

EUROSUPERALLOYS 2014

2nd European Symposium on Superalloys and their Applications

12 –16 May, 2014

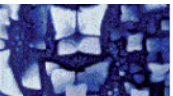
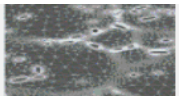
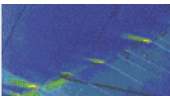
French Riviera,
Giens, France

EUROSUPERALLOYS 2014

2nd European Symposium on Superalloys and their Applications

Preliminary program

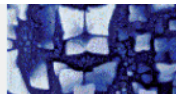
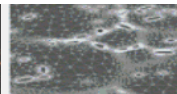
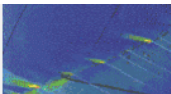
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EUROSUPERALLOYS 2014

Program Overview

	Monday 12	Tuesday 13	Wednesday 14	Thursday 15	Friday 16
08.30 10.20		Welcome address Oral Session 1: <i>Deformation and Damage Mechanisms I</i>	Oral Session 5: <i>Mechanical Behaviour I</i>	Oral Session 7: <i>Mechanical Behaviour II</i>	Oral Session 11: <i>Mechanical Behaviour III</i>
10.20 10.50		Coffee break	Coffee break	Coffee break	Coffee break
10.50 12.30		Oral Session 2: <i>Alloy Development I</i>	Oral Session 6: <i>Native Defects and Precipitate Evolutions in SX</i>	Oral Session 8: <i>Recrystallisation & Grain Growth</i>	Plenary 45 min J.-L. Strudel ----- Best ----- contribution awards Farewell address
12.30 12.30 14.00		Lunch	Lunch	Lunch	Lunch
14.00 15.40		Oral Session 3: <i>Alloy Development II</i>	Free afternoon Sightseeing tour	Oral Session 9: <i>Process - Microstructure Interactions</i>	Departure
15.40 16.10		Start of registration	Coffee break	Coffee break	
16.10 17.50			Oral Session 4: <i>Deformation and Damage Mechanisms II</i>	Oral Session 10: <i>Precipitation</i>	
18.00 19.00			Poster session	Poster session	
19.00 19.45			Get together	Program Committee meeting	
20.00 21:30		Dinner Plenary 45 min M. Könter	Dinner	Banquet Entertainment	Dinner



EUROSUPERALLOYS 2014

Invited lectures

Monday May 12 – 20:45 Chairwoman: T.M. Pollock

Superalloys: Trends, Needs, Challenges, and Opportunities

Maxim Könter

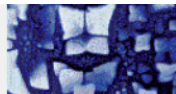
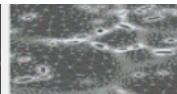
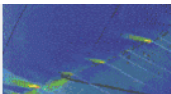
ALSTOM Ltd., Baden, CH

Friday May 16 – 10:50 Chairman: J-Y. Guédou

Mechanisms of Plasticity in Ni Base Superalloys

Loïc NAZE, **Jean-Loup STRUDEL**

Centre des Matériaux, Mines ParisTech, Evry, FR



Tuesday May 13 – 8:40 → 10:20

Deformation and Damage Mechanisms I: Creep

Chairmen : P. Caron & N. Jones

8:40 - Creep Behavior of Thin-Walled Specimens - Experiment and Modelling

Uwe Glatzel¹, Matthias Bensch¹, Rainer Völkl¹, Ernst Affeldt², Niels Warnken³, Atsushi Sato³, Roger C. Reed⁴

¹University Bayreuth, Bayreuth, DE, ²MTU AeroEngines, Munich, DE, ³University Birmingham, Birmingham, GB, ⁴University Oxford, Oxford, GB

9:00 - Modelling of Dislocation Propagation during Creep of Single Crystal Ni-Base Superalloys

S. Masood Hafez Haghghat¹, Zailing Zhu², Franz Roters¹, Roger C. Reed², Dierk Raabe¹

¹Max-Planck-Institut für Eisenforschung, Düsseldorf, DE, ²University of Oxford, Oxford, GB

9:20 - 3D Electron Tomography of Dislocation Substructures which Form during High Temperature and Low stress Creep of a Single Crystal Ni-Base Superalloy

Aleksander Kostka¹, Günther Eggeler²

¹Max-Planck Institute for Iron Research GmbH, Düsseldorf, DE, ²Ruhr-Universität Bochum, Bochum, DE

9:40 - Dislocations in a Ni-Based Superalloy during High Temperature Creep Deformation

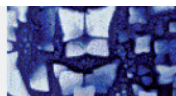
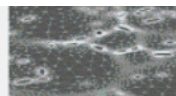
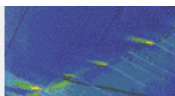
V.A. Vorontsov¹, C.M.F. Rae², L. Kovarik³, M. Mills⁴

¹Imperial College, London, GB, ²Cambridge University, Cambridge, GB, ³Pacific Northwest National Laboratory, Richland, USA, ⁴Ohio State University, Columbus, USA

10:20 - Deformation and Damage Micromechanisms during High Temperature Notched Creep of a Ni-Based Single Crystal Superalloy

Florence Pettinari-Sturmel¹, Muriel Hantcherli¹, Patrick Villechaise², Joel Douin¹, Jonathan Cormier², Zéline Hervier³

¹CEMES-CNRS, Toulouse, FR, ²Institut Pprime, Poitiers, FR, ³Turbomeca – SAFRAN Group, Bordes, FR



Tuesday May 13 – 10:50 → 12:30 Alloy Development I: Ni-Based Alloys Chairpersons : D. Banerjee & J. Esslinger

10:50 - What is the Role of Rhenium in Single-Crystal Superalloys?

Alessandro Mottura¹, Roger C. Reed²

¹University of Birmingham, Birmingham, GB, ²University of Oxford, Oxford, GB

11:10 - High Strength Eutectic Intermetallics

Chandra Sekhar Tiwary, Dipankar Banerjee, Kamanio Chattopadhyay
Indian Institute of Science, Bangalore, IN

11:30 - Compositional Effect on TCP Phase Formation in Ru-containing Ni-Based Single Crystal Superalloys

Qianying Shi¹, Jiajie Huo², Xianfei Ding², Yunrong Zheng², Lamei Cao³, Qiang (Charles) Feng²

¹University of Science and Technology Beijing, Beijing, CN, ²University of Science and Technology Beijing, Beijing, CN, ³Beijing Institute of Aeronautical Materials, Beijing, CN

11:50 - Development of a New 718-type Ni-Co Superalloy Family for High Temperature Applications at 750°C

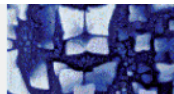
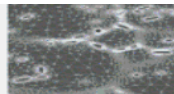
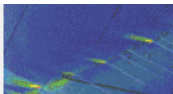
Tatiana Fedorova¹, Joachim Rösler¹, Bodo Gehrman², Jutta Klöwer²

¹Technische Universität Braunschweig, Braunschweig, DE, ²Outokumpu VDM GmbH, Werdohl, DE

12:10 - Mechanical Properties and Development of Supersolvus Heat Treated New Nickel Base Superalloy AD730™

Alexandre Devaux¹, Leif Berlin², Louis Thébaud¹, Romain Delattre³, Coraline Crozet¹, Olivier Nodin³

¹Aubert & Duval, Les Ancizes, FR, ²Siemens Industrial Turbomachinery AB, Finspong, SE, ³Aubert & Duval, Pamiers, FR



Tuesday May 13 – 14:00 → 15:40
Alloy Development II: Co-Based Alloys
Chairmen : S. Drawin & A. Suzuki

14:00 - Recent Progress in Co-base Superalloys-Phase Equilibria and Applications

Kiyohito Ishida

Tohoku University, Sendai, JP

14:20 - Vacuum Induction Melting and Vacuum Arc Remelting of Co-Al-W-X Gamma-Prime Superalloys

Erin McDevitt

ATI Allvac, Monroe, USA

14:40 - Influence of Rhenium in γ' -Strengthened Co-Base Superalloys

Christopher Zenk, Holger Rammensee, Steffen Neumeier, Mathias Göken
FAU Erlangen-Nürnberg, Erlangen, DE

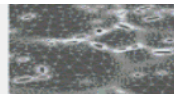
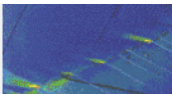
15:00 - Mechanical Properties of Co-Based Alloys with L_{12} Cuboidal Precipitates

Okamoto Norihiko

Kyoto University, Kyoto, JP

15:20 - The Properties of New Co-Base Superalloy Single Crystals

Mike Titus¹, Alessandro Mottura², Yolita Eggeler¹, Robert Rhein¹, Tresa Pollock¹
¹Univ of California Santa Barbara, Santa Barbara CA, USA, ²University of Birmingham, Birmingham, GB



Tuesday May 13 – 16:10 → 17:50

Deformation and Damage Mechanisms II: Fatigue, Oxidation and Crack Propagation

Chairmen : P. Villechaise & J. Zhang

16:10 - High temperature Oxidation of Polycrystalline γ' -Strengthened Co-Base Superalloys of the System Co-Al-W-B

Leonhard Klein, Sannakaisa Virtanen
University of Erlangen-Nürnberg, Erlangen, DE

16:30 - The Laboratory Assessment of High Temperature Corrosion-Fatigue in a Nickel Based Superalloy: Simulating SO₂ Environments

Andrew Girling, Hollie Rosier, Karen Perkins, Paul Jones
Swansea University, Swansea, GB

16:50 - Crack Initiation and Propagation in a New Disc Alloy under Fatigue-Oxidation Conditions

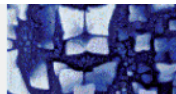
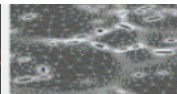
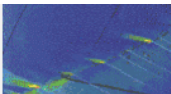
Rong Jiang, Nong Gao, Philippa Reed
University of Southampton, Southampton, GB

17:10 - Mechanisms of Dwell Fatigue Crack Growth in an Advanced Nickel Disk Alloy RR1000

S.Y. Yu¹, H.Y. Li¹, M.C. Hardy², S.A. McDonald³, P. Bowen¹
¹The University of Birmingham, Birmingham, GB, ²Rolls-Royce plc, Derby, GB,
³University of Manchester, Manchester, GB

17:30 - Combining *In-situ* Micromechanical Testing and Advanced EBSD Analyses to Measure and Understand the Crack Propagation Resistance of Individual Grain Boundaries in Inconel 718

Nathalie Bozzolo¹, Farangis Ram², Peter Konijnenberg², K.G. Pradeeg², Stefan Zaefferer²
¹CEMEF Mines ParisTech, Sophia Antipolis, FR, ²Max-Planck-Institute for Iron Research, Düsseldorf, DE



Wednesday May 14 – 8:40 → 10:20

Mechanical Behavior I: Fatigue

Chairmen : E. Andrieu & M. Stockinger

8:40 - Low Cycle Fatigue Behavior and Microstructure Evolution of the Fine-Grained Alloy 718

Shamil Mukhtarov

Institute for Metals Superplasticity Problems RAS, Ufa, RU

9:00 - Toward a Better Understanding of Strain Incompatibilities at Grain Boundaries in the Analysis of Fatigue Crack Initiation at Low Temperature in the Udimet 720Li Superalloy

Baptiste Larrouy¹, Patrick Villechaise¹, Jonathan Cormier¹, Olivier Berteaux²

¹Institut Prime Poitiers, FR, ²Turbomeca – SAFRAN Group, Bordes, FR

9:20 - The Effect of Minimum Dwell Cycling on the Environmental and Fatigue Response of RR1000

James O'Hanlon¹, Mark Hardy², Ben Foss³, Martin Bache¹

¹Swansea University, Swansea, GB, ²Rolls-Royce plc, Derby, GB, ³Imperial College, London, GB

9:40 - Oxide-Assisted Crack Growth in Hold-Time Low-Cycle-Fatigue of Single-Crystal Superalloys

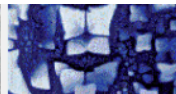
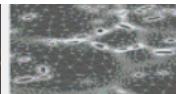
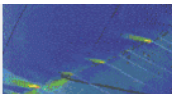
Akane Suzuki¹, Gao Yan¹, Don Lipkin¹, Anjali Singhal¹, Matthew Krug², Douglas Konitzer², Jonathan Almer³, Tresa Pollock⁴, Bernard Bewlay¹

¹GE Global Research, Niskayuna, NY, USA, ²GE Aviation, Cincinnati, USA, ³Argonne National Laboratory, Argonne, USA, ⁴University of California Santa Barbara, Santa Barbara, USA

10:00 - Hold-Time Low Cycle Fatigue of Single Crystal Superalloys: a Review

Wei-Jun Zhang

GE Aviation, Cincinnati, USA



Wednesday May 14 – 10:50 → 12:30

Native Defects and Precipitates Evolutions in Single Crystal Alloys

Chairpersons : R. Singer & N. Bozzolo

10:50 - Microstructural Damage Evolution in Two Ni Based Superalloys Subjected to Different Mechanical Loading Conditions through Quantitative EBSD Measurements using CrossCourt Software

Erica Vacchieri¹, Alessio Costa¹, Simona Parodi², Stuart Richard Holdsworth³
¹Ansaldo Energia S.p.A., Genoa, IT, ²University of Genoa, Genoa, IT, ³EMPA, Dübendorf, CH

11:10 - Development of a New Freckle Criterion for Technical Remelting Processes

Bernd Böttger¹, Georg J. Schmitz¹, Franz-Josef Wahlers², Jutta Klöwer², Jürgen Tewes², Bodo Gehrmann²
¹Access, Aachen, DE, ²Outokumpu VDM GmbH, Werdohl, DE

11:30 - Origins of Misorientation Defects in Single Crystal Castings: a Time Resolved In Situ Synchrotron X-Ray Radiography Study

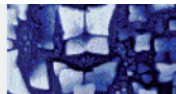
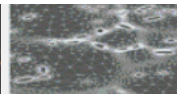
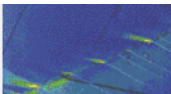
John Aveson¹, Guillaume Reinhart², Henri Nguyen-Thi², Nathalie Mangelinck-Noël², Neil D'Souza³, Howard Stone¹
¹University of Cambridge, Cambridge, GB, ²Aix-Marseille University, Marseille, FR, ³Rolls-Royce plc., Derby, GB

11:50 - Probing the Strain Distribution within a Single Crystal Superalloy during HT Testing

Alain Jacques¹, Mohamed Biskri¹, Thomas Schenk¹, Jean Philippe Chateau - Cornu¹, Pierre Bastie²
¹IJL, Nancy, FR, ²Université de Grenoble, Grenoble, FR

12:10 - Origin of Localised Rafting in Single Crystal Ni-Based Superalloy Turbine Blades before Service: a Tomography-Driven Diffraction Study

Stéphane Pierret¹, Thomas Etter², Alexander Evans³, Steven Van Petegem⁴, Helena Van Swygenhoven⁵
¹Snecma - SAFRAN Group, Moissy-Cramayel, FR, ²ALSTOM Ltd, Baden, CH, ³Institut Laue Langevin, Grenoble, FR, ⁴Paul Scherrer Institute, Villigen, CH, ⁵Ecole Polytechnique Fédérale de Lausanne, Lausanne, CH



Thursday May 15 – 8:40 → 10:20

Mechanical Behavior II: Single Crystal Alloys

Chairmen : G. Eggeler & T. Etter

8:40 - The Lattice Misfit and Creep Strength of γ/γ' Co-Base Superalloys in Comparison with Ni-Base Superalloys

Steffen Neumeier, Christopher Zenk, Alexander Bauer, Lisa Freund, Mathias Göken
University of Erlangen-Nuremberg, Erlangen, DE

9:00 - Effect of Secondary Orientation on Mechanical Properties of a Nickel-Base Single Crystal Superalloy

Li Wang, Zhongjiao Zhou, Jian Shen, Langhong Lou, Jian Zhang
Institute of Metal Research, Chinese Academy of Sciences, Shenyang, CN

9:20 - Transverse Creep Studies of Misoriented Grains in René N4 and GTD444 Superalloy Bicrystals

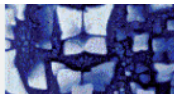
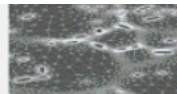
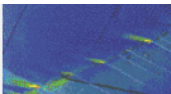
Jean-Charles Stinville, Kaitlin Gallup, Tresa M. Pollock
University of California Santa Barbara, Santa Barbara, USA

9:40 - Impact of the Alloy's Chemistry on the Creep Properties under Thermal Cycling Conditions of Ni-Based Single Crystal Superalloys

Zéline Hervier¹, Rémi Giraud¹, Jonathan Cormier²
¹Turbomeca – SAFRAN Group, Bordes, FR, ²Institut Pprime, Poitiers, FR

10:00 - Thermomechanical Fatigue in Single Crystal Superalloys

Johan Moverare¹, Roger Reed²
¹Linköping University, Linköping, SE, ²University of Oxford, Oxford, GB



Thursday May 15 – 10:50 → 12:30
Recrystallization and Grain Growth
Chairpersons : E. Balikçi & H. Schaff

10:50 - Application of Laser Ultrasonic for the Evolution of Microstructure in INCO718 Superalloy

Jean-Hubert Schmitt¹, Thomas Garcin², Matthias Militzer²

¹Ecole Centrale Paris, Chatenay-Malabry, FR, ²The University of British Columbia, Vancouver, CA

11:10 - Solutions to the Hard-to-Deformed Wrought Superalloys

Ji Zhang, Xuedong Lu, Beijiang Zhang, Zhongnan Bi

China Iron and Steel Research Institute Group, Beijing, CN

11:30 - A study on the Effect of Composition, and the Mechanisms of Recrystallisation in Single Crystal Ni-Based Superalloys

Harshal Mathur¹, Neil (C.N.) Jones², Catherine M.F. Rae³

¹FAU Erlangen-Nürnberg, Erlangen, DE, ²Rolls-Royce plc, Derby, GB, ³University of Cambridge, Cambridge, GB

11:50 - Characterisation of Abnormal Grain Coarsening in Alloy 718

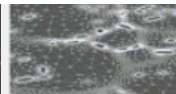
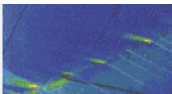
Richard Watson¹, Michael Preuss¹, João Quinta da Fonseca¹, Thomas Witulski², Gregor Terlinde², Markus Büscher²

¹University of Manchester, Manchester, GB, ²Otto Fuchs, Meinerzhagen, DE

12:10 - Full Field Modelling of Recrystallization in Superalloys thanks to Level-Set Method

Marc Bernacki¹, Nathalie Bozzolo¹, Roland Logé¹, Yuan Jin¹, Andrea Agnoli¹, Ana-Laura Fabiano¹, Anthony D. Rollett², Greg S. Rohrer², Jean-Michel Franchet³, Johanne Laigo³

¹CEMEF Mines ParisTech, Sophia Antipolis, FR, ²Carnegie Mellon University, Pittsburgh, USA, ³Snecma-SAFRAN Group, Colombes, FR



Thursday May 15 – 14:00 → 15:30
Process – Microstructure Interactions
Chairmen : L. Nazé & C. O'Brien

14:00 - About the Annealing Twin Density Evolution during Grain Growth in the Inconel 718 Superalloy

Yuan Jin¹, Marc Bernacki¹, Andrea Agnoli¹, Brian Lin², Gregory S. Rohrer², Anthony D. Rollett², Nathalie Bozzolo¹

¹CEMEF Mines-ParisTech, Sophia Antipolis, FR, ²Carnegie Mellon University, Pittsburgh, USA

14:20 - High temperature Behaviour of Liquid Ni-Based Alloys with Oxide Ceramics

Natalia Sobczak¹, Robert Purgert², Jerzy J. Sobczak¹, Rafal Nowak¹, Marta Homa¹, Grzegorz Bruzda¹, Bartłomiej Korpala¹

¹Foundry Research Institute, Krakow, PL, ²Energy Industries of Ohio, Independence, USA

14:40 - Tailoring the Grain Structure of IN718 during Selective Electron Beam Melting

Carolin Körner, Harald Helmer, Andreas Bauereiß, Robert F. Singer
University of Erlangen-Nuremberg, Erlangen, DE

15:00 - Effect of Heat Treatment on the Subsurface Microstructure and Microhardness of Broached Ni-based Superalloy Inconel 718

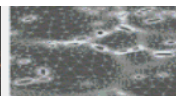
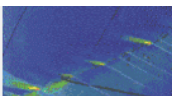
Zhe Chen¹, Ru Lin Peng¹, Pajazit Avdovic², Jinming Zhou³, Johan Moverare¹, Fredrik Karlsson², Sten Johansson¹

¹Linköping University, Linköping, SE, ²Siemens Industrial Turbomachinery AB, Finspång, SE, ³Lund University, Lund, SE

15:20 - Hot isostatic Pressing of Single-Crystal Ni-Base Superalloys: Mechanism of Pore Closure and Effect on Mechanical Properties

Alexander Epishin¹, Thomas Link¹, Bernard Fedelich², Igor Svetlov³

¹Technical University of Berlin, Berlin, DE, ²Federal Institute for Materials Research and Testing (BAM), Berlin, DE, ³All-Russian Institute of Aviation Materials (VIAM), Moscow, RU



Thursday May 15 – 16:10 → 17:50

Precipitation

Chairpersons : J. Cormier & C.M.F. Rae

16:10 - On the Evolution of TCP Phase Chemistry and Crystallography during Creep of the Single Crystal Superalloy ERBO 1

Alireza B. Parsa¹, Aleksander Kostka², Philip Wollgramm¹, Hinrich Buck¹, Christoph Somsen¹, Gunther Eggeler¹

¹Ruhr-Universität Bochum, Bochum, DE, ²Max-Planck Institute for Iron Research GmbH, Dusseldorf, DE

16:30 - The effect of Ru on Precipitation of Topologically Close Packed Phases in Re - Containing Ni Base Superalloys: Quantitative FIB - SEM Investigation and 3D Image Modeling

*Kamil Matuszewski, Ralf Rettig, Robert Singer
University of Erlangen-Nuremberg, Erlangen, DE*

16:50 - On the Composition-Size Relationships of γ' Precipitates in an Advanced Ni-Based Superalloy

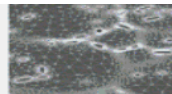
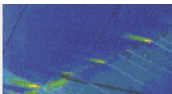
*Yiqiang Chen, Elisabeth Francis, Edward Lewis, Michael Preuss, Sarah Haigh
The University of Manchester, Manchester, GB*

17:10 - Evolution of Secondary Phases in Alloy ATI 718Plus® during Processing

*Ana Casanova¹, Nuria Martín Piris², Robert Krakow¹, Mark C. Hardy³, Catherine M.F. Rae¹
¹University of Cambridge, Cambridge, GB, ²Escuela de Ingeniería Aeronáutica y del Espacio, Madrid, ES, ³Rolls-Royce plc, Derby, GB*

17:30 - γ' Precipitation Kinetics in the Powder Metallurgy Superalloy N19 and Influence of the Precipitation Latent Heat

*Mikael Perrut, Didier Locq
Onera - The French Aerospace Lab, Châtillon, FR*



Friday May 16 – 8:40 → 10:20

Mechanical behavior III: Polycrystalline Alloys

Chairmen : R.C. Reed & U. Glatzel

8:40 - Effect of Initial γ' Particle Size on Creep Strength of a Wrought Ni-Fe Based Superalloy Designed for A-USC Rotor

Masao Takeyama¹, Tatsuya Takahashi²

¹Tokyo Institute of Technology, Tokyo, JP, ²The Japan Steel Works Ltd., Muroran, JP

9:00 - Effect of the Metallurgical State on the Mechanical Behaviour of 718 Ni-Based Superalloy according to the Tensile Specimen Thicknesses

Damien Texier, Daniel Monceau, Eric Andrieu

CIRIMAT, Toulouse, FR

9:20 - Thresholds of Intergranular Crack Growth in a Nickel Disc alloy 720Li

Hangyue Li¹, Joe Fisk¹, Tim Doel¹, Lik-Beng Lim², Steve Williams², Paul Bowen¹

¹The University of Birmingham, Birmingham, GB, ²Rolls-Royce plc., Derby, GB

9:40 - Thermomechanical Behavior of Different Ni-Base Superalloys during Cyclic Loading at Elevated Temperatures

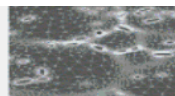
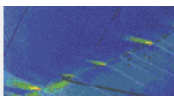
Daniel Huber², Matthias Hacksteiner¹, Cecilia Poletti¹, Fernando Warchomicka³, Martin Stockinger², Christof Sommitsch¹

¹Graz University of Technology, Graz, AT, ²Böhler Schmiedetechnik GmbH & Co KG, Kapfenberg, AT, ³Vienna University of Technology, Vienna, AT

10:00 - Residual Stresses in Inconel 718 Engine Disks

Yoann Dahan, Sébastien Nouveau, Eric Georges

Aubert & Duval, Pamiers, FR



Posters

Poster sessions #1: Tuesday May 13 – 18:00 → 19:45

Poster sessions #2: Thursday May 15 – 18:00 → 19:45

All posters will be displayed throughout the Symposium

Precipitation

0097 Atom Probe Tomographic Study of γ' Precipitation in Single Crystal Ni-Based AM1 Superalloy

Xipeng Tan¹, Luc Rougier², Damien Ponsen⁴, Dominique Mangelinck¹, Carine Perrin-Pellegrino¹, Charles-André Gandin³, Alain Jacot², Paolo Di Napoli², Virginie Jaquet⁴

¹Université Aix-Marseille, Marseille, FR, ²Ecole Polytechnique Fédérale de Lausanne, Lausanne, CH, ³CEMEF MINES ParisTech, Sophia Antipolis, FR, ⁴Snecma-SAFRAN Group, Colombes, FR

0042 Metallurgical Optimization of PM Superalloy N19

Didier Loco¹, Loïc Nazé², Jean-Michel Franchet³, Pierre Caron¹, Alice Dumont², Alain Köster², Jean-Yves Guédou⁴

¹Onera – The French Aerospace Lab, Châtillon, FR, ²CdM Mines ParisTech, Evry, FR, ³Snecma-SAFRAN Group, Colombes, FR, ⁴Snecma-SAFRAN Group, Moissy-Cramayel, FR

0112 Fine Microstructural Characterization of INCONEL 718

Cédric Bellot¹, Fabio Taina², Pascal Lamesle², Denis Delagnes², Philippe Lours²

¹ACRDM, Albi, FR, ²Institut Clément Ader, Albi, FR

0117 On the Evolution of TCP Phase Chemistry and Crystallography during Creep of the Single Crystal Superalloy ERBO 1

Alireza B. Parsa¹, Aleksander Kostka², Philip Wollgramm¹, Hinrich Buck¹, Christoph Somsen¹, Gunther Eggeler¹

¹Ruhr-Universität Bochum, Bochum, DE, ²Max-Planck Institute for Iron Research GmbH, Dusseldorf, DE

0118 Large Scale 3-D Phase-Field Simulation of Coarsening in Ni-Base Superalloys

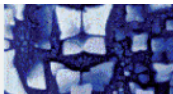
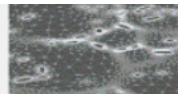
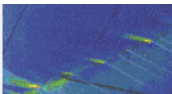
Mohan Kumar Rajendran, Oleg Shchyglo, Ingo Steinbach

Ruhr-Universität, Bochum, DE

0123 A TEM - EDS Study for the Element Partition in Precipitates and Matrix in the Superalloy IN738LC

Ercan Balıkcı¹, Ozgur Duygulu²

¹Bogazici University, Istanbul, TR, ²TÜBITAK - MAM, Gebze, TR



Precipitation (continued)

0133 Microstructural and Mechanical Investigations on ATI Allvac 718PLUS

Loïc Nazé¹, Meriadeg Revaud¹, Alain Koster¹, Luc Rémy¹, Jean-Michel Franchet³, Jean-Yves Guédou²

¹CdM Mines ParisTech, Évry, FR, ²Snecma-SAFRAN Group, Moissy-Cramayel, FR, ³Snecma-SAFRAN Group, Colombes, FR

0151 High Resolution Orientation Mapping of Secondary Phases in ATI 718Plus®

Robert Krakow¹, Mark C. Hardy², Catherine M.F. Rae¹, Paul A. Midgley¹

¹University of Cambridge, Cambridge, GB, ²Rolls-Royce plc, Derby, GB

0162 Numerical Simulation of AM1 Microstructure

Luc Rougier¹, Alain Jacot¹, Charles-André Gandin², Paolo Di Napoli¹, Damien Ponsen³, Virginie Jaquet³

¹EPFL, Lausanne, CH, ²CEMEF Mines ParisTech, Sophia Antipolis, FR, ³Snecma-SAFRAN Group, Colombes, FR

0173 Examination of Chemical Elements Partitioning between the γ and γ' Phases in CMSX-4 Superalloy using EDS microanalysis and electron tomography methods

Beata Dubiel, A. Kruk, A. Czyrska-Filemonowicz

AGH University of Science and Technology, Krakow, PL

0181 Modelling Ternary Effects on Antiphase Boundary Energies in Ni₃Al

K.V. Vamsi, S. Karthikeyan

Indian Institute of Science, Bangalore, IN

0205 Orientation Effect on Discontinuous Precipitation along the Boundary of Second and Third Generation Single Crystal Superalloys

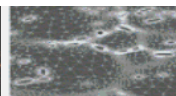
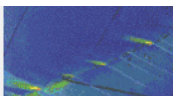
Zhengrong Yu¹, Yunrong Zheng¹, Lamei Cao², Qiang Feng¹

¹University of Science and Technology Beijing, Beijing, CN, ²Beijing Institute of Aeronautical Materials, Beijing, CN

0215 Solution and Aging of the MAR-M246 Nickel-Based Superalloy

Renato Baldan, Carlos Nunes

University of São Paulo, Lorena, BR



Recrystallisation and grain growth

0118 Multipass Forging of Inconel 718 in the Delta-Supersolvus Domain: Assessing and Modeling Microstructure Evolution

Meriem Zouari², Sébastien Rousselle¹, Nathalie Bozzolo¹, Roland Logé¹

¹CEMEF Mines ParisTech, Sophia Antipolis, FR, ²Manoir Aerospace-Forges De Bologne, Chaumont, FR

0128 Grain Structure Prediction for Investment Casting of Nozzle Guide Vanes

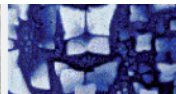
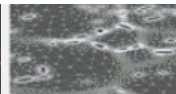
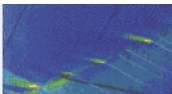
Ole Koeser¹, Agustin Torroba², Efrain Carreño-Morelli², Andrea Carosi³, Laura Maestro⁴, Irene Jimenez⁴, Mehdi Rahimian⁶, Srdjan Milenkovic⁶

¹Calcom ESI SA, Lausanne, CH, ²University of Applied Sciences and Arts - Western Switzerland, Sion, CH, ³Precicast Novazzano SA, Novazzano, CH, ⁴Precicast Bilbao SA, ES, ⁵Industria Turbo Propulsores SA, Zamudio, ES, ⁶Instituto Madrilenio de Estudios Avanzados de Materiales, Getafe, ES

0154 Prediction of Recrystallisation in Single Crystal Nickel-Based Superalloys during Investment Casting

Chinnapat Panwisawas¹, Duncan Putman², Roger C. Reed³

¹The University of Birmingham, Birmingham, GB, ²Rolls-Royce plc, Derby, GB, ³University of Oxford, Oxford, GB



Process Microstructure interactions

0029 Effect of Liquid-Metal Cooling Process on Fatigue Properties of Directionally Solidified Ni-Base Superalloys

Dong Wang, Zhidong Fan, Chang Liu, Gong Zhang, Jian Shen, Langhong Lou, Jian Zhang

Institute of Metal Research, Chinese Academy of Sciences, Shenyang, CN

0007 Turbine Blades Production Technique Equipment Built with a Glance of some High-Gradient Directional Crystallization Process Nature

Alexander Echin, Yury Bondarenko

FSUE "All Russian Scientific Research Institute of Aviation Materials (VIAM)", Moscow, RU

0027 Selective Electron Beam Melting of CMSX-4

Carolin Körner, Markus Ramsperger

University of Erlangen-Nuremberg, Erlangen, DE

0049 Investigation on the Freckle Formation Affected by Geometry Features in Directionally Solidified Superalloy Components

Dexin Ma¹, Jianping Hong¹, Fu Wang¹, Bührig-Polaczek Andreas¹

¹RWTH, Aachen, DE, ²Shanghai Jiao Tong University, Shanghai, CN, ³Northwestern Polytechnical University, Xi'an, CN

0050 Microstructure Investigation of the Superalloy Samples Directionally Solidified in the Thin Shell Casting (TSC) Process

Fu Wang, Dexin Ma, Hao Lu, Andreas Bührig-Polaczek

RWTH, Aachen, DE

0081 Thermal History Prediction Modelling Tool for Investment Casting

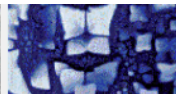
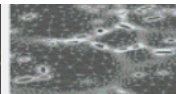
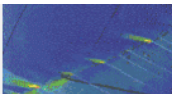
Laura Maestro¹, Aitor Eguidazu¹, Iñaki Vicario¹, Jose Agustin Torroba², Efrain Morelli², Ole Koeser⁴, Andrea Carosi³

¹Precicast Bilbao S.A, Barakaldo, ES, ²University of Applied Sciences and Arts, Sion, CH, ³Precicast Novazzano S.A, Novazzano, CH, ⁴Calcom ESI S.A, Lausanne, CH

0084 Optimisation of the Homogenisation and Hot Isostatic Pressing Treatments of a Fourth Generation Single Crystal Superalloy

Pierre CARON, Catherine RAMUSAT

ONERA – The French Aerospace Lab, Châtillon, FR



Process

Microstructure interactions (continued)

0098 Weldability of HAYNES 282 Superalloy after Long-Term Thermal Exposure

Jeremy Caron, Lee Pike

Haynes International Inc., Kokomo, USA

0132 Influence of Microstructure and Crystallographic Orientation on the Plasma Assisted Nitriding at 400°C of Udimet® 720Li and MC2 Alloys

Sébastien Chollet, Luc Pichon, Jonathan Cormier, Dubois Jean-Baptiste, Patrick Villechaise, Claude Templier

Institut Pprime, Chasseneuil, FR

0138 Effect of solidification parameters on the dendrite arm spacing in MAR M-247

Srdjan Milenkovic¹, Mehdi Rahimian¹, Ilchat Sabirov¹, Laura Maestro²

¹IMDEA Materials Institute, Getafe, ES, ²Precicast Bilbao, S.A., Bilbao, ES

0139 Dissolution Kinetics and Morphological Changes of γ' in AD730 Superalloy

Fatemeh Masoumi¹, Mohammad Jahazi¹, Jonathan Cormier²

¹École de technologie supérieure (ETS), Montreal, CA, ²ISAE-ENSMA, Chasseneuil, FR

0140 Improvement of Creep and Low Cycle Fatigue Properties for Single-Crystal Nickel-Base Superalloys by a Liquid Metal Cooling Solidification Process

Susanne Steuer¹, Jonathan Cormier¹, Tresa Pollock², Patrick Villechaise¹, Zeline Hervier³, Damien Ponsen⁴

¹Institut Pprime, Chasseneuil, FR, ²University of California Santa Barbara, Santa Barbara, USA, ³Turbomeca - SAFRAN Group, Bordes, FR, ⁴Snecma - SAFRAN Group, Colombes, FR

0144 Effect of the cooling rate during heat treatment and hot isostatic pressing on the microstructure of a SX Ni-superalloy

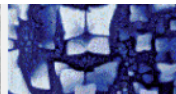
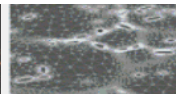
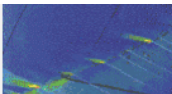
Inmaculada Lopez-Galilea, Stephan Huth, Werner Theisen

Ruhr-Universität Bochum, Bochum, DE

0145 Simulation of the External Pressure Influence on the Microstructural Evolution of a SX Ni-Based Superalloy

Inmaculada Lopez-Galilea, Stephan Huth, Werner Theisen, Ingo Steinbach

Ruhr-Universität Bochum, Bochum, DE



Process

Microstructure interactions (continued)

0160 Weldability of Superalloys Haynes 188 and Hastelloy X by Nd: YAG Laser

J r mie Graneix, Yannick Balcaen, Jean-Denis Beguin, Joel Alexis, Talal Masri
Universit  de Toulouse, Tarbes, FR

0163 Effect of Homogenization Treatment on the Microstructure and Properties of Low Thermal Expansion Superalloy

Lianxu Yu, Wenru Sun, Weihong Zhang, Fang Liu, Xin Xin, Shouren Guo, Zhuangqi Hu
Institute of Metal Research, Chinese Academy of Sciences, Shenyang, CN

0169 Electropolishing of CMSX-4 Turbine Blades using Deep Eutectic Solvents to Remove Surface Oxides and selectively Modify Surface Structure

Neil D'Souza¹, Karl Ryder², Robert Harris², Matthew Appleton¹, Amy Cook²
¹Rolls Royce plc, Derby, GB, ²University of Leicester, Leicester, GB

0183 Effect of Carbon on Wettability and Interfacial Reaction between Molten Superalloy and Ceramic Mould

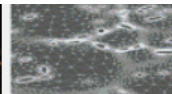
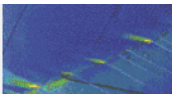
Yizhou Zhou, Xiaoyan Chen, Tao Jin, Xiaofeng Sun
Institute of Metal Research, Chinese Academy of Sciences, Shenyang, CN

0188 Effect of Repeated Solution Cycles on INCO 718 Castings

Borja Barasoain, Oscar Caballero
Industria de Turbopropulsores S.A., Zamudio, ES

0212 Microstructural Investigations on IN718 Manufactured by Selective Laser Melting

Johannes Str  bner, Uwe Glatzel
University Bayreuth, Bayreuth, DE



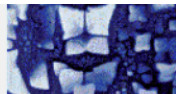
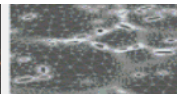
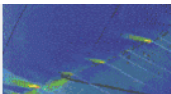
Native defects and precipitate evolution in single crystals

0072 *The role of Particle Ripening in Accelerating the Creep of Nimonic 263*

Giuliano Angella, Riccardo Donnini, Maurizio Maldini, Dario Ripamonti
CNR-IENI, Milan, IT

0093 *High Temperature Elastic Properties and Lattice Misfit Investigations of Nickel-Base Superalloys ERBO1 and LEK94*

Kathrin Demtröder, Hinrich Buck, Philip Wollgramm, Jürgen Schreuer
Ruhr-University Bochum, Bochum, DE



Deformation and damage mechanisms I: Creep

0056 Negative Creep of Ni-Base Superalloys

Svenja Kinzel, Rainer Völkl, Uwe Glatzel

University Bayreuth, Bayreuth, DE

0107 TEM Analysis of Localized, Planar Deformation Events which Govern Creep of Single Crystalline CoNi-Superalloys with γ/γ' Microstructures

Yolita Eggeler¹, Julian Müller¹, Michael Titus², Akane Suzuki³, Tresa Pollock², Erdmann Spiecker¹

¹University of Erlangen-Nürnberg, Erlangen, DE, ²University of California Santa Barbara, Santa Barbara, USA, ³GE Global Research Center, Niskayuna, USA

0116 Simultaneous Strain and Chemical mapping by CBED-EDXS of CMSX-4

Julian Müller, Florian Niekieł, Erdmann Spiecker

University of Erlangen-Nürnberg, Erlangen, DE

0122 Relating Fundamental Creep Mechanisms in Waspaloy to the Wilshire Equations

Christopher Deen¹, Will Harrison¹, Mark Whittaker¹, Steve Williams²

¹Swansea University, Swansea, GB, ²Rolls-Royce plc, Derby, GB

0127 TEM Characterization of the Microstructure and Deformation Micromechanisms of New Ni-Based Polycrystalline Superalloys

Muriel Hantcherli¹, Florence Pettinari-Sturmel¹, Patrick Villechaise², Joël Douin¹, Jonathan Cormier², Alexandre Devaux³

¹CEMES-CNRS, Toulouse, FR, ²Institut PPrime, Chasseneuil, FR, ³Aubert & Duval, Les Ancizes, FR

0168 Observation of Dislocation Evolution during Straining of a $\gamma-\gamma'$ Superalloy Single Crystal using the CECCI technique.

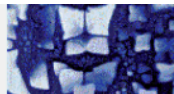
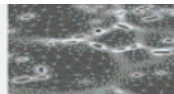
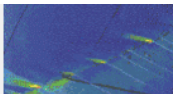
Stefan Zaefferer¹, Zailing Zhu², Roger Reed²

¹Max-Planck-Institut für Eisenforschung, Düsseldorf, DE, ²University of Oxford, Oxford, GB

0186 Thermal Stability and Creep Strength of Allvac718Plus

Martin Pröbstle¹, Steffen Neumeier¹, Daniela Hünert², Mathias Göken¹

¹University Erlangen-Nürnberg, DE, ²Rolls Royce Deutschland Ltd. & Co. KG, Blankenfelde-Mahlow, DE



Deformation and damage mechanisms I: Creep

0194 Deformation Structures in Crept Co-Base Superalloys Hardened by L₁₂-intermetallic Precipitates

Florian Pyczak¹, Alexander Bauer³, Mathias Göken³, Uwe Lorenz¹, Steffen Neumeier³, Michael Oehring¹, Norbert Schell¹, Felix Symanzik²

¹Helmholtz-Zentrum Geesthacht, Geesthacht, DE, ²Helmut Schmidt Universität, Hamburg, DE, ³Universität, Erlangen, DE

0201 Dislocations in Strong Internal Stress Fields: γ - γ' in Ni Base Alloys

Hyung Jun Chan¹, Marc Fivel², Jean-Loup Strudel³

¹IMDEA Materials, Madrid, ES, ²SIMaP-GPM2, Grenoble, St Martin d'Hères, Grenoble, FR, ³CdM Mines-ParisTech, Evry, FR

0202 Multiscale Modeling of Suzuki Strengthening in γ' Precipitates in Ni- and Co-Base Superalloys

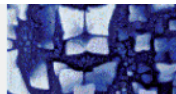
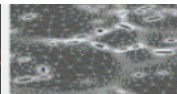
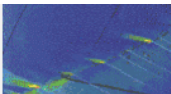
P. Srimannarayana, Sri Raghunath Joshi, K.V. Vamsi, S.K. Verma, S. Karthikeyan
Indian Institute of Science, Bangalore, IN

0204 Nanoscale Characterization of Creep-Induced Elemental Redistribution in a Single-Crystalline Ni-Based Superalloy

Ivan Povstugar, Pyuck-Pa Choi, Aleksander Kostka, Dierk Raabe
Max-Planck-Institut für Eisenforschung, Düsseldorf, DE

0210 Atomistic Investigations of Co-based superalloys - From Density Functional Theory to Structure Maps

Jörg Koßmann, Ralf Drautz, Thomas Hammerschmidt
Ruhr-Universität Bochum, Bochum, DE



Deformation and damage mechanisms II: fatigue, oxidation, crack propagation

0009 A study on Fatigue Crack Initiation in a Polycrystalline Nickel-Based Superalloy by Micro-Mechanical Modelling and In-Situ SEM Experiments

Markus Fried¹, Christian Krechel³, Heinz-Werner Höppel², Ernst Affeldt¹, Björn Eckert¹, Mathias Göken²

¹MTU Aero Engines AG, München, DE, ²University of Erlangen-Nürnberg, Erlangen, DE, ³Zentralinstitut für Neue Materialien und Prozesstechnik ZMP, Fürth, DE

0030 Dynamic Strain Aging During Cyclic Deformation of Haynes 282 Superalloy

Magnus Hömqvist, Ceena Joseph, Christer Persson
Chalmers University of Technology, Gothenburg, SE

0062 Thermal Fatigue of Single Crystal Superalloys: Experiments, Crack Initiation and Crack Propagation Criteria

Leonid Getsov¹, Semenov²

¹NPO ZKTI, St. Petersburg, RU, ²Polytechnical University, St. Petersburg, RU

0075 Oxidation of Nickel-Based Superalloys: Modelling & Validation

Yilun Gong, Roger Reed
University of Oxford, Oxford, GB

0091 Fatigue Crack Propagation from In-Service and Handling Surface Anomalies in a Nickel Based Superalloy at High Temperature

Stéphane Gourdin¹, Yves Nadot¹, Gilbert Hénaff¹, Luc Doremus¹, Stéphane Pierret²

¹Institut Pprime, Chasseneuil, FR, ²Snecma-SAFRAN Group, Moissy Cramayel, FR

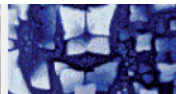
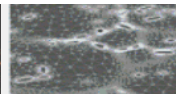
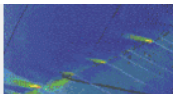
0114 Oxidation of Co-base Superalloys - Initiation Stages and Elementary Processes

Martin Weiser, Sannakaisa Virtanen
University of Erlangen-Nürnberg, Erlangen, DE

0119 Simulation of Oxidation-Nitridation-Induced Microstructural Degradation in a Cracked Ni-Based Superalloy at High Temperature

Kang Yuan¹, Ru Lin Peng¹, Xin-Hai Li², Sten Johansson¹, Yan-Dong Wang³

¹Linköping University, Linköping, SE, ²Siemens Industrial Turbomachinery AB, Finspång, SE, ³University of Science and Technology Beijing, Beijing, CN



Deformation and damage mechanisms II: fatigue, oxidation, crack propagation

0148 Strain Rate and Temperature Effects on Crack Initiation of Inconel 718 Direct Aged

Maxime Perrais¹, Dominique Poquillon¹, Eric Andrieu¹, Anthony Burteau²

¹CIRIMAT, Toulouse, FR, ²Snecma-SAFRAN Group, Moissy-Cramayel, FR

0209 Cyclic Plasticity and Lifetime of the Nickel-Based Alloy C-263: Experiments, Models and Component Simulations

Gerhard Maier¹, Oliver Hübsch¹, Hermann Riedel¹, Christoph Somsen²,

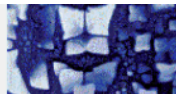
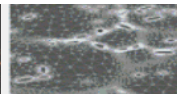
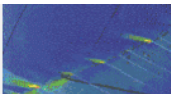
Jutta Klöwer³, Ralf Mohrmann⁴

¹Fraunhofer Institute for Mechanics of Materials, Freiburg, DE, ²Ruhr-Universität Bochum, Bochum, DE, ³OutoKumpu VDM GmbH, Altena, DE, ⁴RWE Technology GmbH, Essen, DE

0211 Fatigue Crack Growth of MAR-M247 CC (HIP) - Experiments and Modeling

Christoph Schweizer, Michael Schlesinger

Fraunhofer Institute for Mechanics of Materials, Freiburg, DE



Alloy development I: Ni base

0010 Development of Advanced P/M Ni-Base Superalloys for Turbine Disks

Gerhikh Garibov, Nina Grits, Alexey Vostrikov, Elizaveta Fedorenko, Alexander Volkov

All-Russia Institute of Light Alloys Stock Co., Moscow, RU

0037 New Single Crystal Superalloys - Overview and Update

Jacqueline Wahl, Ken Harris

Cannon-Muskegon Corporation, Muskegon, USA

0089 Electronic Properties and Diffusion Behavior of Refractory Elements in Ni-Base Superalloys: a Combined DFT + kMC Approach.

Sergej Schuwalow, Jutta Rogal, Ralf Drautz

Ruhr University Bochum, Bochum, DE

0094 The Effect of Boron on the Mechanical Properties of a New Polycrystalline Superalloy

Paraskevas Kontis¹, Fredrik Karlsson², Roger Reed¹

¹University of Oxford, Oxford, GB, ²Siemens Industrial Turbomachinery AB, Finspong, SE

0101 The Technology for Automated Development of Economically Doped Heat-Resistant Nickel Superalloys

Yuriy Shmotin, Aleksander Logunov, Denis Danilov, Igor Leshchenko

JSC "NPO SATURN", Rybinsk, RU

0130 Relationship between Growth Rate and Creep Properties of Directional Solidified Eutectic NiAl-Cr(Mo)

Ioannis Sprenger, Christoph Seemüller, Antje Krüger, Anton Möslang, Martin Heilmaier

Karlsruhe Institute of Technology, Karlsruhe, DE

0131 Development of Low-Cost Single Crystal Superalloys

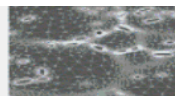
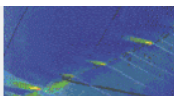
Jiarong Li, Shizhong Liu, Zhenxue Shi, Xiaoguang Wang, Dingzhong Tang

Beijing Institute of Aeronautical Materials, Beijing, CN

0147 Solid Solution Hardening of the Matrix Phase of Nickel-Based Superalloys

Ernst Fleischmann¹, Rainer Vökl¹, Ernst Affeldt², Uwe Glatzel¹

¹University Bayreuth, Bayreuth, DE, ²MTU Aero Engines GmbH, Munich, DE



Alloy development I: Ni base (continued)

0164 Microstructure Stability Optimization of 263 Ni-Based Superalloy

Coraline Crozet, Alexandre Devaux, Denis Béchet
Aubert & Duval, Les Ancizes, FR

0182 Computational Design of Re/Ru Bearing Ni-Base Superalloys

K V Vamsi¹, K N Goswami¹, R Balamuralikrishnan², Niranjan Das², D Banerjee¹, S Karthikeyan¹

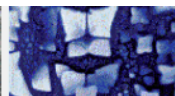
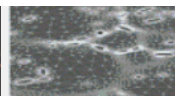
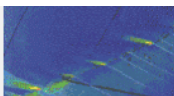
¹Indian Institute of Science, Bangalore, IN, ²Defence Metallurgical Research Laboratory, Hyderabad, IN

0214 HAYNES 244 alloy - a New 760°C Capable Low Thermal Expansion Alloy

Michael Fahrmann, Lee Pike
Haynes International Inc., Kokomo, USA

0218 Refractoriness and High Temperature Oxidation Behavior of HfC-Containing Cr-Rich Alloys

Elodie Conrath, Patrice Berthod
Université de Lorraine, Vandoeuvre-lès-Nancy, FR



Alloy development II: Co base

0021 Atomistic Simulations of the Deformation Behavior of Cubic Ni₃Al Nanoparticles

Erik Bitzek, Jonathan Amodeo, Aruna Prakash

Universität Erlangen-Nürnberg, Erlangen, DE

0036 Effect of Mo on the High Temperature Wear Resistance of Co-Cr-W-C Alloy

Amir Motallebzadeh¹, Huseyin Cimenoglu¹, Erdem Atar²

¹Istanbul Technical University, Istanbul, TR, ²Gebze Institute of Technology, Kocaeli, TR

0068 High-Temperature Ni-Co-Base Superalloy of a New Class VZh171 for Hot Sections of Advanced Gas Turbine Engines

Maxim Akhmedzyanov, Ivan Mazalov, Sergey Ovsepyan

All-Russian Institute of Aviation Materials, Moscow, RU

0115 In situ High Temperature Studies of CoRe Alloys at the New Small-Angle Neutron Scattering Instrument SANS-1 at Maier-Leibnitz Zentrum

Ralph Gilles¹, Debashis Mukherji², Pavel Strunz³, Lukas Karge¹, Joachim Rösler²

¹TU Muenchen, Garching, DE, ²TU Braunschweig, Braunschweig, DE, ³Nuclear Physics Institute, Rez, CZ

0165 The influence of Boron and Carbon on Grain Boundary Strength of γ' -Hardened Co-Base Superalloys

Lisa Freund, Steffen Neumeier, Alexander Bauer, Mathias Göken

University of Erlangen-Nuremberg, Erlangen, DE

0184 First Principles Study of Alloying Affects on Co₃(Al,W) Precipitates with L₁₂ Structure

Sri Raghunath Joshi, K.V Vamsi, S Karthikeyan

Indian Institute of Science, Bangalore, IN

0189 Physical Metallurgy and Creep Behaviour of Some Candidate Co-Base Superalloys

Matthias Knop¹, Vassili A. Vorontsov¹, Mark C. Hardy², David Dye¹

¹Imperial College, London, GB, ²Rolls-Royce plc, Derby, GB

0191 Investigation of Ternary Subsystems of Superalloys by Thin-Film Combinatorial Synthesis and High-Throughput Analysis

Alfred Ludwig, Amin Janghorban, Janine Pfetzinger-Micklich, Jan Frenzel

Ruhr-Universität Bochum, Bochum, DE

0199 Influence of Ti and Ta on the Creep Behavior of Co-Al-W-base Single Crystal Superalloys at 900°C

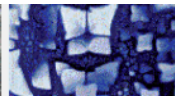
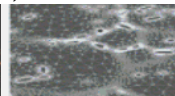
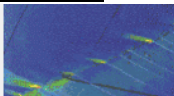
Fei Xue, Haijing Zhou, Xuhua Chen, Meiling Wang, Xianfei Ding,

Qiang (Charles) Feng

University of Science and Technology Beijing, Beijing, CN

0223 Characterisation of P/M Manufactured Niobium Silicide Based Materials

Stefan Drawin, ONERA - The French Aerospace Lab, Châtillon, FR



Mechanical behavior I: fatigue

0052 In- and Out-of-Phase Thermomechanical Fatigue of a Ni-Based Single-Crystal Superalloy

Mikael Segersäll, Johan J. Moverare, Daniel Leidermark, Kjell Simonsson
Linköping University, Linköping, SE

0086 Influence of Phase Angle on Damage Mechanisms and TMF Life on the Polycrystalline Nickel Based Superalloy of RR1000

Jonathan Jones¹, Mark Whittaker¹, Steve Williams², Robert Lancaster¹
¹Swansea University, Swansea, GB, ²Rolls-Royce, Derby, GB

0105 Thermomechanical Fatigue Crack Growth in a Cast Polycrystalline Superalloy

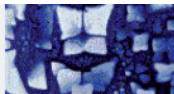
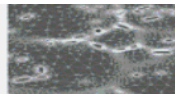
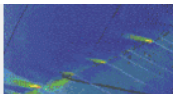
Johan Moverare¹, Paraskevas Kontis², Sten Johansson¹, Roger C Reed²
¹Linköping University, Linköping, SE, ²University of Oxford

0142 Creep-Fatigue Interactions in Equiaxed and Single Crystal Ni Based Superalloys

Erica Vacchieri¹, Alessio Costa¹, Eleonora Poggio¹, Stuart Richard Holdsworth²
¹Ansaldo Energia S.p.A., Genoa, IT, ²EMPA Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, CH

0219 Link between Microstructures and Fatigue Life in Wrought Inconel 718 DA

Meriem Abikchi¹, Thomas Billot³, Jérôme Crépin¹, Arnaud Longuet², Caroline Mary², Thilo F. Morgeneyer¹, Loïc Nazé¹
¹CdM Mines ParisTech, Evry, FR, ²Snecma-SAFRAN Group, Moissy-Cramayel, FR, ³Snecma-SAFRAN Group, Colombes, FR



Mechanical behavior II: Single-crystalline alloys

0014 Development and Use of a New Burner Rig Facility to Mimic Service Loading Conditions of Ni-Based Single Crystal Superalloys

Florent Mauget¹, Damien Marchand¹, Médéric Morisset¹, Denis Bertheau¹, Jonathan Cormier¹, José Mendez¹, Zéline Hervier², Elisabeth Ostojka-Kuczynski²
¹Institut Pprime, Chasseneuil, FR, ²SAFRAN - Turbomeca, Bordes, FR

0033 Evolution of Strain Distribution and Fracture in Single Crystal CMSX-4 Superalloy studied by X-ray Diffraction Methods

Jacek Krawczyk, Robert Albrecht, Włodzimierz Bogdanowicz
University of Silesia, Chorzów, PL

0069 Nanoindentation Testing of the γ/γ' and TCP Phase in the Interdendritic Region and Dendrite Core of a Nickel Based Superalloy.

Hamad ur Rehman¹, Karsten Durst³, Gunther Eggeler², Mathias Göken¹
¹University of Erlangen-Nürnberg, Erlangen, DE, ²Ruhr-Universität Bochum, Bochum, DE, ³TU Darmstadt, Darmstadt, DE

0073 Influence of Secondary γ' Phase on the Creep Behavior of Single Crystals Superalloy at Intermediate Temperature

Jian Yu, Jiarong Li, Jinqian Zhao, Shizhong Liu, Mei Han, Zhenxue Shi
Beijing Institute of Aeronautical Materials, Beijing, CN

0100 How Stress/Temperature Regimes and Crystallographic Loading Directions Affect the Creep Parameters of ERBO1

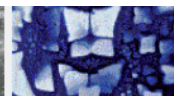
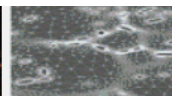
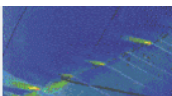
Philip Wollgramm, Hinrich Buck, Klaus Neuking, Gunther Eggeler
Ruhr-Universität Bochum, Bochum, DE

0159 Creep Deformation Behavior of Rhenium Free Ni-Based Single Crystal Superalloys LSC-15

Nobuyasu Tsuno, Satoshi Takahashi
IHI corporation, Yokohama, JP

0193 Creep Properties of a New Re Free Single Crystal Ni-based Superalloy, NKH71

Yoshihiro Kondo¹, Yuusuke Kubo¹, Nobuhiro Miura¹, Yoshinori Murata², Akira Yoshinari³
¹National Defense Academy, Yokosuka, JP, ²Nagoya University, Nagoya, JP, ³Hitachi Co. Ltd., Hitachi, JP



Mechanical behavior III: Polycrystalline alloys

0004 Evaluation of Microstructural and Mechanical Properties of H-282 Superalloy with Application in Land-Based Turbines and Aircraft Jet-Engines

Octavio Covarrubias^{1,2}

¹Frisa Forjados SA de CV, Santa Catarina, Mexico, ²Universidad Autonoma de Nuevo Leon, San Nicolas, Mexico

0013 Impact of Microstructural Evolutions during Thermal Aging of Alloy 625 on its Static Mechanical Properties

Lorena Mataveli Suave¹, Denis Bertheau¹, Jonathan Cormier¹, Patrick Villechaise¹, Aurélie Soula², Zéline Hervier³, Johanne Laigo⁴

¹Institut Pprime, Chasseneuil, FR, ²Aircelle – SAFRAN Group, Plaisir, FR, ³Turbomeca – SAFRAN Group, Bordes, FR, ⁴Snecma – SAFRAN Group, Moissy-Cramayel, FR

0079 Correlation of Secondary Dendrite Arm Spacing with the Mechanical Behaviour of Cast INCONEL® 718 alloy

Natalia Soldevilla, Oscar Caballero, Koldo Mirena Ostolaza
Industria de Turbo Propulsores (ITP), Zamudio, ES

0129 The influence of Heat Treatment Parameters on the Microstructure and Mechanical Properties of a Powder Metallurgy Nickel-Base Superalloy

Gaofeng Tian, Jinwen Zou, Guojun Ma
Beijing Institute Aeronautical Materials, Beijing, CN

0167 Influence of the Quenching Drasticity and Cooling Interruption Temperature on Microstructure and Tensile Properties of the Nickel-Based Superalloy Udimet®720.

Paul Le Baillif¹, Rémi Lacoste¹, Pascal Lamesle¹, Denis Delagnes¹, Christian Dumont², Farhad Rezai-Aria¹

¹Université de Toulouse, Albi, FR, ²Aubert & Duval, Les Ancizes, FR

0190 Studying the Influence of Substitutional Elements on Mechanical Behaviour of Alloy 718

Bertrand Max¹, José San Juan², Maria No², Jean-Marc Cloue¹, Bernard Viguier¹, Eric Andrieu¹

¹CIRIMAT, Toulouse, FR, ²Universidad del País Vasco, Bilbao, ES

0198 Mechanical Properties and Microstructure of Large IN713LC Nickel Superalloy Castings

Jirí Zýka¹, Jaroslav Málek², Karel Hrabáček³

¹UJIP PRAHA a.s., Prague, CZ, ²Czech Technical University, Prague, CZ, ³První brněnská strojírna Velká Bíteš a.s., Velká Bíteš, CZ

