



*OECD Nuclear Energy Agency
International Workshop on*

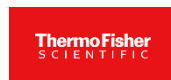


Structural Materials for Innovative Nuclear Systems

Hosted by

**Idaho National Laboratory, Idaho Falls, USA
12-15 September 2022**

Program



Structural Materials for Innovative Nuclear Systems

Monday, 12 September, Room BSUB-232, Student Union Building (1784 Science Center Dr., Idaho Falls) INL bus will pick up guests at Residence Inn at 8:00, and Springhill Suites at 8:10.		
8:30 – 9:30	Registration (room BSUB-232 in Student Union building)	
Opening session		
9:30 – 9:40	Welcome address from INL	M. Walck, INL Deputy Director
9:40 – 9:50	Welcome address from OECD-NEA EGSM	F. Balbaud (CEA)
Session 1:	Overview of Programs	Chair: Jian Gan
9:50 – 10:10	Overview on DOE program on materials for innovative nuclear systems	S. Lesica (DOE)
10:10 – 10:30	Research activity on nuclear structural materials in Korea	D.-J. Kim (KAERI)
10:30 – 11:00	Coffee break	
Session 2:	Fundamental and experimental studies on irradiation damage	Chair: Yong Dai
11:00 – 11:20	Defects and dislocations as sources of stress and deformation produced by irradiation: from microscopic models to FEM of reactor components	S. Dudarev (UKAEA)
11:20 – 11:40	Comprehensive fundamental studies using pure iron to assess the credibility of using self-ion simulation of neutron-induced void swelling	L. Shao (Texas A&M University)
11:40 – 12:00	In-situ High-energy X-ray Diffraction Study on Deformation Behavior of Neutron-Irradiated Fe-9%Cr	D. Piedmont (Univ. of Illinois at Urbana-Champaign)
12:00 – 12:20	Microstructural Evolution of Alloy 718 Under High Temperature In-situ Ion Irradiation	S. Taller (ORNL)
12:20 - 13:30	Working Lunch (BSUB-232, Student Union Bldg). Lunch talk: Advanced Characterization for Reactor Structural Materials	Presenter: J. Gan (INL)
Session 2:	Fundamental and experimental studies on irradiation damage	Chair: Céline Cabet
13:30 – 13:50	Radiation Effects in Additively Manufactured 316L Stainless Steels and its Modified Variants	L. He (North Carolina State University)
13:50 – 14:10	Experimental study of the incubation period for helium bubble swelling in ferritic steels	V. Krsjak (Slovak University of Technology)
14:10 – 14:30	Microstructural analysis of nanocluster evolution in ODS Eurofer irradiated to 20 dpa in a spallation target	Y. Dai (PSI)
14:30 – 14:50	Mechanical Properties and Microstructure of Neutron-Irradiated T91 and HT9	J. Stubbins (Univ. of Illinois at Urbana-Champaign)
14:50 – 15:10	Development of Real-Time In-pile Creep Testing Capability for Characterizing the Structural Material	M. Wilding (INL)
15:10 – 15:30	Discussion	
15:30 – 16:00	Coffee break	
Session 1:	Overview of Program	Chair: Alfons Weisenburger
16:00 – 16:30	Materials Qualification Testing for the Westinghouse Lead Fast Reactor	M. Ickes (Westinghouse)
Session 3:	Corrosion for advanced nuclear systems	Chair: Alfons Weisenburger
16:30 – 16:50	Performance of LFR structural materials in the oxygen-controlled lead at 480°C	L. Kosek (CVR)
16:50 – 17:10	Elucidating the corrosion mechanism of Ni-based superalloys in UCl ₃ -containing chloride molten salt	T. Copeland-Johnson (INL)
17:10 – 17:30	Discussion	
17:30	Adjourn INL bus will pick up guests and send back to Residence Inn and Springhill Suites	

Structural Materials for Innovative Nuclear Systems

Tuesday, 13 September		
Bus will pick up guests at Residence Inn at 8:15, and Springhill Suites at 8:25		
8:45 – 9:00	Registration	
Session 1:	Overview of Programs	Chair: Fanny Balbaud
9:00 – 9:30	Overview of Advanced Materials and Manufacturing Technologies (AMMT) Program	M. Li (ANL)
9:30 – 10:00	Accelerated discovery of materials	P. Hosemann (Univ. of California, Berkeley)
Session 4:	Advanced Manufacturing	Chair: Fanny Balbaud
10:00 – 10:30	Coffee break	
10:30 – 10:50	Advanced Nuclear Materials technology development prioritization enabled by material score cards	I. van Rooyen (PNNL)
10:50 – 11:10	Additive Manufacturing of Grade 91 Steel for Affordable Nuclear Reactor Components with Improved Radiation Tolerance	S. Maloy (PNNL)
11:10 – 11:30	Microstructural and Mechanical Responses of Ion-Irradiated 304 SS and 304 Oxide-Dispersion-Strengthened Steel Additively Manufactured via Selective Laser Melting	T. Chen (Oregon State University)
11:30 – 11:50	In situ observation of powder and gel based additive manufacturing processes for ceramics	M. Pouchon (PSI)
11:50 – 12:10	Discussion	
12:10 – 13:20	Working Lunch Lunch talk: Harvesting of Structural Materials from Decommissioned Commercial NPP and Test Reactors to Support Reactor Life Extension and Future Research Needs	presenter: P. Xu (INL)
Session 5:	Materials for high-temperature applications	Chair: Stuart Maloy
13:20 – 13:40	Development of data-driven (machine learning) models for predictions of the high-temperature fatigue life of Alloy 617	O. Muransky (ANSTO)
13:40 – 14:00	Study of isothermal and continuous cooling transformation in a SA 508 grade 3 class 1 steel	M. J. Iofrida (CNEA)
14:00 – 14:20	Solid-state diffusion welding of Ni-based alloys	I. Sah (KAERI)
14:20 – 14:40	HT property and microstructure of Incoloy 800H and its weldments using different filler materials	W. Li (CNL)
14:40 – 15:00	High temperature design of welded joints for Generation IV nuclear reactor systems	H.-Y. Lee (KAERI)
15:00 - 15:30	Coffee break	
15:30 – 15:50	Code Qualification of Alloy 709 for High Temperature Reactor Structural Applications	T. Sham (INL)
15:50 – 16:10	No ball milling needed: Alternative ODS steel manufacturing with GARS and friction-based processing	D. Zhang (PNNL)
16:10 – 16:30	Small Scale Mechanical Testing of Nuclear Structural Materials	D. Frazer (INL)
16:30 – 16:50	Discussion	
16:50 – 17:00	Break	
17:00 – 18:00	Poster presentations (3 min each) in BSUB-232	Chair: Jian Gan
18:00 – 19:30	Poster session in BSUB-232 INL Drink and snack refreshment will be provided	Associate Lab Director Jess Gehin will attend
19:30	Adjourn INL bus will pick up guests and send back to Residence Inn and Springhill Suites	

Structural Materials for Innovative Nuclear Systems

Wednesday, 14 September Bus will pick up guests at Residence Inn at 8:10, and Springhill Suites at 8:20		
Session 1: Overview of Programs		Chair: Manuel Pouchon
8:40 – 9:00	A unified European strategic research agenda for nuclear materials	C. Cabet (CEA)
Session 6: Materials development for Molten Salts Reactors		Chair: Manuel Pouchon
9:00 – 9:20	Development and Qualification of Advanced Materials for Sodium-Cooled and Molten Salt Fast Demonstration Reactors	J. Romero (Terrapower)
9:20 – 9:40	Corrosion in molten chlorides - CEA developments and research program	F. Balbaud (CEA)
9:40 – 10:00	Irradiation Testing of Nickel-based Alloys for Molten Salt Reactors	R. Hania (NRG)
10:00 – 10:20	Discussion	
10:20 - 10:50	Coffee break	
Session 7: Properties of Complex Concentrated Alloys		Chair: Alfons Weisenburger
10:50 – 11:10	Composition stability of derivative high-entropy and SMART alloys for nuclear fusion applications	D. Nguyen (UKAEA)
11:10 – 11:30	Rapid Screening of High Entropy Alloys using Laser Ultrasonics	A. Khanolkar (INL)
11:30 – 11:50	Discussion	
12:30 – 13:40	Working Lunch Lunch talk: Structural Materials and Chemistry Research and Development in the NEAMS Program	presenter: B. Spencer (INL)
Panel Are We On The Path To Introducing High-Entropy Alloys To Next Generation Nuclear Systems?		Chair: James Marrow
13:40 – 14:10	Thermodynamic study of Hf Addition to Refractory W-Ta-Cr-V High Entropy Alloy from First- Principles	E. Martinez Saez (Clemson University)
14:10 – 14:40	Properties of high entropy alloys for nuclear applications	E. Pickering (University of Manchester)
14:40 – 15:10	Multi-Principal Element Alloys for Extreme Environments	A. Clarke (Colorado school of Mines)
15:10 – 15:40	Irradiation response of FCC High-Entropy Alloys using in-situ and ex-situ experiments	A. Couet (Univ. of Wisconsin-Madison)
15:40 - 16:10	Coffee break	
16:10 – 17:10	Panel discussion Chair: James Marrow Panelists: A. Couet, A. Clarke, E. Pickering, E. Martinez Saez	
17:10 – 18:00	Taking group picture	
18:00 – 20:00	Dinner Reception at BSUB-232 in Student Union Bldg. Dinner speech NSUF program support on advanced reactor structural materials R&D	INL ALD Ronald Crone will attend presenter: Rory Kennedy (INL)
20:00	Adjourn INL bus will pick up guests and send back to Residence Inn and Springhill Suites	

Structural Materials for Innovative Nuclear Systems

Thursday, 15 September		
Bus will pick up guests at Residence Inn at 8:10, and Springhill Suites at 8:20		
Session 1:	Overview of Programs	Chair: Manuel Pouchon
8:40 – 9:00	AFA-steels for Lead alloy cooled nuclear reactors – an overview of the European activities in the GEMMA project	A. Weisenburger (KIT)
9:00 – 9:20	Current Gaps in Modeling Deformation Behavior of Oxide Dispersion Strengthened Alloys for Fission/Fusion	C. Massey (ORNL)
Session 8:	Materials development for Advanced Cladding	Chair: Manuel Pouchon
9:20 – 9:40	Evaluation of alumina-forming duplex stainless steels (ADSS) as accident tolerant fuel cladding materials	C.-W. Kim (KAIST)
9:40 – 10:00	Recent progress in mechanical testing of the nuclear fuel cladding materials	B. Garrison (ORNL)
10:00 – 10:20	The Role of N in the Structure and Properties of Proton Irradiates 12Cr1MoWV Ferritic Martensitic Steels for Advanced Reactors	K. Clarke (Colorado school of Mines)
10:20 - 10:50	Coffee break	
10:50 – 11:10	Impact of Capacitive Discharge Resistance Welding on the Radiation Tolerance of 14YWT Cladding	C. Lear (LANL)
11:10 – 11:30	Discussion	
11:30 – 12:00	Meeting Summary from the session chairs and open discussion	
12:00 – 12:10	Closing Speech	
12:10	Bus will first pick up guests not going to MFC tour and send back to hotels	
12:10 – 12:45	Badging for MFC tour. Lunch (boxed lunch only for people on the tour)	
12:45	Bus will pick up MFC tour participants at student union bldg.	
14:00 – 17:00	Technical Tour at MFC Hot Fuel Examination Facility (HFEF) & Irradiated Materials Characterization Lab (IMCL) Foreign visitors must be on the approval list of security plan to participate the tour Max tour participants are 50 and will be divided into 4 groups	
17:00	Bus will pick up tour participants at MFC and send back to Residence Inn and Springhill Suites	