

## *Program*

# **Beyond Nickel-Based Superalloys**

**An ECI Conference**

**May 13-17, 2013**

**Bad Berneck (Bavaria), Germany**

**Conference Chair:**

**Uwe Glatzel, University of Bayreuth**

**Conference Co-Chairs:**

**Bernard Bewlay, General Electric Global Research**

**Lesley Cornish, University of Witwatersrand**

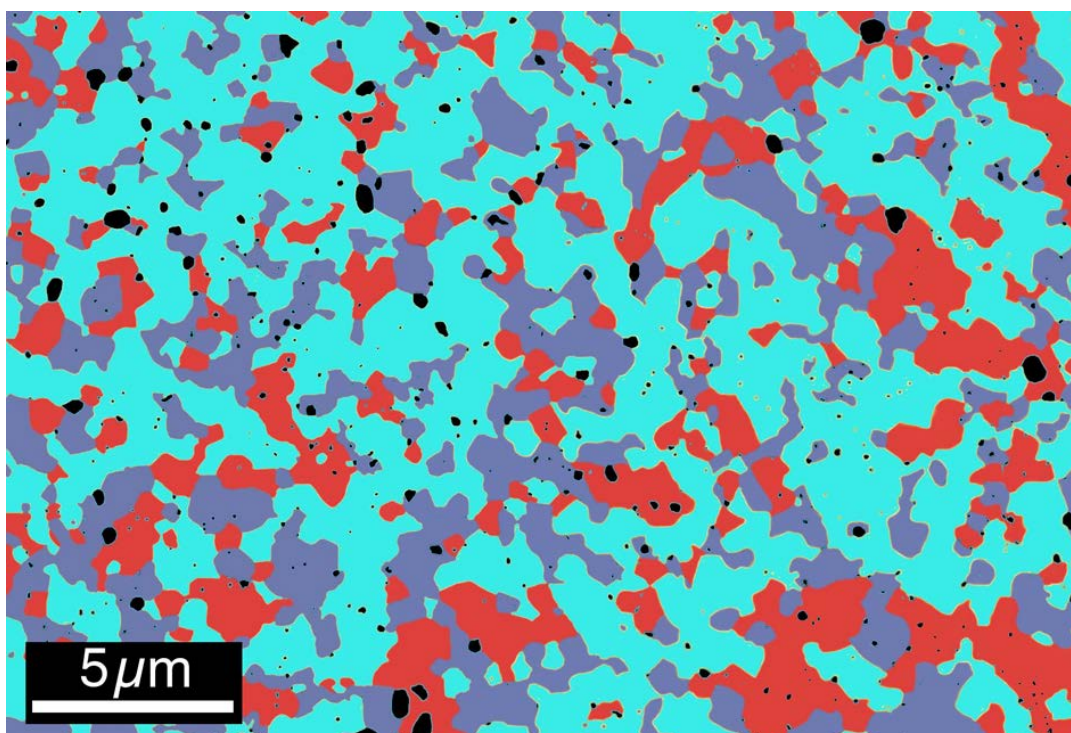
**Martin Heilmaier, Karlsruhe Institute of Technology**

**Joachim Schneibel, (formerly) Oak Ridge National Laboratory**

**David Shifler, Office of Naval Research**

**Howard Stone, Cambridge University**

**Kyosuke Yoshimi, Tohoku University**



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## **Welcome to the Beyond Nickel-Based Superalloys conference 2013**

The Local Organizing Committee welcomes all participants of the International Conference on Beyond Nickel-Based Superalloys.

The Local Organizing Committee will do every effort in order for you to enjoy the next days in our Bavarian, or precisely speaking Upper Franconia country side. We hope that scientists and students from all over the world will experience a very good conference with stimulating meetings and discussions. The response was overwhelming, with more than 70 contributions from all over the world. Therefore we are able to present a rich program of high quality.

The concept is to have a meeting in a nice, enclosed setting where the attendees cannot escape but will have meals and social events all together. This was the reason to choose the small village of Bad Berneck in Upper Franconia, close to the Fichtelgebirge with its about 5.000 inhabitants.

We do our best to prepare an interesting and enjoyable side and social program and hope that the conference on Beyond Nickel-Based Superalloys will help to strengthen the relationships between materials researchers all over the world.

A conference like this requires the dedicated efforts of many people and I would like to thank all of them. Especially, I would like to thank the International Committee, Ram Darolia and the ECI staff, who selected the speakers, decided on the financial support and helped to establish the scientific program of the meeting. I furthermore appreciate the help of all students, graduate students and staff of the research group Metals and Alloys (University Bayreuth) who are running the conference.

I would like to acknowledge financial support by the Deutsche Forschungsgemeinschaft (DFG), Office of Naval Research, GE and MAN Turbo und Diesel by specific travel grants for this conference. This support has helped to organize an attractive program in keeping the costs for individual participants low.

With this, I wish all participants fruitful and enjoyable days in Bad Berneck, Bayreuth, Franconia and Bavaria. All members of the Local Organizing Committee will help you in case you need assistance during your stay at the conference.



Uwe Glatzel

Bayreuth, May 2013





**Beyond Nickel-Based Superalloys, 13 – 17 May 2013, Bayreuth (Bad Berneck), Germany**

	<b>Monday</b> 13 May 2013	<b>Tuesday</b> 14 May 2013	<b>Wednesday</b> 15 May 2013	<b>Thursday</b> 16 May 2013	<b>Friday</b> 17 May 2013
<b>9:00</b>		<b>1 - General I</b>	<b>5 - Mo-Silicides I</b>	<b>7 - PGM Based alloys</b>	<b>10 - Co-Based Alloys + miscellaneous</b>
<b>10:20</b>		<i>Coffee Break</i>			
<b>10:50</b>		<b>2 – General II</b>	<b>6 - Nb-Silicides II</b>	<b>8 – Mo-Silicides II</b>	<b>11 - Coatings + Miscellaneous</b>
<b>12:30</b>		<i>Lunch Break</i>			
<b>14:00</b>		<b>3 – Nb-Silicides I</b>	Departure 14:15  Tour to Festspielhaus and Maisel Brewery Museum, Dinner in the museum  Return ~ 22:30	<b>9 – Co-Based alloys</b>	<i>End of conference</i>
<b>15:00</b>	<b>14:00 - 21:00</b> Registration	<i>Coffee Break</i>		<i>Coffee Break</i>	
<b>15:30</b>		<b>4 – Refractory alloys</b>		<b>Poster Session</b>	
<b>16:30</b>		<i>End</i>		<i>End</i>	
	<b>18:00 - 22:30</b> Reception, Hotel Hartl's Lindenmühle	<b>18:00 - 21:00</b> Hike to a local beer garden		<b>18:30 - about midnight</b> Conference Dinner with shows in Bad Berneck	

## **NOTES**

- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.
- Technical sessions will be in the Jean-Paul Hall. Poster sessions will be in the Atrium.
- If weather permits meals and coffee breaks will be outside. Otherwise meals and breaks will be in the Atrium.
- Be sure to check your contact information on the Participant List in this program and make any corrections to your name/contact information online. A corrected copy will be sent to all participants after the conference.
- Speakers – Please leave at least 5 minutes for questions and discussion. Be available for discussion during meals and social periods

### **Conference Tour and Banquet**

#### **Wednesday, 15 May - afternoon and evening:**

Two tour buses will departure at **14:15** from the conference site. We will see the famous Festspielhaus and will have a short tour of Bayreuth city and finally end at the Maisel's Brewery Museum.

1. Stop: "Festspielhaus": Within the "Festspielhaus" the world famous "Wagner Festspiele" (Opera) takes place every year for six weeks in summer (July/August). Unfortunately the rehearsal for the "Festspiele" starts every year in May, therefore we are not allowed to go inside the "Festspielhaus". Additionally

2. Stop City of Bayreuth: We will have a short guided tour of the city center (Marktplatz and surroundings).

3. Stop: The Maisel's Brewery and Cooperage Museum, the world's most comprehensive beer museum (featured in the Guinness Book of Records). We will have a one-hour tour there, followed by a beer tasting.

4. Stop: We enjoy a buffet dinner within the museum premises.

Return to Bad Berneck is scheduled for 22:30, arriving at about 23:00.

*Food, drinks and entrance fees are covered by the conference fee. Casual dress is recommended.*

Monday, 13 May

16:00 – 18:00 Registration

18:00 Opening Reception at Hotel Lindenmühle

Tuesday, 14 May, 9:00 – 10:20

**1 - General I**  
**Chair: Zi-Kui Liu**

9:00	<b>U. Glatzel and R. Darolia</b>	<b>Oral-1-a</b>	OPEN REMARKS
	<i>University Bayreuth, Germany</i> <i>GE (retired), ECI liaison, USA</i>		
9:20	<b>H.J. Stone</b>	<b>Oral-1-b</b>	METAL-INTERMETALLIC BASED ALLOYS BEYOND SUPERALLOYS
	<i>University of Cambridg, UK</i> Jones N.G., Neumeier S., Edmonds I.M., Jones C.N.		
9:40	<b>W. Smarsley</b>	<b>Oral-1-c</b>	POTENTIAL OF INTERMETALLICS TO REPLACE NICKEL-BASED SUPERALLOYS FOR ADVANCED OPERATION CONDITIONS
	<i>MTU Aero Engines, Germany</i> Jörg Esslinger, Helmut Clemens		
10:00	<b>B.P. Bewlay</b>	<b>Oral-1-d</b>	VERY HIGH-TEMPERATURE NB- AND MO-BASED SILICIDES – THE PAST AND THE FUTURE!
	<i>GE- Global Research, USA</i> P.R. Subramanian		
10:20	<b>Coffee Break</b>		

Tuesday, 14 May, 10:50 – 12:30

**2 - General II**

**Chair: Howard Stone**

10:50	<b>D.A. Shifler</b>	<b>Oral-2-a</b>	DOD NEED AND PAYOFFS FOR MATERIALS BEYOND NI-SUPERALLOYS AND STATUS UPDATE
	<i>Office of Naval Research, USA</i>		
11:10	<b>N. Jones</b>	<b>Oral-2-b</b>	BEYOND SUPERALLOYS FOR TURBINE BLADE APPLICATION – AN OEM PERSPECTIVE
	<i>Rolls Royce; UK</i>		
11:30	<b>E. George</b>	<b>Oral-2-c</b>	COMPRESSIVE CREEP AND TENSILE PROPERTIES OF DIRECTIONALLY SOLIDIFIED NIAL-CR(MO) EUTECTIC COMPOSITES
	<i>Oak Ridge National Laboratory, USA</i> Marie Dudova, Hongbin Bei, Antonin Dlouhy		
11:50	<b>H. Inui</b>	<b>Oral-2-d</b>	MECHANICAL PROPERTIES OF CO-BASED ALLOYS WITH L12 CUBOIDAL PRECIPITATES
	<i>Kyoto University, Japan</i>		
12:10	<b>W.J. Clegg</b>	<b>Oral-2-e</b>	THE USE OF SMALL-SCALE TESTING FOR DEVELOPING NEW HIGH TEMPERATURE MATERIALS
	<i>University of Cambridge; UK</i> Claudia Walter, Fabio Di Gioacchino, Shiyu Liu, Philip R. Howie, Clare E. Davis, Jeff Wheeler, Johann R. Michler, Sandra Korte		
12:30	<b>Lunch</b>		

Tuesday, 14 May, 14:00 – 15:00

**3 - Nb-silicides I**

**Chair: Harayuki Inui**

14:00	<b>J.J. Lewandowski</b>	<b>Oral-3-a</b>	FRACTURE AND FATIGUE OF NB-SILICIDE COMPOSITES
	<i>Case Western Reserve University, USA</i>		
14:20	<b>P. Tsakirooulos</b>	<b>Oral-3-b</b>	NIOBIUM SILICIDE BASED ALLOYS: CHALLENGES AND BREAKTHROUGHS
	<i>University of Sheffield; UK</i>		
14:40	<b>S. Miura</b>	<b>Oral-3-c</b>	DIRECT AND INDIRECT EFFECTS OF THE ALLOYING ELEMENTS ON THE MECHANICAL PROPERTIES OF NB-SI ALLOY
	<i>Hokkaido Univ., Japan</i>		
15:00	<b>Coffee Break</b>		

Tuesday, 14 May, 15:30 – 16:30

**4 – Refractory alloys**

**Chair: Bernard Bewlay**

15:30	<b>L. Singheiser</b>	<b>Oral-4-a</b>	THERMAL AND MECHANICAL BEHAVIOUR AND PROPERTIES OF TUNGSTEN ALLOYS
	<i>Forschungszentrum Jülich GmbH, Germany</i> J. Linke, Th. Loewenhoff, G. Pintsuk, I. Uytendhouwen, M. Wirtz		
15:50	<b>Z.K. Liu</b>	<b>Oral-4-b</b>	BUILDING THE FUNDAMENTALS OF W-BASED ALLOYS: FIRST-PRINCIPLES CALCULATIONS AND THERMODYNAMIC MODELING
	<i>Penn State; USA</i> Bill Y. Wang, Yong J. Hu, Yi Wang, Shun Li Shang, Laszlo J. Kecskes, Brady G. Butler		
16:10	<b>D. Comins</b>	<b>Oral-4-c</b>	ELASTIC CONSTANTS OF RHODIUM-BASED SINGLE CRYSTAL ALLOYS $RH_3ZR$ AND $RH_3NB$ DETERMINED BY SURFACE BRILLOUIN SCATTERING
	<i>University of the Witwatersrand, South Africa</i> Clemence Sumanya, Bhekumusa Mathe, Arthur Every, Makoto Osawa, Hiroshi Harada		
16:30	<b>End</b>		

18:00 If the weather is good, participants can hike to a local beer garden with a restaurant. The hike is about 6 km one way – please wear outdoor shoes. For those not willing to hike, there will be a shuttle bus available.

*(Expenses for this activity are not included in the conference fee.)*

Wednesday, 15 May, 9:00 – 10:20

**5 – Mo-silicides I**

**Chair: Hans-Jürgen Christ**

9:00	<b>G. Hasemann</b>	<b>Oral-5-a</b>	DIRECTIONAL SOLIDIFICATION OF MULTIPHASE MO-BASED ALLOYS
	<i>University Magdeburg, Germany</i> Manja Krüger, Iurii Bogomol, Petr I. Loboda		
9:20	<b>K. Yoshimi</b>	<b>Oral-5-b</b>	MICROSTRUCTURE AND HIGH TEMPERATURE STRENGTH OF TIC-DISPERSED MO-SI-B ALLOYS
	<i>Tohoku University, Japan</i> Shimpei Miyamoto, Seong-Ho Ha, Kouichi Maruyama, Takashi Goto		
9:40	<b>S. Drawin</b>	<b>Oral-5-c</b>	PROPERTIES OF P/M MANUFACTURED NIOBIUM SILICIDE BASED MATERIALS
	<i>ONERA, The French Aerospace Lab, France</i>		
10:00	<b>A. Lange</b>	<b>Oral-5-d</b>	MAGNETRON SPUTTERED $MO(SI_x,AL_{1-x})_2$ OXIDATION PROTECTION COATINGS FOR MO-9SI-8B-ALLOYS
	<i>DLR - German Aerospace Center / Institute of Materials Research, Germany</i> Reinhold Braun, Martin Heilmaier		
10:20	<b>Coffee Break</b>		

Wednesday, 15 May, 10:50 – 12:30

**6 – Nb-silicides II**

**Chair: Kouichi Maruyama**

10:50	<b>S. Knittel</b>	<b>Oral-6-a</b>	OXIDATION PROTECTIVE COATINGS FOR NB-SI BASED IN-SITU COMPOSITES
	<i>SNECMA, France</i> Léo Portebois, Stéphane Mathieu, Michel Vilasi, Stefan Drawin		
11:10	<b>C. Seemüller</b>	<b>Oral-6-b</b>	MECHANICAL PROPERTIES OF AN ADVANCED NB-SILICIDE ALLOY PRODUCED BY POWDER METALLURGY
	<i>Karlsruhe Institute of Technology, Germany</i> Martin Heilmaier, Thomas Hartwig, Marco Mulser, Nicholas Adkins, Michael Wickins		
11:30	<b>X. Guo</b>	<b>Oral-6-c</b>	MICROSTRUCTURE AND MECHANICAL PROPERTIES OF INTEGRALLY DIRECTIONALLY SOLIDIFIED NB-TI-SI BASED ULTRAHIGH TEMPERATURE ALLOY
	<i>Northwestern Polytechnical University, China</i> Haisheng Guo, Ping Guan		
11:50	<b>Z. Xu</b>	<b>Oral-6-d</b>	THE ROLE OF SN IN THE OXIDATION OF NB SILICIDE BASED ALLOYS
	<i>University of Sheffield, UK</i> Claire A. Utton, Panos Tsakirooulos		
12:10	<b>M.C. Galetz</b>	<b>Oral-6-e</b>	CR-SI-GE REFRACTORY ALLOYS FOR ULTRA HIGH TEMPERATURE APPLICATIONS: MICROSTRUCTURAL EVOLUTION
	<i>Dechema Forschungsinstitut, Germany</i> Ali Soleimani-Dorcheh		
12:30	<b>Lunch</b>		

14:15 Buses depart for tour and museum dinner. Return approximately 23:00.



Thursday, 16 May, 9:00 – 10:20

**7 – PGM Based alloys**

**Chair: Joachim Rösler**

9:00	<b>Y. Yamabe-Mitarai</b>	<b>Oral-7-a</b>	MECHANICAL PROPERTIES AND OXIDATION BEHAVIOR OF IR-BASED ALLOYS
	<i>NIMS, Japan</i> Zebin Bao, Daishi Ohtsubo, Hideyuki Muakami		
9:20	<b>C.H. Liebscher</b>	<b>Oral-7-b</b>	SUPERDISLOCATIONS AND ANTIPHASE BOUNDARY ENERGIES IN PT <sub>3</sub> AL
	<i>University of California, Berkeley, USA</i> Uwe Glatzel		
9:40	<b>L. Cornish</b>	<b>Oral-7-c</b>	FURTHER ADDITIONS TO PT-BASED ALLOYS FOR HIGH TEMPERATURE APPLICATIONS
	<i>University of the Witwatersrand, South Africa</i> Bernard Odera, Mxolisi Shongwe, Michael Witcomb, Marandela Mulaudzi, Gitu Nldovu, George Rading, Jones Papo		
10:00	<b>R. Völkl</b>	<b>Oral-7-d</b>	A REVIEW ON PT-BASE SUPERALLOYS FOR ULTRA HIGH TEMPERATURE APPLICATIONS
	<i>University of Bayreuth, Germany</i> Uwe Glatzel		
10:20	<b>Coffee Break</b>		

Thursday, 16 May, 10:50 – 12:30

**8 – Mo-silicides II**

**Chair: Kyosuke Yoshimi**

10:50	<b>C. Hochmuth</b>	<b>Oral-8-a</b>	MICROSTRUCTURE AND CREEP PROPERTIES OF MO-SI-B BASE ALLOYS AT HIGH TEMPERATURES
	<i>University Bayreuth, Germany</i> Daniel Schliephake, Rainer Völkl, Martin Heilmaier, Uwe Glatzel		
11:10	<b>J.H. Perepezko</b>	<b>Oral-8-b</b>	HIGH TEMPERATURE MO-SI-B ALLOYS: PHASE STABILITY AND OXIDATION PERFORMANCE
	<i>University of Wisconsin-Madison, USA</i>		
11:30	<b>D. Schliephake</b>	<b>Oral-8-c</b>	THE INFLUENCE OF TITANIUM ON CREEP PROPERTIES OF MO-BOROSILICIDE ALLOYS FOR ULTRA-HIGH TEMPERATURE APPLICATIONS
	<i>Karlsruhe Institute of Technology, Germany</i> Martin Heilmaier		
11:50	<b>M. Krüger</b>	<b>Oral-8-d</b>	DEFORMATION AND FRACTURE BEHAVIOUR OF MULTIPHASE MO-SI-B-ZR ALLOYS
	<i>University Magdeburg, Germany</i> D. Schliephake, M. Heilmaier		
12:10	<b>J. Rösler</b>	<b>Oral-8-e</b>	DEVELOPMENT OF CO-RE-BASED ALLOYS FOR HIGH TEMPERATURE APPLICATIONS
	<i>Technical University Braunschweig, Germany</i> Debashis Mukherji		
12:30	<b>Lunch</b>		

Thursday, 16 May, 14:00 – 15:00

**9 – Co-Based alloys**

**Chair: William Clegg**

14:00	<b>H.Y. Yan</b>	<b>Oral-9-a</b>	ALLOYING AND THE SEARCH FOR OXIDATION-RESISTANT CO-AL-W SUPERALLOYS
	<i>Imperial College London, UK</i> V.A. Vorontsov, D. Dye		
14:20	<b>H.-J. Christ</b>	<b>Oral-9-b</b>	HIGH-TEMPERATURE OXIDATION OF MO-SI-B- AND CO-RE-CR- BASED ALLOYS
	<i>University Siegen, Germany</i> Steffen Burk, Bronislava Gorr		
14:40	<b>T. Depka</b>	<b>Oral-9-c</b>	CREEP OF CO-RE-BASED ALLOYS AT 1100°C
	<i>Ruhr-Universität Bochum, Germany</i> Christoph Somsen, Gunther Eggeler, Debashis Mukherji, Joachim Rösler		
15:00	<b>Coffee Break</b>		

Thursday, 16 May, 15:00 – 17:00

**Poster Session**

**Chair: Uwe Glatzel**

- Poster-1**      ATOMIC MODELING OF ZIRCONIUM SEGREGATION AT  
MOLYBDENUM GRAIN BOUNDARIES  
**Olena Lenchuk**, Karsten Albe  
*TU Darmstadt, Germany*
- Poster-2**      CONTAMINATION OF Nb SILICIDE BASE ALLOYS BY  
INTERSTITIALS: CAN IT BE CONTROLLED?  
**Panos Tsakirooulos**  
*University of Sheffield, UK*
- Poster-3**      THE EFFECT OF GERMANIUM AND TIN ADDITIONS IN THE  
MICROSTRUCTURE AND OXIDATION OF NIOBIUM SILICIDE  
BASED ALLOYS  
**Ofelia Hernandez-Negrete**, Panos Tsakirooulos  
*University of Sheffield, UK*
- Poster-4**      PHASE EQUILIBRIA IN THE Nb-Si-Sn TERNARY SYSTEM  
**Claire A. Utton**, Zhen Xu, Ioannis Papadimitriou, Panos Tsakirooulos  
*University of Sheffield, UK*
- Poster-5**      NUMERICAL APPROACH OF THE THERMOMECHANICAL  
BEHAVIOR IN THE PROTECTIVE LAYERS NICKEL-BASED AT  
HIGH TEMPERATURE (TURBINE BLADE)  
**Khelifa Hocine**, A.Charif Boumaza  
*Mecanic Laboratory; Laghouat University ; Algeria*
- Poster-6**      FIRST-PRINCIPLES CALCULATIONS AND THERMODYNAMIC RE-  
MODELING OF THE HF-W SYSTEM  
**Alyson C. Lieser**, Chelsey L. Zacherl, Arkapol Saengdeejing, Zi-Kui Liu,  
Laszlo J. Kecskes  
*The Pennsylvania State University, USA*

- Poster-7**      **LOW CYCLE FATIGUE BEHAVIOR OF A NI<sub>3</sub>AL-BASED SUPERALLOY WITH MONOCRYSTALLIC STRUCTURE AT HIGH TEMPERATURE.**  
**Mikhail Gorbovets**, Mikhail Belyaev, Ivan Khodinev  
*State Research Center of the Russian Federation (FSUE "VIAM") Moscow, Russia*
- Poster-8**      **MECHANICAL PROPERTIES OF A SINGLE CRYSTAL  $\gamma'$ -STRENGTHENED CO-BASED ALLOY**  
**N. V. Petrushin**, K. K. Hvatkiy, V. V. Gerasimov, T. Link, A. I. Epishin, G. Nolze  
*Scientific Research Institute of Aviation Materials (VIAM)*
- Poster-9**      **SCATTER OF CREEP STRENGTH AND INFLUENCE OF CHEMICAL COMPOSITION**  
**Stefan Linn**, A. Scholz, M. Oechsner  
*Technische Universität Darmstadt, Germany*
- Poster-10**     **NOVEL ANCHOR PHASES FOR ABRASIVE TURBINE TIPS BASED ON NIAL**  
**John R. Davenport**, Matthew E. Hancock, Robert J. Stearn, William J. Clegg  
*Department of Materials Science & Metallurgy, Cambridge, U.K.*
- Poster-11**     **EFFECT OF MICROSTRUCTURE ON THE OXIDATION RESISTANCE OF NB-SI BASED IN-SITU COMPOSITES**  
**Léo Portebois**, Stéphane Mathieu, Michel Vilasi, Stéphane Knittel, Mick Wickins, Nick Adkins, Stefan Drawin  
*Institut Jean Lamour - Université de Lorraine, Nancy, France*
- Poster-12**     **THE DEVELOPMENT AND VALIDATION OF A NEW THERMODYNAMIC DATABASE FOR NI BASED ALLOYS**  
**J. Bratberg**, L. Kjellqvist, H. Mao, A. Engström, P. Mason, Q. Chen, A. Markström, H. Chen  
*Thermo-Calc Software AB, Stockholm, Sweden*
- Poster-13**     **A NI-MO-CR INTERMETALLIC WITH PT<sub>2</sub>MO-TYPE SUPERLATTICE AND POTENTIALLY USEFUL COMBINATION OF PROPERTIES**  
**H. M. Tawancy**, Luai M. Al-Hadhrami  
*Research Institute, King Fahd University of Petroleum and Minerals, Saudi Arabia*

- Poster-14** EFFECT OF MICROSTRUCTURE ON THE AMBIENT TENSILE DEFORMATION BEHAVIOR OF NICKEL BASE CAST SUPERALLOY SUPERCAST 247A  
**A. Lavakumar**, Prince Kumar Singh, Ch. V. S. Murthy , N. Eswara Prasad  
*Maulana Azad National Institute of Technology, India*
- Poster-15** DEVELOPMENT OF NB-SILICIDE ALLOYS WITH LANTHANIDE AND OTHER METAL ADDITIONS  
**Andrew Twedde**, Panos Tsakirpoulos  
*The University of Sheffield, UK*
- Poster-16** EFFECT OF HF ON MICROSTRUCTURE AND PROPERTIES OF NB-SILICIDE BASED ALLOYS  
**Jack Nelson**, Panos Tsakirpoulos  
*The University of Sheffield, England*
- Poster-17** SOLIDIFICATION PROCESSING OF TWO NB-SILICIDE BASED ALLOYS  
**Conor McCaughey**, Panos Tsakirpoulos, Russell Goodall  
*University of Sheffield, England*
- Poster-18** OXIDATION RESISTANT COATINGS FOR NIOBIUM SILICIDE BASED ALLOYS  
**Gary Bywater**, Adrian Leyland, Panos Tsakirpoulos  
*The University of Sheffield, UK*
- Poster-19** OXIDATION MECHANISMS IN YTTRIUM-ALLOYED MO-SI-B  
**Sanjib Majumdar**, Daniel Schliephake, Bronislava Gorr, Hans-Jürgen Christ, Martin Heilmaier  
*Institut für Werkstofftechnik, Universität Siegen, Germany*
- Poster-20** HIGH TEMPERATURE OXIDATION AND GRAIN GROWTH KINETICS OF NICKELFREE SUPERALLOYS  
**Abhishek Jain**, Lakam Ajay Kumar, Sasikumar. C  
*Department of Materials Science & Metallurgical Engineering, MANIT, Bhopal, M.P, India*

- Poster-21** MICROSTRUCTURES AND MECHANICAL PROPERTIES OF Nb-Si BASED MATERIALS PREPARED BY ELECTROMAGNETIC COLD CRUCIBLE DIRECTIONAL SOLIDIFICATION  
**Yongwang Kang**, Yuncheng Yan, Ming Li, Qiang Huang, Yafang Han  
*Beijing Institute of Aeronautical Materials, Beijing, China*
- Poster-22** EXPERIMENTAL STUDY OF THE SOLID-LIQUID PHASE EQUILIBRIA AT THE SI-RICH REGION OF THE NB-CR-SI SYSTEM  
**Yann Graz**, N. David, J.M. Fiorani, M. Vilasi  
*Institut Jean Lamour - Université de Lorraine, Nancy, France*
- Poster-23** MICROSTRUCTURE EVOLUTION AND OXIDATION BEHAVIOUR AT HIGH TEMPERATURE OF COBALT-BASED SUPERALLOYS STRENGTHENED BY HAFNIUM CARBIDES  
**Patrice Berthod**, Elodie Conrath  
*Institut Jean Lamour - Université de Lorraine, Nancy, France*
- Poster-24** TENSILE BEHAVIOR OF CO-AL-W-TA-B-MO ALLOYS WITH A  $\Gamma/\Gamma'$ -CO<sub>3</sub>(AL, W) MICROSTRUCTURE AT ROOM- AND HIGH-TEMPERATURES  
**Jiangbo Sha**  
*School of Materials Science and Engineering, Beihang University, P. R. China*
- Poster-25** A NEW MECHANICAL PROPERTY OPTINIZATION METHOD FOR HIGH-CR-CONTENT NBSI-BASED ALLOYS  
**Hu Zhang**  
*Beihang University, Beijing 100191, China*

Friday, 17 May, 9:00 – 10:20

**10 – Co-Based alloys + Miscellaneous**

**Chair: Lesley Cornish**

9:00	<b>D. Mukherji</b>	<b>Oral-10-a</b>	IN-SITU MEASUREMENTS AT HIGH TEMPERATURES WITH NEUTRON AND SYNCHROTRON PROBES HELP CO-RE-BASE ALLOY DEVELOPMENT
	<i>Technical University Braunschweig, Germany</i> Ralph Gilles, Pavel Strunz, Přemysl Beran, Helmut Eckerlebe, Joachim Rösler		
9:20	<b>S. Neumeier</b>	<b>Oral-10-b</b>	LATTICE MISFIT AND MICROSTRUCTURE EVOLUTION DURING CREEP IN A W-CONTAINING GAMMA PRIME HARDENED CO-BASE SUPERALLOY
	<i>University Erlangen-Nürnberg, Germany</i> C. Zenk, A. Bauer, M. Göken		
9:40	<b>J.J. Kruzic</b>	<b>Oral-10-c</b>	UTILIZING CRACK BRIDGING TOUGHENING TO MOVE BEYOND NICKEL BASED SUPERALLOYS
	<i>Oregon State University, USA</i>		
10:00	<b>C.E. Davis</b>	<b>Oral-10-d</b>	PLASTICITY AND DEFORMATION OF LAVES PHASES
	<i>University of Cambridge, UK</i> Philip R. Howie, William J. Clegg		
10:20	<b>Coffee Break</b>		



Friday, 17 May, 10:50 – 12:30

**11 – Coatings + Miscellaneous**

**Chair: Uwe Glatzel**

10:50	<b>A. Bhowmik</b>	<b>Oral-11-a</b>	HIGH TEMPERATURE COMPRESSION BEHAVIOR OF CHROMIUM-LAVES PHASE ALLOY
	<i>University of Cambridge, UK</i> Steffen Neumeier, Mathias Göken, Cathie Rae, Howard J Stone		
11:10	<b>C. Tiwari</b>	<b>Oral-11-b</b>	NOVEL ULTRA HIGH STRENGTH INTERMETALLIC EUTECTIC ALLOYS BASED ON THE NI-AL SYSTEM WITH TERNARY ADDITIONS
	<i>Indian Institute of Science Bangalore, India</i> Dipankar Banerjee, Kamanio Chattopadhyay		
11:30	<b>S. Mathieu</b>	<b>Oral-11-c</b>	THE EFFECT OF CHEMICAL COMPOSITION ON THE OXYDATION BEHAVIOR OF NB <sub>SS</sub> - NB <sub>5</sub> SI <sub>3</sub> IN AIR AT 815°C AND 1100°C
	<i>Institut Jean Lamour - Université de Lorraine, Nancy, France</i> Leo Portebois, Michel Vilasi, Patrice Berthod, Stéphane Knittel, Sandrine Mathieu, Stefan Drawin		
11:50	<b>J.R. Davenport</b>	<b>Oral-11-d</b>	MECHANICAL PROPERTIES OF FREE-STANDING MCRALY COATINGS USING IN-SITU DIGITAL IMAGE CORRELATION
	<i>University of Cambridge, UK</i> Fabio Di Gioacchino, Matthew E. Hancock, Robert J. Stearn, William J. Clegg		
12:10	<b>R. Braun</b>	<b>Oral-11-e</b>	E/TBC SYSTEMS ON NB/NB <sub>5</sub> SI <sub>3</sub> BASED ALLOYS
	<i>DLR - German Aerospace Center, Linder Hoehe, Cologne, Germany</i> Annika Lange, Uwe Schulz, Léo Portebois, Stéphane Mathieu, Michel Vilasi, Stefan Drawin		
12:30	<b>Lunch</b>		

