Program of PMI science)	Rapp/Katoh	
10:30 -- 20 min	<i>Coffee Break</i>		
10:50 -- 30 min	SNL	Buchenauer/Kolasinski	
11:20 -- 30 min	GA/DIII-D	Thomas	
11:50 -- 30 min	UIUC	Ruzic/Allain	
12:20 -- 60 min	<i>Lunch MPEX presentation</i>	Rapp	
1:20 -- 45 min	UT-K & SciDAC	Wirth	
2:05 -- 30 min	INL	Merrill/Shimada	
2:35 -- 15 min	GIT	Yoda	
2:50 -- 20 min	MIT	Wright	
3:10 -- 35 min	PPPL (including NSTX-U diagnostics and PMI modeling, LTX, and proposed LM work)	Skinner	
3:45 -- 15 min	LLNL	Umansky	
4:00 -- 15 min	<i>Break</i>		
4:15 -- 30 min	<i>International Collab. And Device Exploitation</i>	Jaworski	
4:45 -- 45 min	<i>Discussion Session</i>		
	What are the missing program elements?		
	- High Heat flux testing		
	- New materials development		
	- SCIDAC/ connections		
	- Tritium permeation/retention studies		
5:30	<i>End Session</i>		

Agenda for Friday, July 29, 2016

ORNL

Day 5 -- 8:30 to 2:35

8:30 -- 10 min	<i>Description of day's activities</i>	Clark	
	<i>Tungsten R&D</i>		
	D/He in W issues		
8:40 -- 10 min	- Pros vs cons of He induced morphologies	Doerner	
8:50 -- 10 min	- Predictive capabilities	Wirth	
9:00 -- 10 min	- Discussion		
	Neutron/ion beam/plasma damaged W		
9:10 -- 20 min	- Fuel retention	Buchenauer	
9:20 -- 10 min	- Thermomechanical properties	Tynan	
9:30 -- 10 min	- Discussion		
	Response of W to plasma		
9:40 -- 10 min	- Erosion	Rapp	
9:50 -- 10 min	- Migration	Unterberg	
10:00 -- 10 min	- Discussion		
10:00 -- 20 min	<i>Coffee Break</i>		
10:30 -- 60 min	Identification of near-term milestones	Group Discussion	
11:30 -- 30 min	<i>Lunch</i> <i>Exascale computing program</i>	Kothe	
	<i>Liquid PFM R&D</i>		
	Technology issues		
12:00 -- 20 min	- Corrosion	Pint	
12:20 -- 20 min	- Fuel inventory	TBD	
12:40 -- 30 min	Liquid systems talk	Zinkle	
	Deployment issues		
1:10 -- 20 min	- Flowing systems	Majeski	
1:30 -- 20 min	- Vapor pressure	Nygren	
1:50 -- 30 min	Identification of near-term milestones	Group Discussion	
2:20 -- 15 min	Meeting wrap-up/next steps discussion	Clark	
2:35	<i>Meeting Adjourned</i>		