

## GAT 2013 Toulouse, France – Scientific program

**Tuesday, June 11<sup>th</sup> – Morning**

08:30	Opening session
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### Session 1 – Chairman: Florian Pyczak

08:45	Invited talk <b>1.1. Introduction of Gamma Titanium Aluminides in Safran Aero Engines.</b> Marie Mineur SAFRAN, France
09:15	<b>1.2. Development of TiAl alloy for a high temperature application</b> Koyanagi Yoshihiko, Ueta Shigeki Daido Steel Corp. Ltd., Nagoya, Japan
09:35	<b>1.3. Impact of Numerical Simulations in Developing Near-net Shape Gamma-TiAl Casting Process</b> Jana Santhanu, Aguilar Julio, Kättlitz Oliver , Stoyanov Todor, Tiefers Rüdiger Access e.V., Aachen, Germany
09:55	<b>1.4. Embrittlement of TiAl after high temperature exposure</b> Jonathan Paul <sup>1</sup> , Florian Pyczak , Frank-peter Schimansky, Friedrich Bleicher, Georg Geiger, Laurent Bortolotto, Andreas Kolitsch, Bernadeta Pelic, Rossi Yankov, Cecile Langlade, Patrick Masset, Gerhard Wolf, David Rafaja, Peter Schumacher, Michael Schütze <sup>1</sup> Helmholtz-Zentrum Geestacht, Germany

**10:15**

**Coffee break**

### Session 2 – Chairman: Gilbert Henaff

10:35	Invited talk <b>2.1. Protection Concepts for High Temperature Oxidation of TiAl Alloys</b> Michael Schütze DECHEMA-Forschungsinstitut, Frankfurt am Main, Germany
11:05	<b>2.2. The Effect of Brazing Conditions on Microstructures and Hardness of a Powder Metallurgy Beta Gamma Alloy Containing Nb and Mo</b> Dongyi Seo <sup>1</sup> , T. Sawatzky , J. K. Hong , H. Saari <sup>1</sup> Aerospace, National Research Council of Canada (NRC), Ottawa, Canada
11:25	<b>2.3. Diffusion brazing of <math>\gamma</math>-TiAl alloys: Investigations of the joint by electron microscopy and XRD</b> Florian Pyczak, Katja Hauschildt, Uwe Lorenz, Andreas Stark, Norbert Schell Helmholtz-Zentrum Geestacht, Germany
11:45	<b>2.4. Electron beam brazing of <math>\gamma</math>-titanium aluminide for linear and circumferential joints</b> Uwe Reisgen, Simon Olschok, Alexander Backhaus ISF - Welding and Joining Institute, Aachen, Germany

**12:15**

**Lunch**

## GAT 2013 Toulouse, France – scientific program

**Tuesday, June 11<sup>th</sup> – Afternoon**

### Session 3 – Chairman: Jean-Yves Guedou

14:00	Invited talk <b>3.1. The Application of TiAl Alloys in Commercial Aircraft Engines: The Present and the Future!</b> Bernard P Bewlay <sup>1</sup> , Michael Weimer, Thomas Kelly, Akane Suzuki <sup>1</sup> General Electric Global Research, Niskayuna, NY, United States
14:30	Invited talk <b>3.2. Research Activities of <math>\gamma</math>-TiAl alloys in HIT</b> Yuyong Chen, Shuzhi Zhang, Fantao Kong, Hongzhi Niu Harbin Institute of Technology, China
15:00	<b>3.3. Thermal barrier coatings on a beta-stabilized gamma-TiAl alloy applying the halogen effect</b> Simone Friedle <sup>1</sup> , Michael Schütze, Nadine Laska, Reinhold Braun <sup>1</sup> Dechema Forschungsinstitut, Frankfurt a.M. – Germany
15:20	<b>3.4. Effects of short crack on fatigue threshold and fatigue crack growth in a nearly full lamellar TiAl alloy</b> Shiyuan Wang <sup>1</sup> , Hangyue Li, Nigel Martin, Mark Dixon <sup>1</sup> University of Birmingham, UK
15:40	<b>3.5. Effect of thermomechanical treatment on properties variation of orthorhombic Ti<sub>2</sub>AlNb based alloys</b> Evgeny Alexeev, Nadezda Nochovnaya, Pavel Panin All-Russian Scientific Research Institute of Aviation Materials (VIAM), Moscow, Russia

**16:00**

**Coffee break**

### Session 4 – Chairman: Helmut Clemens

16:20	Invited talk <b>4.1. Development of Gamma TiAl for Gas Turbine Engines</b> Wilfried Smarsly MTU Aero Engines, Germany
16:50	<b>4.2. Fatigue resistance of a TiAl alloy prepared by SPS</b> Gilbert Henaff, Véronique Pelosin, Yacine Kchaou, Denis Bertheau, Médéric Morisset, Mathieu Comyn University of Poitiers, France
17:10	<b>4.3. A study of deformation mechanisms associated with fatigue fracture surface morphologies in a fully lamellar TiAl-base alloy</b> Rengen Ding <sup>1</sup> , Hangyue Li, David Hu, Nigel Martin, Dixon Mark, Bowen Paul <sup>1</sup> University of Birmingham, UK
17:30	<b>4.4. Fracture of a <math>\gamma</math>-TiAl polycrystal: model versus experiment.</b> Dominique Geoffroy, Eva Héripéré, Jérôme Crépin, Arjen Roos ONERA, Châtillon, France
17:50	<b>4.5. Microstructural Characterisation of Fatigue Fracture Surfaces of Lamellar Ti<sub>45</sub>Al<sub>2</sub>Mn<sub>2</sub>Nb<sub>1</sub>B</b> Jing Yang <sup>1</sup> , Dawei Hu, Hangyue Li, Mark Dixon <sup>1</sup> University of Birmingham, UK

## GAT 2013 Toulouse, France – scientific program

**Wednesday, June 12<sup>th</sup> – Morning**

### Session 5 – Chairman: Volker Guether

08:30	Invited talk <b>5.1. Investment Cast Titanium Aluminide Low Pressure Turbine Blades</b> Paul McQuay PCC Structurals, USA
09:00	<b>5.2. Additive manufacturing of high-niobium titanium aluminide aerospace components: process development and material properties</b> Kourtis Lampros, Iain Todd, Mark W Rainforth University of Sheffield, UK
09:20	<b>5.3. Manufacturing and properties of TiAl TNM sheet materials</b> Matthias Achtermann <sup>1</sup> , Joachim Klose, Christiane Rothe, Ines Eulitz, Volker Guether <sup>1</sup> GfE Metalle und Materialien GmbH, Nuremberg, Germany
09:40	<b>5.4. The recovery of TiAl from the TiPro process by-product by froth flotation</b> Kenneth Sichone, Brian Gabbitas University of Waikato, New Zealand

**10:00**

**Coffee break**

### Session 6 – Chairman: Sara Biamino

10:20	Invited talk <b>6.1. Boron addition in cast TiAl alloys – a double-edged sword</b> Hu D University of Birmingham, UK
10:50	<b>6.2. Boron Effect in GE-TiAl Alloys Prepared by Spark Plasma Sintering</b> Jiangshan Luo <sup>1</sup> , Thomas Voisin, Jean-philippe Monchoux, Alain Couret <sup>1</sup> Research Center of Laser Fusion, Mianyang, China
11:10	<b>6.3. The effect of carbon addition to a <math>\beta</math>-solidifying Ti-43.5Al-4Nb-1Mo-0.1B alloy</b> Emanuel Schwaighofer <sup>1</sup> , Andreas Stark, Janny Lindemann, Helmut Clemens, Volker Güther, Svea Mayer <sup>1</sup> Montanuniversität Leoben, Austria
11:30	<b>6.4. Effect of carbon on microstructures and mechanical behaviors of a new Ti-45Al-3Fe-2Mo alloy</b> Yong Liu, Canxu Zhou, Huang Lan, Congzhang Qiu, Shangru Meng, Wei Zhang, Baiyun Huang Central South University, Changsha, China
11:50	<b>6.5. Microsegregation and omega phase in high Nb containing TiAl</b> Lin Song <sup>1</sup> , Xiangjun Xu, Jian Sun, Junpin Lin <sup>1</sup> University of Science and Technology, Beijing, China

**12:15**

**Lunch**

## GAT 2013 Toulouse, France – scientific program

**Wednesday, June 12<sup>th</sup> – Afternoon**

### Session 7 – Chairman: Junpin Lin

14:00	Invited talk <b>7.1. Third generation Gamma-TiAl alloys: recent developments at Avio</b> Silvia Sabbadini <sup>1</sup> , Federica Pelissero, Mauro Filippini, Stefano Beretta, Sara Biamino <sup>1</sup> Avio S.p.A, Rivalta di Torino - Italy
14:30	Invited talk <b>7.2. One-step near-net shaping of TiAl turbine blades by SPS</b> J.P. Monchoux <sup>1</sup> , T. Voisin, H. Jabbar, Z. Trzaska, L. Durand, M. Thomas, A. Couret <sup>1</sup> CEMES-CNRS, Toulouse, France
15:00	<b>7.3. On the microstructure-property relationships in a PM TiAl-based alloy</b> Marc Thomas, Olivier Berteaux ONERA, Chatillon, France
15:20	<b>7.4. Gamma TiAl by selective electron beam melting: Microstructure and Aluminium loss</b> Schwerdtfeger Jan <sup>1</sup> , Singer Robert F, Körner Carolin <sup>1</sup> University of Erlangen-Nürnberg, Germany
15:40	<b>7.5. Scale-up of SPS for the sintering of TiAl alloys</b> Miguel A. Lagos <sup>1</sup> , Iñigo Agote, Juergen Hennicke <sup>1</sup> Tecalia, San Sebastian - Spain

**16:00**

**Coffee break**

### Posters. Chairmen: Jonathan Paul and Yuyong Chen

16:20 17:30	<b>P.1. Hot Deformation Behavior of TiAl Prepared by Triple VAR Melting</b> Fan Gao, Zhenxi Li Beijing Institute of Aeronautical Materials, China
	<b>P.2. Investigation of fatigue failures of a high-Nb TiAl alloy at different temperatures</b> Min Zhang 1, Xiping Song, Junpin Lin University of Science and Technology, Beijing, China
	<b>P.3. High Temperature Mechanical Properties and Oxidation Resistance of New Gamma TiAl Alloys</b> Seung Eon Kim Korea Institute of Materials Science, Changwon, Gyeongnam - South Korea
	<b>P.4. Surface engineering of gamma-titanium aluminide alloys for combined improvements in environmental durability at elevated temperatures</b> Rossen Yankov <sup>1</sup> , Andreas Kolitsch, Johannes Borany, Patrick Masset, Laurent Bortolotto, Alexander Donchev, Michael Schütze <sup>1</sup> Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany
	<b>P.5. Microstructures and Cyclic Oxidation Behavior of Novel TiAl Alloys</b> J. Hong <sup>1</sup> , D. Kim, D.Y. Seo, S.W Kim, Y.S. Na, S.E. Kim <sup>1</sup> KIMS
	<b>P.6. Microscopic mechanisms of spark plasma sintering in TiAl alloys</b> Zofia Trzaska <sup>1</sup> , Guillaume Bonnefont, Alain Couret, Jean-Philippe Monchoux <sup>1</sup> CEMES-CNRS Toulouse, France
	<b>P.7. Microstructures and Mechanical Properties of TNM-TiAl alloys densified by SPS</b> Thomas Voisin <sup>1</sup> , Jean-Philippe Monchoux, Helmut Clemens, Alain Couret <sup>1</sup> CEMES-CNRS, Toulouse, France
	<b>P.8. Effects of heat treatment on halogenated TNM-B1 alloy with a thermal barrier coating on RT tensile properties and microstructure</b> A. Straubel <sup>1</sup> , C. Leyens, S. Friedle, M. Schütze, N. Laska, R. Braun <sup>1</sup> Technische Universität Dresden, Germany

### Session 8 – Chairmen: Bernard Bewlay and Shigehisa Naka

17:30 19:00	Round Table: Major R&D topics for the future
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## GAT 2013 Toulouse, France – scientific program

**Thursday, June 13<sup>th</sup> – Morning**

### Session 9 – Chairman: Marc Thomas

08:30	Invited talk <b>9.1. High energy X-Rays and neutrons as tools for development of intermetallic titanium aluminides</b> Helmut Clemens Montanuniversitaet Leoben, Austria
09:00	<b>9.2. Crystallographic texture and elastic modulus anisotropy of titanium aluminides based alloys</b> Pavel Panin, Nadezda Nochovnaya, Dmitry Kablov All-Russian Scientific Research Institute of Aviation Materials (VIAM), Moscow, Russia
09:20	<b>9.3. Creep damage characterisation of TiAl based alloy using 3D computed tomography</b> Stanekova Hana, Lapin Juraj Slovak Academy of Sciences, Bratislava, Slovak Republic
09:40	<b>9.4. Atomic-scale simulations of radiation effects in Ti-Al based intermetallic compounds</b> Roman Voskoboinikov Australian Nuclear Science and Technology Organisation, Lucas Heights, Australia

**10:00**

**Coffee break**

### Session 10 – Chairman: Bernard Viguier

10:20	Invited talk <b>10.1. In-situ Observation of Cracking in Gamma Lamellar Alloys</b> Masao Takeyama Tokyo Institute of Technology, Japan
10:50	Invited talk <b>10.2. Modulated Microstructures in Multiphase Titanium Aluminide Alloys: Origin and Design Potential</b> Fritz Appel Helmholtz-Zentrum Geesthacht, Germany
11:20	<b>10.3. Generalized planar fault energies and mechanical twinning in gamma TiAl alloys: relation to stoichiometric effect</b> Jian Sun Shanghai Jiaotong University, China
11:40	<b>10.4. Microstructure sensitive modeling of deformation behavior of a TiAl alloy with variable lamellae thickness</b> Mohammad Rizviul Kabir, Mubeen Shahid, Marion Bartsch Institute of Materials Research, German Aerospace Center

**12:00**

**Buffet lunch**

**13:00**

**Tours to Airbus and to old Toulouse**

**19:30**

**Workshop banquet**

## GAT 2013 Toulouse, France – scientific program

**Friday, June 14<sup>th</sup> – Morning**

### Session 11 – Chairman: Wilfried Smarsly

08:30	Invited talk <b>11.1. Application of ceramic crucible melting for precision-cast and hot-forged TiAl components</b> Toshimitsu Tetsui National Institute for Materials Science, Tsukuba, Japan
09:00	<b>11.2. Development of forging processes for TiAl engine components for aerospace and automotive industries</b> Othman Skalli, Jacques Tschofen Manoir Aerospace-Forges de Bologne, France
09:20	<b>11.3. Microstructure and mechanical properties of low cost TiAl-based precision cast turbocharger wheels</b> Lapin Juraj, Stanekova Hana, Demian Svetozár, Čičman Ján Slovak Academy of Sciences, Bratislava, Slovak Republic
09:40	<b>11.4. Effect of Heat Treatments on Mechanical Properties of Forged Ti-43Al-5V-4Nb Alloy</b> Keiji Kubushiro <sup>1</sup> , Satoshi Takahashi, Masao Takeyama <sup>1</sup> IHI Corporation

**10:00**

**Coffee break**

### Session 12 – Chairman: Svea Mayer

10:20	Invited talk <b>12.1. Crystallography of phase transformations in TiAl-based alloys</b> Emmanuel Bouzy, Alain Hazotte LEM3, Université de Lorraine, Metz, France
10:40	<b>12.2. Thermomechanical analysis of phase transition temperatures on <math>\gamma</math>-TiAl produced by electron beam melting</b> Sara Biamino <sup>1</sup> , Mathieu Ternier, Federica Pelissero, Matteo Pavese, Paolo Fino, Claudio Badini <sup>1</sup> Politecnico di Torino, Torino, Italy
11:00	<b>12.3. <math>\omega</math>-phase formation in a TiAl-Nb-Mo alloy</b> Martin Schloffer Boryana Rashkova, Thomas Schöberl, Zaoli Zhang, Svea Mayer, Helmut Clemens Montanuniversitaet Leoben, Austria
11:20	<b>12.4. Phase transformations in silicon-doped TiAl alloys</b> Antoine Paris <sup>1</sup> , Mikael Perrut, Anne Denquin, Dominique Daloz <sup>1</sup> ONERA, Châtillon, France
11:40	<b>12.5. Effect of V/Nb Combined Addition on Phase Stability of Beta-Ti Phase in TiAl Based Alloy</b> Hirotoyo Nakashima, Masao Takeyama Tokyo Institute of Technology, Japan
12:00	Concluding remarks

**12:15**

**Buffet lunch**