WAM 2020

NEUTRONS FOR SOCIETY

ESRF

- Large Scale Instruments for AM industry
- Industrial consolidation of AM technologies & standardization
- New approaches and achievements on AM-characterization
- Simulation, new models and Non-Destructive Investigations
- Podium Discussion

	Wednesday 1st April	Thursday 2nd April	Friday 3rd April
09:00		Laurent Pambaguian (ESA)	Jonathan Cormier (ENSMA)
09:45		Hans Söderhjelm (Höganäs)	Nicolas Lammens (Siemens)
10:15		Julie Maisonneuve (CEA Tech)	Manuel Poncela (ArcelorMittal)
10:45		Break	Break
11:15		Elena Lopez (Fraunhofer IWS)	Jonàs Martínez (INRIA)
11:45		Ben Dutton (MTC)	Vincent Robin (EDF)
12:15		Marta Herrera García (CATEC)	Eric Lass (UTK)
12:45		Lunch	Lunch
13:15			
13:45			
14:00	Prof. Schober (ILL) - Dr Reichert (ESRF)	Peter Lee (Univ. College London)	Marina Urbina (CEA)
14:30	E. Capria (ESRF) - C. Boudou (ILL)	Tao Sun (University of Virginia)	Podium discussions
15:00	Break	Katia Artzt (DLR)	
15:30	T. Buslaps (ESRF) - T. Pirling (ILL)	Sandra Cabeza (ILL)	*Concluding remarks & closure*
16:00	E. Boller (ESRF) - A. Tengattini (ILL)	Break	
16:30	V. Honkimäki (ESRF) - T. Hansen (ILL)	Molly Probert (Univ. of Bristol)	
17:00	Visit of ILL & ESRF installations	Sofiane Terzi (Novitom)	
17:30		Pierre Lhuissier (SIMaP)	
17:55		*End of session*	
18:00			
18:30			
19:00	Poster session		
19:30			
20:00	Cheese & Wine	Gala Dinner at "Château de la Commanderie" (access by coach)	

Large Scale Instruments for AM industry

Wednesday 1st April

14.00 **Welcome - Helmut Schober (ILL) & Harald Reichert (ESRF)**

14.30 **E. Capria (ESRF) - C. Boudou (ILL)**
Access advanced characterisation techniques at the European neutron and synchrotron light sources

15.00 Break

15.30 **T. Buslaps (ESRF) - T. Pirling (ILL)**
Mechanical strain & stress: mapping from surface to bulk and dynamic measurements

16.00 **E. Boller (ESRF) - A. Tengattini (ILL)**
Unique features and complementarity of x-rays synchrotron and neutron imaging techniques

16.30 **V. Honkimäki (ESRF) - T. Hansen (ILL)**
When neutron and synchrotron x-rays diffraction reveals the evolving structure of materials

17.00 **Visit of ILL & ESRF installations**

19.00 **Poster session**

20.00 **Cheese & Wine**

Industrial consolidation of AM technologies & standardization

Thursday 2nd April

9.00 **Laurent Pambaguian (ESA)**
From Additive to Advanced, an overview of the Space Industry manufacturing challenges

9.45 **Hans Söderhjelm (Höganäs)**
TBC

10.15 **J. Maisonneuve (CEA Tech) | G. Gaillard (CEA Tech) | & Maria Averyanova (AddUp)**
HUB FAMERGIE: Additive Manufacturing for Energy Industry

10.45 Break

11.15 **Elena Lopez (Fraunhofer IWS)**
Quality Management in Additive Manufacturing – Latest developments at Additive Manufacturing Center Dresden

11.45 **Ben Dutton (MTC)**
AM Inspection Progress at the MTC

12.15 **Marta Herrera García (CATEC)**
Development of successful Applications by AM for the space sector: Value chain, thermal treatments and relevance of internal stresses

12.45 Lunch Break

New approaches and achievements on AM-characterization

Thursday 2nd April

14.00 **Peter Lee (Univ. College London)**
Quantifying dynamic phenomena during laser additive manufacturing using synchrotron imaging

14.45 **Tao Sun (University of Virginia)**
In situ synchrotron x-ray study of metal additive manufacturing

15.15 **Katia Artzt (German Aerospace Center -DLR)**
Characterization methods for additive manufacturing: Influence of processing strategies on residual stresses, microstructure and defects in AM materials and components

15.45 **Sandra Cabeza (ILL)**
Neutron characterization towards safe structural application of AM components

16.15 Break

16.45 **Molly Probert (Univ. of Bristol)**
Mechanical properties in depth: in-situ stroboscopic measurements at SALSA

17.15 **Sofiane Terzi (Novitom)**
Assessment of rugosity in internal channels of additive manufactured parts using synchrotron radiation

17.35 **Pierre Lhuissier (SIMaP)**
Defects in metal additive manufacturing parts investigated by 4D imaging : genesis of formation and mechanical consequences

17.55 ***End of session***

20.00 **Gala Dinner at "Château de la Commanderie"**

Simulation, new models and Non-Destructive Investigations

Friday 3rd April

9.00 **Jonathan Cormier (ENSMA)**
Creep and fatigue durability of Ni-based superalloys of processed by LPBF/LMD: application to Inconel 718, Waspaloy and René 65

9.45 **Nicolas Lammens (Siemens)**
Process-property-performance prediction for cradle-to-grave simulation of AM

10.15 **Manuel Poncela (ArcelorMittal)**
Residual stresses at steel SLM printed part, its distribution, mitigation and simulation

10.45 Break

11.15 **Jonàs Martínez (INRIA)**
Additive manufacturing of small-scale geometry with controllable elasticity

11.45 **Vincent Robin (EDF)**
Residual state induced by wire arc deposition : understand the origin, assess the distribution and predict the consequences

12.15 **Eric Lass (University of Tennessee, Knoxville)**
Processing-Structure-Property Relationships in AM: Modeling to Practice

12.45 Lunch Break

Podium Discussion

Friday 3rd April

How to share fundamental knowledge and how to join forces in order to tackle the most fundamental challenges in AM?

From micro to macro and functionnalisation?

From powder to a product in use?

14.00 **Introduction by Marina Urbina (LITEN | CEA Grenoble)**
European programmes – Funding opportunities for academics and industry

14.30 **Discussions**

15.30 **Concluding remarks & closure**

16.00 ***End of workshop***

Biographies

Katia Artzt

Research Associate at the German Aerospace Center

Katia Artzt | German Aerospace Center – Institute of Materials Research – Research Group Materials Design

Dr. Katia Artzt studied Material Science at the University of Stuttgart. In her PhD thesis she investigated oxide ceramic matrix composites at the Ruhr-Universität Bochum and the German Aerospace Center in Cologne. Since 2016 Dr. Artzt is focusing on metal additive manufacturing.

She has specialized in process-materials properties-performance relationships. With her thorough background in materials research and processing technology, Dr. Artzt aims to transfer the understanding from fundamental studies to complex additively manufactured components.

Sandra Cabeza

Co-responsible Scientist - SALSA Diffractometer

Sandra Cabeza | Institut Laue Langevin

Dr. Sandra Cabeza Sanchez holds a PhD in Materials Science on Magnesium Powder Metallurgy, with a background as Aerospace Engineer specialised on structural materials. Currently she has been appointed as scientist at ILL Diffraction group as co-responsible of SALSA strain diffractometer, in close collaboration with the Industrial Liaison Unit.

For the past five years, Dr Cabeza has focused on the characterization of additive manufactured materials and their structural integrity, in particular at synchrotron and neutron sources, challenging established hypothesis and proposing the new generation of in-situ of experiments. She has leaded and contributed to ISO standards, European and industrial collaboration projects, together with the supervision of master and PhD students..

Biographies

Jonathan Cormier

Associate Professor & Researcher

Jonathan Cormier | ENSMA

Dr Jonathan Cormier completed his PhD thesis on the “Non-isothermal creep at high and very high temperature of the Ni-based single crystal superalloy MC2” in 2006, at ISAE-ENSMA - the National Higher French Institute of Aeronautics and Space. The following year, he becomes Associate professor at ISE-ENSMA, with lectures covering various topics such as Resistance of Materials, Creep, Experimental Analysis in Mechanics, Mechanical Properties of Metallic Materials and High Temperature Materials. He's the (co)author of 120 publications since 2005, including 89 articles in international peer-reviewed journals. He's the laureate of several awards, lately acknowledged with the IMR Lee Hsun Young Scientist Award 2020. Dr Cormier is also the editor of the 'Metallurgical and Materials Transactions A' journal since September 2016.

Benjamin Dutton

Technical Specialist

Ben Dutton | MTC

Dr Ben Dutton is a Technical Specialist at the MTC with 16 years’ experience in NDT. He possesses a valuable combination of academic and industrial experience with proven expertise in integrating design and manufacturing functions. His PhD was in laser ultrasound and EMAT’s (both non-contact ultrasonic methods) but through his professional career he has gained experience in most NDT methods (contact ultrasound including phased array, X-ray radiography and computed tomography, eddy current, thermography and shearography).

As a Technical Specialist at the MTC, he is leading projects where in-situ inspections are required for PBF, DED and laser welding. He is also very active in post build NDT inspection projects mainly for AM, and leads the quality for AM standards strategy at the MTC. He has been involved in projects in the following sectors: Aerospace, Space, Automotive, Transportation (Rail) and Medical. Project portfolio includes single client, MTC CRP (Core Research Program), UK government supported such as Innovate UK and European such as H2020. He is very actively leading and participating in the development several international NDT standards for AM. Finally, he is part of the ASTM AM Center of Excellence team at the MTC.

Biographies

Marta Herrera García

Materials and Process Engineer

Marta Herrera García | CATEC

Dra. Marta Herrera Garcia holds a PhD in Materials Science and Engineering (2015). In 2011 she started working as research and teaching staff at the University of Seville, with focus in the development of Powdermetallurgy materials and processes.

Later in 2016, she joined the Materials and Processes division at CATEC, for R&D activities in the framework of aerospace materials and manufacturing related technologies and non-destructive testing.

Nicolas Lammens

Research Engineer

Nicolas Lammens | Siemens Digital Industries Software

Nicolas Lammens is currently a Research Engineer in the Additive Manufacturing RTD team of Siemens Digital Industries Software, where his main activities are focused towards development of AM-enhanced fatigue predictions. In its efforts to advance the state-of-the-art and deliver industry-ready solution to its partners, Siemens Digital Industries Software fosters strong national and international collaborations with academia.

Prior to joining Siemens, Nicolas held a post-doctoral position at Ghent University, investigating AM polymer fatigue for bio-medical applications subsequent to obtaining a PhD degree in materials science for research on optical fiber sensing for structural health monitoring..

Biographies

Eric Lass

Assistant Professor

Eric Lass | University of Tennessee, Knoxville

Dr. Eric A. Lass received a B.S. in Materials Science & Engineering from Michigan Technological University in 2001, an M.S. in Materials Engineering from Rensselaer Polytechnic Institute in 2003, and a Ph.D. in Materials Science and Engineering in 2008 from the University of Virginia. Prior to his recent move into academia, Dr. Lass spent 10 years at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. While at NIST, Dr. Lass led much of the experimental efforts in the Thermodynamics and Kinetics Group (TKG) of the Materials Science and Engineering Division (MSED). He was the leader of the TKG project titled "Advanced Materials Design: Structural Applications"; and also lead the experimental efforts of the MSED project on additive manufacturing (AM). Dr. Lass' current research areas include additive manufacturing of Fe-, Ni-, Co-, and Al-based alloys, microstructural evolution in superalloys, and Integrated Computational Materials Engineering (ICME) assisted materials design.

His general research interests are in process-structure-property relationships, specifically the application of thermodynamics and kinetics to microstructural evolution and phase transformations in metals and alloys, and in understanding how microstructural evolution can be controlled to enable the design of new materials and processes. He is also active in TMS, serving in leadership positions on several technical committees, the MPMD council, and the Program committee; and is also involved in organizing multiple symposia at TMS and MS&T annual meetings.

In addition to receiving a prestigious NRC postdoctoral fellowship, Dr. Lass was recognized as a TMS Young Leader, and was recently awarded the 2018 ASM Henry Marion Howe Medal, a 2019 Department of Commerce Bronze Medal, and the 2020 TMS EPD Nagy El-Kaddah Award.

Biographies

Peter Lee

Professor of Materials Science

Peter Lee | University College London

Peter holds the Royal Academy of Engineering Chair in the Emerging Technology of Additive Manufacturing. He is a Professor of Materials Science at University College London, but his group is based at the Research Complex at Harwell, where the UK's Synchrotron, Neutron and Laser sources are located. His research focusses on the computational simulation and X-ray imaging of materials at a microstructural level. He was one of the pioneers of multi-scale and through process modelling (now termed ICME), working at Alcan on the prediction of defects in light alloy components for companies such as Ford and Rolls-Royce.

Peter is an avid experimentalist, developing nano-precision rigs that replicate the processing and service performance of materials on synchrotron beamlines, enabling us to see inside materials in 3D as they change in time. He has developed a series of additive manufacturing machines (both powder bed and Directed Energy Deposition blown powder) that work on synchrotron beamlines at Diamond Light Source, ESRF and APS. His work is revealing how microstructures evolve in processes ranging from additive manufacturing to volcanic eruptions. His experimental techniques and open-source codes have been exploited internationally by aerospace, automotive, energy and biomedical companies to solve important engineering challenges – from developing additive manufactured human joint replacements to aerospace components.

Pierre Lhuissier

Researcher

Pierre Lhuissier | SIMAP - CNRS - Univ. Grenoble Alpes

Researcher of the CNRS in the laboratory of Science and Engineering of Materials and Processes (SIMAP) of University Grenoble Alpes, my research is mainly focused on elaboration and hot forming of light alloys and on architectured materials mechanical properties. I operate intensively in situ and operando characterisation by micro/nano-tomography or SEM/EBSD to disclose the underlying mechanisms.

As a consequence, I conduct developments on data acquisition procedures, sample environments and data treatments (images analysis, digital volume correlation, features evolution...).
I also use powder bed fusion additive manufacturing (EBM and SLM) to elaborate architectured materials and especially lattice structures in which I investigate the relationships between building parameters, defect magnitude, local deformation and mechanical properties.

Biographies

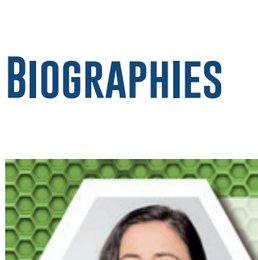
Elena Lopez

Head of Department at the Additive Manufacturing Center Dresden

Elena Lopez | Fraunhofer IWS

Dra. Elena Lopez studied chemical engineering at the Universidad de Valladolid and Friedrich-Alexander-Universität Erlangen-Nürnberg.
She finished her PhD thesis about the topic of plasmachemical etching of silicon solar wafers at the Technische Universitaet Dresden.

After focusing on CVD technologies, she moved to Printing and Additive Manufacturing technologies in 2014. She is the Head of Department for Additive Manufacturing at the Additive Manufacturing Center Dresden (AMCD) at Fraunhofer IWS. Nowadays she leads a big consortium named Agent-3D with more than 100 companies involved.

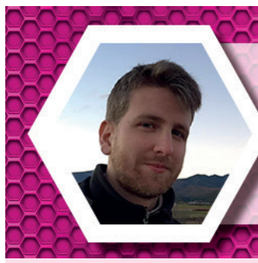


Julie Maisonneuve

AM project leader

Julie Maisonneuve | CEA Tech

Biography soon available.



Jonàs Martínez

Junior researcher

Jonàs Martínez | INRIA

Jonàs Martínez is a junior researcher at INRIA (France). He received a Ph.D. degree from Universitat Politècnica de Catalunya in 2013, and was awarded an ERCIM postdoctoral fellowship.

His current recent research lies at the intersection between Additive Manufacturing (AM), computational geometry, and computer graphics, with an emphasis on the study of random geometry with applications in AM..

Biographies

Laurent Pambaguian

Engineer - Materials and Processes Section

Laurent Pambaguian | European Space Agency - Mechanical Department

Dr. Laurent Pambaguian received a PhD on "Mechanical behaviour of interfaces in Metal Matrix Composites" in 1994 from ONERA, The French Aeronautic Lab. He did two post docs in Spain on heterogeneous deformation of aluminium alloys and in Austria on metal matrix composites.

In 1999 he has been recruited as Engineer in the Materials and Processes Section of the European Space Agency and focussed on addressing the development of advanced materials and processes for the future ESA missions. He has been the first to develop Additive Manufacturing Technologies at ESA and is expanding his expertise on this topic since 2004.

Molly Probert

Mechanical Engineering (PhD)

Molly Probert | University of Bristol

Currently studying for a PhD with the Solid Mechanics Research Group at the University of Bristol. My main area of research has focused on the effects of residual stress on crack propagation and subsequent fracture in elastic plastic materials.

During the course of my research I have been involved in a variety of neutron diffraction experiments to characterise stress fields in metalic specimens subject to residual stressed during fatigue cracking and fracture.

Biographies

Vincent Robin

Expert research engineer

Vincent Robin | EDF

Since 2016, Vincent ROBIN is an expert research engineer working for different projects related to manufacturing and repair for nuclear power plant equipment at EDF Group Research Center. These research activities concern the understanding of physical phenomena involved during material processing and the assessment of consequences on equipment fitness for service. Material characterization, process monitoring and simulation of manufacturing processes are the main topics of interest applied to : ingot casting, forging and heat treatment, arc welding and repair, additive manufacturing and surfacic mitigation processes. Vincent ROBIN is a graduated engineer in mechanical engineering since 1998. He obtained a PhD in 2009. This R&D work was prepared at the same time than its professional activity which started in 1998.

The title of the thesis is "From the numerical modeling of manufacturing processes and welding in particular to the mechanical behavior of weldments". After ten year of working in the field of scientific software development for manufacturing process and fracture mechanics simulation at ESI Group within the framework of R&D projects and industrial studies for different part of the industry (nuclear power, transportation, defense...), he decided to work more intensively for the nuclear industry. Since 2008 he has been working for Framatome (formerly AREVA Nuclear Power) in the mechanical engineering department as a numerical simulation specialist. He was expert in the manufacturing domain and in charge of R&D projects in the field of fabrication (e.g. welding, machining, additive manufacturing...), fracture mechanics and materials. In 2016, he has joined EDF Group Research Center as an expert research engineer working for different projects related to manufacturing and repair for nuclear power plant..

Biographies

Manuel Sánchez Poncela

R&D Engineer

ArcelorMittal

Manuel Sánchez Poncela | ArcelorMittal Global R&D

Currently working at the Additive Manufacturing department of ArcelorMittal Global R&D (Asturias, ES). My research is focused on studying steel microscopic and macroscopic behavior during 3D printing at different technologies and post-processing for tuning the microstructure and mitigate residual stresses inherent to the fabrication process.

I am an industrial engineer by the Polytechnic Schools of Gijón (ES) and Grenoble INP (FR), with a further specialization in material science by LMU and TUM universities (Munich, GR). Before joining ArcelorMittal, I have been working at CEA Cadarache: studying the relaxation cracking with numerical simulation of austenitic steel welding and FRM II as data analyst of residual stresses in welding.

Tao Sun

Associate Professor

University of Virginia

Tao Sun | University of Virginia

Tao Sun is an Associate Professor at the Department of Materials Science and Engineering of University of Virginia (UVA). Tao's doctoral research at Northwestern University (with Vinayak Dravid) was focused on fabrication and characterization of nanostructured oxides. In 2010, Tao joined the X-ray Science Division (XSD) of Argonne National Laboratory as a Postdoc, working on coherent electron scattering (with Dr. J. Murray Gibson) and coherent x-ray scattering (with Dr. Jin Wang).

In 2012, Tao became an Assistant Physicist in the Imaging Group of XSD and later promoted to Physicist in 2017. During this period, Tao developed and applied high-speed x-ray imaging/diffraction techniques for studying highly dynamic irreversible/non-repeatable material processes. In Sep 2019, Tao started his academic career at UVA as a tenure-track associate professor. Tao's lab at UVA will be specialized in developing advanced material systems using laser-based additive manufacturing techniques, with a research focus on understanding the physics underlying AM materials' unique microstructures and properties.

Biographies

Sofiane Terzi

Materials Engineer

NOVITOM
ADVANCED 3D IMAGING SERVICES

Sofiane Terzi | Novitom

Biography soon available.

Marina Urbina

European Programme Manager

liten
cea tech

Marina Urbina | LITEN CEA Grenoble

Marina Urbina is European Programme Manager of the Nanomaterials Technologies Division at the Laboratory for Innovation in New Energy Technologies and Nanomaterials (LITEN) within the Alternative Energy and Atomic Energy Commission (CEA). She is also member of the National Contact Point for the theme NMBP (Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing) of the Horizon 2020 European Programme, member of the Executive Board of NANOFUTURES Association and Chairwoman of its Research and Technology Working group.

She has participated as partner of European Coordination and Support Actions devoted to Nanosafety, Key Enabling Technologies, Materials for Energy, Renewable Energies, Additive Manufacturing Technologies, Circular Economy, Structural Funds and Co-funding topics. Besides, since 2012 she has participated and coordinated the setting up of around 80 European proposals, with a success rate of more than 30%. She obtained a PhD in Chemistry from the University Autonoma of Madrid in 1999 awarded by a Spanish Government National Grant and was beneficiary of a Post-Doctoral Marie Curie European Grant in the Large Group Rhodia Researchers in Paris, nowadays Solvay.