

SCHEDULE AND STATUS OF IRRADIATION EXPERIMENTS – A. F. Rowcliffe (Oak Ridge National Laboratory)

OBJECTIVE

To provide an updated summary of the status of irradiation experiments for the fusion materials program.

SUMMARY

The current status of reactor irradiation experiments is presented in tables summarizing the experimental objectives, conditions, and schedule.

PROGRESS AND STATUS

Currently, there are three experiments in-reactor (RB-10J, RB-14J, and JP-25). Post-irradiation testing is in progress on CTR-62/63 and RB-11J/12J. Experiments TRIST-TC1 and RB-13J have been removed from reactor and are awaiting disassembly.

EBR-II Reactor, Idaho Falls

Experiment	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000
COBRA 1A2					
4 Mark B7A capsules	P.I.E.				
X530					
2 Mark B7 capsules	Disassembly P.I.E.				

High Flux Isotope Reactor, ORNL

Experiment	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000
JP 9-16					
8 Fh. 2 Target capsules	P.I.E.				
JP-20					
Ph. 2 Target capsule	P.I.E.				
JP-21					
Ph. 2 Target	Disassembly P.I.E.				
JP-22					
Ph. 2 Target capsule	Disassembly P.I.E.				
CTR-60					
Target capsule	Disassembly P.I.E.				
CTR-61					
Target capsule	Irradiation Disassembly				
HT-S Series					
10 rabbits	Irradiation P.I.E.				

Experiment Schedule																																											
Experiment	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	FY 1996	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	FY 1998	May-99	Jun-99	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00	FY 2000
HT-F Series																																											
6 rabbits																																											
Irradiation																																											
P.I.E.																																											
HFIR-TRIST-ER1																																											
RB In-situ experiment																																											
Irradiation																																											
Disassembly																																											
P.I.E.																																											
HFIR-MFE-RB-10J																																											
RB Spectrally tailored																																											
Design/assembly																																											
Irradiation																																											
Disassembly																																											
P.I.E.																																											
HFIR-MFE-RB-11J, 12J																																											
2 RB spectrally tailored																																											
Design/assembly																																											
Irradiation																																											
Disassembly																																											
P.I.E.																																											
HFIR-RB-13J																																											
RB varying temperature																																											
Design/Assembly																																											
Irradiation																																											
Disassembly																																											
P.I.E.																																											
HFIR-RB-14J																																											
Unshielded																																											
Irradiation																																											
Disassembly																																											
P.I.E.																																											

Summary of Reactor Irradiation Experiments										
Experiment	Lead Lab	Collaborators	Responsible Person	Major Objectives	Materials	Temperature °C	Dose (dpa) or fluence	Irrad. Start	Irrad. Finish	Status
COBRA 1A2	PNL	ORNL, ANL, MONBUSH-O	M.L. Hamilton	Tensile and fatigue prop., Charpy impact, fracture toughness, TEM	Austenitic and ferritic steels, Fe-alloys, V, Be, low act. materials, Cu alloys, TiAl, SiC, C-C comp.	370, 400, 800	33	Nov-92	Sep-94	
X530	ANL		H. Tsai, H.M. Chung	He-effects, swelling, Charpy Impact, fracture toughness, tensile prop.	V alloys	370	5	Aug-94	Sep-94	
High Flux Isotope Reactor, ORNL, Oak Ridge, TN										
HFR-CTR-60	ORNL		S.J. Zinkle	Flexure bars, TEM, Indentation disks	Isotopically tailored ceramics	100-600	2.4E+28 n/m ²	Dec-94	Aug-95	
HFR-CTR-61	ORNL		S.J. Zinkle	Similar to HFR-CTR-60	Austenitic and ferritic steels	7.20E+26		Dec-94	Aug-98	
HFR-JP-9	ORNL	JAERI	P.J. Maziasz/ J.E. Pavel	He effects by isotopic tailoring, tensile prop., TEM	300-600	57		Jul-90	Apr-94	
HFR-JP-12	ORNL	JAERI	P.J. Maziasz/ J.E. Pavel	Similar to HFR-JP-9			57	Jul-90	Apr-94	
HFR-JP-15	ORNL	JAERI	P.J. Maziasz/ J.E. Pavel	Similar to HFR-JP-9			57	Jul-90	Apr-94	
HFR-JP-20	ORNL	JAERI	J.E. Pavel	Tensile Prop., TEM, He effects by isotopic tailoring	Austenitic and ferritic steels	300-600	8	Dec-93	Jun-94	
HFR-JP-21	ORNL	JAERI	J.E. Pavel	Similar to HFR-JP-20			18	Dec-93	Apr-95	
HFR-JP-22	ORNL	JAERI	J.E. Pavel	Similar to HFR-JP-20			34	Dec-93	Jan-96	
HFR-JP-23	PNL	MONBUSH-O	D.S. Gelles	TEM	Austenitic and ferritic steels, Cu, Mo, V alloys, TiAl	300-600	8	Dec-93	Jun-94	
HFR-HT-S1,-S7	ORNL	L.L. Snead	L.L. Snead	Thermal conductivity	Various Insulators	80-350	0.01-1.0	Jun-95	Aug-95	
HFR-HT-F Series	ORNL		L.L. Snead	Fiber tensile	SiC	80-800	0.001-1.0	Jan-95	Mar-96	

Summary of Reactor Irradiation Experiments										
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HFIR-TRIST-ER1	ORNL	MONBUSHO/JAERI	S.J. Zinkle	In-situ electrical conductivity	Al2O3	450	3E+25 n/m2	Apr-96	Jun-96	
HFIR-RB-10J	ORNL	JAERI	J.E. Pawel	Tensile, fracture	Vanadium, 316LN-1G, J316	200, 500	5	Oct-98	Oct-99	
HFIR-RB-11J	ORNL	MONBUSHO/JAERI	M. L. Grossbeck	Tensile, fracture, TEM	Low activation ferritics, V alloys, SiC	300	5	Feb-97	May-98	
HFIR-RB-12J	ORNL	MONBUSHO/JAERI	M. L. Grossbeck	Tensile, fracture, TEM	Low activation ferritics, V alloys, SiC	500	5	Feb-97	May-98	
HFIR-RB-13J	ORNL	MONBUSHO/JAERI	S. J. Zinkle	Varying temp. experiment	Ceramics, Fe-Cr-Ni, V alloys, ferritics, copper	200, 350, 500	5	Jul-98	Jul-99	
HFIR-RB-14J	ORNL	MONBUSHO	L. L. Snead	Strength, fracture, dim. stability, diffusivity	2nd generation SiC/SiC	300, 500, 800	5	Feb-99	Feb-00	
HFIR-TRIST-TC1	ORNL	MONBUSHO/JAERI	L. L. Snead	In-situ thermal conductivity	SiC/SiC, SiC	150-700	3	Jan-99	Dec-99	
HFIR-CTR-62	ORNL	JAERI	R.L. Klueh	Charpy impact and He effects	and conventional ferritic steels	300, 400	13	Apr-95	Dec-95	
HFIR-CTR-63	ORNL	JAERI	R.L. Klueh	Charpy impact and tensile, TEM, He effects	and conventional ferritic steels	300, 400	13	Apr-95	Dec-95	
HFIR-JP25	ORNL	JAERI	R.L. Klueh	Tensile, fracture, TEM	Low activation ferritics	300, 500	20	Feb-99	Jan-00	
High Flux Beam Reactor, Brookhaven National Laboratory										
HFBR-ISEC-3	ORNL		L.L. Snead	In-situ electrical	WESGO Al2O3	450	1.5	Jul-95	Sep-95	
HFBR-V1	ORNL		L.L. Snead	Tensile, fracture	V-4Cr-4Ti	75, 150, 225 75, 225, 300,	0.4	May-95	Jun-95	
HFBR-V2	ORNL		L.L. Snead	Tensile, fracture	V-4Cr-4Ti	375	0.4	Jul-95	Aug-95	
HFBR-V3	ORNL		L.L. Snead	Tensile, fracture	V-4Cr-4Ti	160, 265, 315, 420	0.4	Aug-96	Sep-96	
HFBR-V4	ORNL		L.L. Snead	Tensile, fracture	V-4Cr-4Ti	105-505	0.1	Aug-96	Sep-96	

Summary of Reactor Irradiation Experiments										
Experiment	Lead Lab	Collaborators	Responsible Person	Major Objectives	Materials	Temperature °C	Dose (dpa) or fluence	Irrad. Start	Irrad. Finish	Status
Advanced Test Reactor, Idaho Falls										
ATR-A1	ANL	MONBUSHO	D.L. Smith	Tensile, fracture toughness, TEM, creep	Vanadium alloys	200, 300	5	Dec-95	May-96	
BOR-60 Reactor, RIAR, Dimitrovgrad, Russia										
BOR-60-Fusion-1	ORNL, ANL	RDIPE, RIAR	A.F. Rowcliffe, D.L. Smith	Mechanical and microstructural properties	V alloys	350-380	10	Jul-95	Mar-96	
SM-2 Reactor, RIAR, Dimitrovgrad, Russia										
SM-2.1	ORNL, PNL	RIAR	S.J. Zinkle	Tensile, electrical, microstructural, and creep properties	Cu alloys	100, 200, 330	1, 5	Dec-93	Feb-94	
SM-2.2	PNL	SRIAR	D.J. Edwards	Mechanical behavior of bonded materials	Cu alloys/SS, Cu/Be	120, 300	0.2	Mar-96	May-96	
SM-2.3	PNL	SRIAR	D.J. Edwards	Mechanical behavior of bonded materials	Cu alloys/SS, Cu/Be	150, 300 200	0.4 2.0	Sep-97 Jul-98	Dec-97 Oct-98	
Irradiation complete										
Irradiation in progress										
Irradiation planned										