

# 18 | PLANSEE SEMINAR 2013

International Conference on  
Refractory Metals and Hard Materials

Reutte/Austria  
3 – 7 June, 2013

Final Program

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Heinrich Kestler, Lorenz S. Sigl, Dénes Széchényi, Josef Wagner

## Welcome to the 18<sup>th</sup> Plansee Seminar!

I am greatly honored by the many contributions we received upon our call for papers a year ago. The large number of outstanding contributions emphasizes the continued interest in the science and technology of refractory metals and hard materials more than sixty years since the first Plansee Seminar in 1952.

The presentations of the 18<sup>th</sup> Plansee Seminar, both, lectures and posters, cover a wide range of aspects of the powder metallurgy of refractory metals and hard materials. Starting with global overviews of PM markets and R&D trends, they address nearly all disciplines in our industry: from innovations in powder production to processing, materials and their application, from modeling and characterization to the more than ever important topic of recycling. We are very much looking forward to the Plansee Seminar as a platform of scientific and technological exchange as well as a lively meeting-place to establish and foster contacts and relationships in our part of the PM community.

I would like to thank you very much for your effort and commitment to this conference and encourage you to bring in your expertise, be it by presenting a paper or by vividly participating in the discussions.

Let me wish you an enriching seminar week in an inspiring atmosphere!



Heinrich Kestler  
Secretary of the Plansee Seminar

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# Program Overview

| Date      | Sun, 2 June |  | Mon, 3 June   |    | Tue, 4 June  |  |                                   |   |  |  |  |
|-----------|-------------|--|---|----|--|--|-----------------------------------|---|--|--|--|
| Location  | WSH         |  | WSH   | CT | WSH  | CT   | BZ                                |   |  |  |  |
| Time<br>↓ |             |  | 08:00<br>Registration   |    | 08:00<br>Oral RM:<br>Applications  |  |                                   |   |  |  |  |
|           |             |  | 09:00<br>Opening Ceremony   |    |  |  |                                   |   |  |  |  |
|           |             |  | 09:45<br>Opening Session  |    |  |  |                                   |   |  |  |  |
|           |             |  |   |    | 12:00<br>Lunch Break   |  |                                   | 12:20<br>Lunch Break                          |  |  |  |
|           |             |  | 14:00   |    | 13:30<br>Oral HM:<br>Materials 1   |  |                                   | 13:30<br>Oral RM:<br>Modeling &<br>Simulation | 13:30<br>Spec. Int. HM:<br>Powder<br>Production &<br>Recycling |  |  |
|           |             |  | Registration  |    | 15:40<br>Break   |  |                                   | 15:40<br>Break                                | 15:40  |  |  |
|           |             |  |   |    | 16:00<br>Oral RM:<br>Materials 1   | 16:00<br>Poster HM:<br>Applications &<br>Materials |                                   | 16:00<br>Oral HM:<br>Modeling &<br>Simulation | End of Session   |  |  |
|           |             |  |   |    | 17:50<br>End of Sessions   |  |                                   |   | 17:20<br>End of Session  |  |  |
|           |             |  | Welcome Reception (17:00 - 21:00)   |    | Social Evening I (19:30 - 22:30)   |  | Social Evening II (19:30 - 22:30) |   |  |  |  |
|           |             |  | <b>Location Legend</b><br>WSH: Walter Schwarzkopf Hall<br>BZ: Bildungszentrum<br>CT: Ceratizit Building |    | <b>Oral Session Refractory Metals</b><br><b>Poster Session Refractory Metals</b><br><b>Special Interest Session Refractory Metals (oral)</b> |  |                                   |   |  |  |  |

# Program Overview

| Wed, 5 June                                  |  |   | Thu, 6 June                             |   |  | Fri, 7 June                                   |
|--|--|---|---|---|--|---|
| WSH  | CT   | BZ  | WSH                                     | CT  | BZ   | WSH   |
| 08:00<br>Oral HM:<br>Materials 2             |  |   | 08:00<br>Oral HM:<br>PVD 1              | 08:30<br>Spec. Int. RM:<br>Powder<br>Production &<br>Recycling                            |  | 08:30<br>Oral HM:<br>Mechanical<br>Properties |
| 09:40<br>Break                               |  |   | 10:10<br>Break                          |   |  | 10:30<br>Break                                |
| 10:00<br>Oral RM:<br>Materials 2             | 10:10<br>Spec. Int. HM:<br>Trends in<br>Processing |   | 10:30<br>Oral HM:<br>PVD 2              |   | 10:30<br>Poster RM:<br>Modeling,<br>Characterization,<br>Powder<br>Production &<br>Recycling | 10:50<br>Oral RM:<br>Characterization         |
| 12:10<br>Lunch Break                         |  |   | 12:30<br>Lunch Break                    |   |  | 12:50<br>Farewell<br>Address                  |
| 13:30<br>Oral RM:<br>Corrosion               |  | 13:30<br>Poster HM:<br>Modeling,<br>Characterization<br>& Testing | 13:30<br>Oral RM:<br>P/M<br>Processes 1 | 13:30<br>Poster HM:<br>Surface<br>Engineering,<br>Powder, P/M<br>Processes &<br>Recycling |  | 13:00<br>End of Seminar                       |
| 15:40<br>Break                               |  |   | 15:40<br>Break                          | 15:40<br>End of Session   |  |   |
| 16:00<br>Oral HM:<br>CVD                     |  | 16:00<br>Poster RM:<br>P/M Processes                              | 16:00<br>Oral RM:<br>P/M<br>Processes 2 |   |  |   |
| 17:40<br>End of Session                      |  |   | 17:20<br>End of Session                 |   |  |   |
| Conference Dinner<br>(19:30 - 23:30 / 00:30) |  |   |   |   |  |   |

|  |
|--|
| Oral Session Hard Materials                    |
| Poster Session Hard Materials                  |
| Special Interest Session Hard Materials (oral) |

# Oral Sessions

## Monday, 3 June, 09:00 – 09:45 Opening Ceremony

|       |   |   |
|-------|---|---|
|       | <b>Musical Welcome</b>                              | Plansee Werksmusik  |
| 09:00 | <b>Suite in D-major Overture</b><br>G. Ph. Telemann | Chamber Orchestra Reutte<br>Conductor: Tobias Lämmle                    |
|       | <b>Opening Address</b>                              | Bernhard Schretter<br>Member of the Executive Board, Plansee Holding AG |
|       | <b>Les Postillons</b>                               | Chamber Orchestra Reutte  |
|       | <b>Welcome Address</b>                              | Heinrich Kestler<br>Secretary of the Seminar                            |
|       | <b>Fanfare</b>                                      | Chamber Orchestra Reutte  |

## Monday, 3 June, 09:45 – 12:00 Opening Session

Chair: Sigl L.S., PLANSEE SE, Austria  
Kestler H., PLANSEE SE, Austria  
Location: Walter Schwarzkopf Hall, WSH

|               |      |  |
|---------------|------|--|
| 09:45         | OS 1 | <b>Leadership, Innovation, Globalization:<br/>Challenges and Opportunities in a Globalized World</b><br><u>Simon H.*</u><br>*Simon-Kucher & Partners, Germany  |
| 10:30         | OS 2 | <b>Global Trends in the PM Refractory Metals Industry</b><br><u>Shashkov D.*</u><br>*H.C. Starck Inc., USA   |
| 11:00         | OS 3 | <b>Global R&amp;D Trends in the P/M Hard Metals Industry</b><br><u>Norgren S.</u> , Garcia J.**, Blomqvist A.**, Yin L.***<br>*Sandvik Mining R&D Rock Tools, Sweden<br>**Sandvik Coromant R&D, Sweden<br>***Sandvik Hard Materials R&D, China |
| 11:30         | OS 4 | <b>A Sustainable Pathway for the Recovery and Recycling of Refractory Metals:<br/>A Strategy for the Management of Critical Materials</b><br><u>Apelian D.*</u><br>*Worcester Polytechnic Institute, USA                                       |
| 12:00 – 13:30 |      | <b>Lunch Break</b>   |



# Oral Sessions

## Monday, 3 June, 13:30 – 15:40 Hard Materials – Materials 1

- Chair: Lengauer W., Vienna University of Technology, Austria  
Song X., Beijing University of Technology, China
- Location: Walter Schwarzkopf Hall, WSH
- 13:30 HM 1 Fabrication of Functionally Graded WC-Co Using a Novel Carburizing Process (Keynote)**  
Fang Z.Z.\*, Fan P.\*, Xu W.\*\*, Kyusup H.\*, Haitao W.\*\*, Jun G.\*  
\*University of Utah, USA  
\*\*Heavystone Lab LLC, USA
- 14:00 HM 2 Design of Graded Cemented Carbides with Fe-Ni-Co Binders Assisted by Thermodynamic and Kinetic Modeling**  
García J.\*  
\*Sandvik Coromant R&D, Sweden
- 14:20 HM 3 Understanding Cobalt Layer Formation: In Situ Observation and New Insights on the Mechanism**  
Sachet E.\*, Mühlbauer G.\*\*, Yukimua J.\*\*\*, Kubo Y.\*\*\*, Schubert W.-D.\*\*  
\*North Carolina State University, USA  
\*\*Vienna University of Technology, Austria  
\*\*\*Hitachi Tool Engineering, Ltd., Japan
- 14:40 HM 4 Cobalt Capping: A Technique for Improving the Transverse Rupture Strength, Fracture Toughness and Wettability by Braze Alloys of WC-Co Hardmetals**  
Konyashin I.\*, Hlawatschek S.\*, Ries B.\*, Lachmann F.\*, Vukovic M.\*  
\*Element Six GmbH, Germany
- 15:00 HM 5 Miraculous Long-range Migration Behavior of Rare Earth Additives in WC-Co Cemented Carbides**  
Zhang L.\*, Chen S.\*\*, Wang Z.\*, Chen Z.\*\*  
\*State Key Laboratory of Powder Metallurgy, Central South University, China  
\*\*Changsha Mining and Metallurgy Research Institute Co., Ltd., China
- 15:20 HM 6 Effect of Carbon Activity on the Shape and Size Distribution of WC**  
Borgh I.\*, Hedström P.\*, Persson T.\*\*, Norgren S.\*\*\*, Borgenstam A.\*, Ågren J.\*, Odqvist J.\*  
\*KTH Royal Institute of Technology, Sweden  
\*\*Seco Tools AB, Sweden  
\*\*\*Sandvik Mining R&D Rock Tools, Sweden
- 15:40 – 16:00 Break**

# Oral Sessions

## Monday, 3 June, 16:00 – 17:50 Refractory Metals – Materials 1

Chair: Danninger H., Vienna University of Technology, Austria

Knabl W., PLANSEE SE, Austria

Location: Walter Schwarzkopf Hall, WSH

### 16:00 RM 1 Recovery and Recrystallization Behavior of Technically Pure Molybdenum (Keynote)

Primig S., Leitner H.\*, Knabl W.\*\*, Lorich A.\*\*, Stickler R.\*\*\*

\*Montanuniversität Leoben, Austria

\*\*PLANSEE SE, Austria

\*\*\*University of Vienna, Austria

### 16:30 RM 2 Strengthening Mechanisms of the Molybdenum Based Alloy MHC

Pöhl C.\*, Lang D.\*, Schatte J.\*\*, Leitner H.\*

\*Montanuniversität Leoben, Austria

\*\*PLANSEE SE, Austria

### 16:50 RM 3 The Study on High Temperature Stability of Carbon in Carbon-Added Molybdenum and TZM Alloy

Kadokura T.\*, Hiraoka Y.\*\*, Itohara T.\*\*, Ikegaya A.\*

\*A.L.M.T. Corp., Japan

\*\*Okayama University of Science, Japan

### 17:10 RM 4 Structural Mo-Ti-Zr-C Alloys: Room for Improvement?

Lipkin D.\*, Rogers K.\*\*

\*GE Global Research, USA

\*\*GE Healthcare, USA

### 17:30 RM 5 Thermal Analysis, Transformations and Properties of Pt- and Pd-Alloyed Zr-Nb Alloys

Gasik M.\*, Nomura N.\*\*, Kondo R.\*\*, Hanawa T.\*\*

\*Aalto University School of Chemical Technology, Finland

\*\*Tokyo Medical and Dental University, Japan

17:50 End of Session

## Tuesday, 4 June, 08:00 – 10:00 Refractory Metals – Applications

Chair: Zeiler B., International Tungsten Industry Association, United Kingdom

Winkler J., PLANSEE SE, Austria

Location: Walter Schwarzkopf Hall, WSH

### 08:00 RM 6 Substitution of Thoria Additions by Lanthanum-Oxide Doping in Electrodes for Atmospheric Plasma Spraying

Heißl M.\*, Mitterer C.\*, Granzer T.\*\*, Schröder J.\*\*, Kathrein M.\*\*\*

\*Montanuniversität Leoben, Austria

\*\*PLANSEE Composite Materials GmbH, Germany

\*\*\*PLANSEE SE, Austria

# Oral Sessions

- 08:20 RM 7 **Tungsten Heavy Alloys for Collimators and Shieldings in the X-Ray Diagnostics**  
Handtrack D., Tabernig B.\*, Kestler H.\*, Pohl P.\*, Glatz W.\*, Sigl L.S.\*  
\*PLANSEE SE, Austria
- 08:40 RM 8 **Development of Tungsten-Based Materials for Fusion Engineering Applications**  
Smith G., Armstrong D.\*, Beck C.\*, Edmondson P.\*, Gibson J.\*, Hanna L.\*, Xu A.\*, Yi X.\*, Grant P.S.\*, Marrow J.\*, Moody M.\*, Roberts S.G.\*  
\*Oxford University, United Kingdom
- 09:00 RM 9 **Recent Advances in Ta Thin Film Applications**  
Abouaf M., Kumar P.\*  
\*H.C. Starck Inc., USA
- 09:20 RM 10 **Co-sputtered Mo-W and Mo-Nb Thin Films**  
Sun S.\*, Zhang Q.\*, Rozak G.\*, Dary F.\*  
\*H.C. Starck, USA
- 09:40 RM 11 **Molybdenum and Tungsten Trioxides and Their Solid Solution for Germ-Free Surfaces**  
Guggenbichler J.P., Lackner M.\*  
\*AMiSTec GmbH & Co. KG, Austria
- 10:00 – 10:20 **Break**

## Tuesday, 4 June, 10:20 – 12:20 Hard Materials – Applications

Chair: van den Berg H., Kennametal Shared Services GmbH, Germany  
Schleinkofer U., CERATIZIT Austria GmbH, Austria

Location: Walter Schwarzkopf Hall, WSH

- 10:20 HM 7 **Precipitation of  $M_7C_3$  Carbides During Sintering of TiCN-WC-Ni-Co-Cr Alloys Used in Hot Rolling Applications**  
Iparraguirre I.\*, Rodriguez N.\*, Ibarreta F.\*\*, Martinez R.\*\*, Sánchez-Moreno J.M.\*  
\*CEIT-Centro de Estudios e Investigaciones, Spain  
\*\*FMD-CARBIDE, Spain
- 10:40 HM 8 **New Applications for Polymer Matrix Materials Based on Hard Material Fillers**  
Kayser A., Uibel K.\*, Grimm F.\*  
\*ESK Ceramics GmbH & Co.KG, Germany
- 11:00 HM 9 **Investigations on Adhesive Wear Mechanism in Turning of Stainless Steels**  
Collin M., Odelros S.\*, Embretzén P.-O.\*, Östby J.\*  
\*Sandvik Coromant, Sweden
- 11:20 HM 10 **Effect of Gradation by Reactive Imbibition on Commercial WC-Co Drilling Tools Used in Oil and Gas Industries**  
Ther O., Colin C.\*, Gerbaud L.\*, Dourfaye A.\*\*  
\*Mines Paristech, France  
\*\*Varel Europe, France

# Oral Sessions

- 11:40 HM 11 **Chromium Containing TiAlN Coatings for Metal Cutting**  
Kohlscheen J.\*, van den Berg H.\*  
\*Kennametal Shared Services GmbH, Germany
- 12:00 HM 12 **A Tribological Approach Towards Engineering the Wear Behavior of PVD Coatings**  
Morstein M.\*, Dessarzin P.\*, Karvankova P.\*  
\*PLATIT AG, Switzerland
- 12:20 – 13:30 Lunch Break

## Tuesday, 4 June, 13:30 – 15:40 Refractory Metals – Modeling & Simulation

Chair: Coube O., European Powder Metallurgy Association, France  
Plankensteiner A., PLANSEE SE, Austria

Location: Walter Schwarzkopf Hall, WSH

- 13:30 RM 12 **Studying Target Erosion in Sputtering Magnetrons Using a Discrete Numerical Model (Keynote)**  
Feist C.\*, Plankensteiner A.\*\*\*, Linke C.\*\*\*, Kuniya T.\*\*\*, Winkler J.\*\*  
\*CENUMERICS, Austria  
\*\*PLANSEE SE, Austria, \*\*\*PLANSEE Japan Ltd., Japan
- 14:00 RM 13 **Towards a Multiphysics Finite Element Model for Arc Erosion Simulation**  
Röthlisberger A.\*, Vüllers F.T.N.\*, Kowanda C.\*\*, Müller F.E.H.\*\*, Diener M.\*, Spolenak R.\*  
\*Laboratory for Nanometallurgy, ETH Zurich, Switzerland  
\*\*PLANSEE Powertech AG, Switzerland
- 14:20 RM 14 **Atomistic Modelling of Refractory Metals with Analytic Bond-Order Potentials: Application to Interface Energies Between bcc-W and Al5-W**  
Hammerschmidt T.\*, Cak M.\*, Drautz R.\*  
\*Ruhr-University Bochum, Germany
- 14:40 RM 15 **Phase Equilibria in the Nb-Cr-B System**  
Coelho G.C.\*, Rego C.E.\*\*, Gigolotti J.C.J.\*, Silva A.A.A.P.\*\*\*, Nunes C.A.\*\*\*\*, David N.\*\*\*\*, Fiorani J.M.\*\*\*\*, Vilasi M.\*\*\*\*  
\*Universidade de Sao Paulo (USP) and Centro Universitario de Volta Redonda (UniFOA), Brazil  
\*\*Centro Universitario de Volta Redonda (UniFOA), Brazil  
\*\*\*Universidade de Sao Paulo (USP) and Universite de Lorraine, Insitut Jean Lamour, Brazil  
\*\*\*\*Universidade de Sao Paulo (USP), Brazil, \*\*\*\*\*Universite de Lorraine, Insitut Jean Lamour, France
- 15:00 RM 16 **Numerical Simulation of Refractory Metals and Cemented Carbides in the Regime of Powder Filling and Powder Transfer**  
Grohs C.\*, Plankensteiner A.\*, Schiochet Nasato D.\*\*, Kloss C.\*\*\*  
\*PLANSEE SE, Austria  
\*\*Johannes Kepler University, Austria  
\*\*\*DCS Computing GmbH, Austria
- 15:20 RM 17 **Fracture Toughness and Useful Life Modeling of Mo Rotary Targets**  
Bhattacharyya A.\*, Gaydos M.\*, Abouaf M.\*  
\*H.C. Starck Inc., USA
- 15:40 – 16:00 Break

# Oral Sessions

## Tuesday, 4 June, 13:30 – 15:40 Special Interest Session: Hard Materials – Powder Production and Recycling

Chair: Trasorras J.R.L., Global Tungsten & Powders Corp., USA

Schubert W.-D., Vienna University of Technology, Austria

Location: CERATIZIT Building, CT

- 13:30 HM 13 Review of the Hardmetal Recycling Market and the Role of the Zinc Process as a Recycling Option (Keynote)**  
Karhuma T., Kurkela M.\*  
\*Tikomet Oy, Finland
- 14:00 HM 14 Numerical Simulation of Organic Binder Decomposition During Thermal Debinding**  
Kraft T., Schmidt I.\*, Riedel H.\*, Svoboda J.\*\*  
\*Fraunhofer Institute for Mechanics of Materials IWM, Germany  
\*\*Academy of Sciences Brno, Czech Republic
- 14:20 HM 15 Effect of WC Material Properties and Milling Parameters on the Grain Size and Sintering Behaviour of Coarse WC Powder**  
Johansson A.\*, Persson T., Laarz E.\*  
\*Seco Tools AB, Sweden
- 14:40 HM 16 Property Changes Induced in Sub-Micron WC Through Various Final Milling Techniques**  
Cook R.\*  
\*Global Tungsten & Powders Corp., USA
- 15:00 HM 17 Rim-Nitrided WC Powder: Preparation, Properties and Use for Hardmetals**  
Wetzel M.\*, Lengauer W.\*\*, Wawrzik S.\*\*\*, Buchegger C.\*\*  
\*TU Bergakademie Freiberg, Germany  
\*\*Vienna University of Technology, Austria
- 15:20 HM 18 Analysis of WC with Increased Ta Doping**  
Weidow J.\*, Schubert W.-D.\*\*\*, Halwax E.\*\*  
\*Chalmers University of Technology, Sweden  
\*\*Vienna University of Technology, Austria
- 15:40 – 16:00 Break**

## Tuesday, 4 June, 16:00 – 17:20 Hard Materials – Modeling & Simulation

Chair: Fang Z.Z., University of Utah, USA

Magin M., CERATIZIT Luxembourg S.à.r.l., Luxembourg

Location: Walter Schwarzkopf Hall, WSH

- 16:00 HM 19 Strength of WC/WC Grain Boundaries in WC-Co from Atomistic Calculations**  
Petisme M.\*, Johansson S.\*\*\*, Wahnström G.\*  
\*Chalmers University of Technology, Sweden  
\*\*Sandvik, Sweden

# Oral Sessions

- 16:20    HM 20    **Numerical Simulation of Microcrack Initiation and Propagation in WC/Co-Hardmetal Under Fatigue Loading Using a Hybrid FEM-XFEM Damage Model**  
Özden U.A.\*, Bezold A.\*, Broeckmann C.\*  
\*IWM RWTH Aachen University, Germany
- 16:40    HM 22    **Nanometer-Thick Equilibrium Films in Doped Cemented Carbides**  
Johansson S.\*, Wahnström G.\*\*  
\*Sandvik Coromant R&D, Sweden  
\*\*Chalmers University of Technology, Sweden
- 17:00    HM 23    **Applying Computational Thermodynamic and Kinetics to Analyse the Effect of N in Hardmetals**  
Frisk K.\*, Borgh I.\*\*, Markström A.\*\*\*, Lindwall G.\*, Norgren S.\*\*\*\*  
\*Swerea KIMAB, Sweden  
\*\*KTH Royal Institute of Technology, Sweden  
\*\*\*Thermo-Calc Software AB, Sweden  
\*\*\*\*Sandvik Mining R&D Rock Tools, Sweden
- 17:20                    **End of Session**

## Wednesday, 5 June, 08:00 – 09:40    Hard Materials – Materials 2

Chair:                    Vleugels J., Katholieke Universiteit Leuven, Belgium  
                              Andrén H.-O., Chalmers University of Technology, Sweden  
Location:                Walter Schwarzkopf Hall, WSH

- 08:00    HM 24    **A Study of the Decomposition of the Mixed (Ti,Zr)C Phase**  
Borgh I.\*, Hedström P.\*, Blomqvist A.\*\*, Århammar C.\*\*, Ågren J.\*, Odqvist J.\*  
\*KTH Royal Institute of Technology, Sweden  
\*\*Sandvik Machining Solutions, Sweden
- 08:20    HM 26    **Optimization of WC Particle Size, Ni Binder Content and Mo<sub>2</sub>C Addition for Improved SPS WC-TiC-Ni Cemented Carbides**  
Genga R.\*, Cornish L.\*, Akdogan G.\*\*  
\*University of the Witwatersrand, South Africa  
\*\*University of Stellenbosch, South Africa
- 08:40    HM 27    **Hot Press Sintering of Hard Material Master Alloys Synthesized in Situ by Mechanically Induced Self-Sustaining Reaction**  
Córdoba J.M.\*, Chicardi E.\*, Lences Z.\*\*, Gotor F.\*  
\*Materials Science Institute of Seville, Spain  
\*\*Slovak Academy of Science, Slovakia
- 09:00    HM 28    **Microstructure Evolution of Nanocrystalline WC-10Co Hardmetals During Sintering**  
Lin C.\*, Cao R.\*, Lin Z.\*, Li Y.\*  
\*General Research Institute for Non-ferrous Metals, China
- 09:20    HM 29    **Nanoscaled Hardmetals - Fiction or Reality?**  
Richter V.\*, Pötschke J.\*, Holke R.\*\*, Michaelis A.\*  
\*Fraunhofer IKTS, Germany
- 09:40 – 10:00        **Break**

# Oral Sessions

## Wednesday, 5 June, 10:00 – 12:10 Refractory Metals – Materials 2

Chair: German R., San Diego State University, USA  
Karpov M., Institute of Solid State Physics, RAS, Russia  
Location: Walter Schwarzkopf Hall, WSH

- 10:00 RM 18 Microalloying of Mo-Si Alloys as a Key for the Development of Ultrahigh Temperature Mo-Borosilicide Alloys (Keynote)**  
Heilmaier M., Schliephake D.\*, Krüger M.\*\*  
\*Karlsruhe Institute of Technology, Germany  
\*\*Otto-von-Guericke Universität Magdeburg, Germany
- 10:30 RM 19 Bibliographical Survey on the Development of Tungsten Heavy Alloys**  
Cury R.\*  
\*PLANSEE Tungsten Alloys, France
- 10:50 RM 20 Development of Tungsten-Copper Functionally Graded Materials via Ultrafine Composite Powder for Fusion Applications**  
Yu Y., Song J.\*, Peng F.\*, Zhuang Z.\*\*, Lian Y.\*\*\*, Liu X.\*\*\*  
\*Xiamen Honglu Tungsten & Molybdenum Industry Co. Ltd, China  
\*\*China National R&D Center for Tungsten Technology, Xiamen Tungsten Co. Ltd, China  
\*\*\*Fusion Reactor Design & Material Division, Southwestern Institute of Physics, China
- 11:10 RM 21 Ductilisation of W: Syntheses, Analyses and Characterization of W-Laminates Made of W-Foils**  
Reiser J., Rieth M.\*, Dafferner B.\*, Hoffmann A.\*\*  
\*Karlsruhe Institute of Technology, Germany  
\*\*PLANSEE SE, Austria
- 11:30 RM 22 The Use of Ultra-Fine Rhenium Powder for Demanding Applications**  
Bryskin B., Kostylev A.\*\*, Lumpov A.\*\*, Troshkina I.\*\*\*  
\*Bryskin Metallurgical Consulting, USA  
\*\*FSUE Khlopin Radium Institute RPA, Russia  
\*\*\*Mendeleev University of Chemical Technology, Russia
- 11:50 RM 23 Integrally Directionally Solidified Microstructure and Mechanical Properties of Nb-Ti-Si Based Ultrahigh Temperature Alloys**  
Guo H., Guo X.\*\*, Zheng X.J.\*, Zhao H.L.\*  
\*Western Metal Materials Co., Ltd, China  
\*\*Northwestern Polytechnical University, China
- 12:10 – 13:30 Lunch Break**

# Oral Sessions

## Wednesday, 5 June, 10:10 – 12:10 Special Interest Session: Hard Materials – Trends in Processing

Chair: Smid I., Pennsylvania State University, USA  
Useldinger R., CERATIZIT Luxembourg S.à r.l., Luxembourg  
Location: CERATIZIT Building, CT

- 10:10 HM 30 Thermal Spraying – A Technology for Hardmetal Coating Solutions**  
Berger L.-M., Thiele S.\*\*  
\*Fraunhofer Institut IWS, Germany  
\*\*Fraunhofer Institut IKTS, Germany
- 10:30 HM 31 Development of a HVOF WC Based Thick Coating**  
He J.\*, Perdikaris C.\*, Wolfe T.A.\*, Jewett T.\*  
\*Global Tungsten & Powders Corp., USA
- 10:50 HM 32 Rapid Synthesis of Ultrafine WC-Co Cemented Carbides**  
Song X.\*, Liu X.\*, Wei C.\*, Wang H.\*, Gao Y.\*  
\*Beijing University of Technology, China
- 11:10 HM 33 Characterisation of Gas Reactions During Ceramic and Hardmetal Production**  
Gestrich T.\*, Jaenicke-Roessler K.\*, Herrmann M.\*, Neher R.\*  
\*Fraunhofer Institute IKTS Dresden, Germany
- 11:30 HM 34 On the Interaction of Alumina During Sintering of Cemented Carbides**  
Bichler A.\*, Dalbauer V.\*\*\*, Sachet E.\*\*\*, Schubert W.D.\*\*  
\*Wolfram Bergbau und Hütten AG, Austria  
\*\*Vienna University of Technology, Austria  
\*\*\*North Carolina State University, USA
- 11:50 HM 35 Selective Laser Sintering of Tungsten Carbide Inlays for Local Wear Protection of Injection Molding Tools**  
Koehler H.\*, Seefeld T.\*, Vollertsen F.\*  
\*BIAS - Bremer Institut für angewandte Strahltechnik, Germany
- 12:10 – 13:30 Lunch Break**

## Wednesday, 5 June, 13:30 – 15:40 Refractory Metals – Corrosion

Chair: Mori G., Montanuniversität Leoben, Austria  
Abouaf M., H.C. Starck Inc., USA  
Location: Walter Schwarzkopf Hall, WSH

- 13:30 RM 24 Mo-Si-B Alloys for Ultra-High Temperature Applications (Keynote)**  
Perepezko J.H.\*  
\*Department of Materials Science and Engineering, University of Wisconsin-Madison, USA
- 14:00 RM 25 Corrosion of Molybdenum in Cooling Water**  
Holzer C.\*, Vichytil C.\*, Mori G.\*, Linke C.\*\*  
\*Montanuniversität Leoben, Austria  
\*\*PLANSEE SE, Austria



# Oral Sessions

- 14:20 RM 26 **Electrochemical Corrosion of Molybdenum Electrodes in Soda-Lime Glass Containing Antimony**  
Bölitz M.-C.\*, Holzknrecht R.\*\*<sup>\*</sup>, Völkl R.\*<sup>\*</sup>, Traxler H.\*\*<sup>\*</sup>, Glatzel U.\*  
<sup>\*</sup>University Bayreuth, Germany  
<sup>\*\*</sup>PLANSEE SE, Austria
- 14:40 RM 27 **The Effect of Chromium and Palladium on Oxidation Resistance of Tungsten**  
Makonovitsky A.\*, Shneck R.\*\*<sup>\*</sup>, Hessel S.\*\*<sup>\*\*\*</sup>  
<sup>\*</sup>Metal-Tech Ltd. / Department of Materials Engineering, Ben Gurion University of the Negev, Israel  
<sup>\*\*</sup>Department of Materials Engineering, Ben Gurion University of the Negev, Israel  
<sup>\*\*\*</sup>Metal-Tech Ltd., Israel
- 15:00 RM 28 **On the Oxidation Behavior and Protection of Niobium Silicide In-Situ Composites**  
Portebois L.\*<sup>\*</sup>, Knittel S.\*\*<sup>\*</sup>, Drawin S.\*\*<sup>\*\*\*</sup>, Vilasi M.\*, Mathieu S.\*  
<sup>\*</sup>Universite de Lorraine, France  
<sup>\*\*</sup>SNECMA, France  
<sup>\*\*\*</sup>ONERA, France
- 15:20 RM 29 **Freeze-Dried Molybdenum Solid Standards: Preparation and Characterization**  
Dang T.\*<sup>\*</sup>, Lunk H.-J.\*, Otis J.\*<sup>\*</sup>, Bard T.\*  
<sup>\*</sup>Global Tungsten & Powders Corp., USA
- 15:40 – 16:00 Break

## Wednesday, 5 June, 16:00 – 17:40 Hard Materials – Chemical Vapor Deposition

Chair: Rupp S., Walter AG, Germany  
Czettl Ch., CERATIZIT Austria GmbH, Austria  
Location: Walter Schwarzkopf Hall, WSH

- 16:00 HM 36 **CVD Ti<sub>1-x</sub>Al<sub>x</sub>N Coatings for Large Scale Production**  
Holzschuh H.\*, Bürgin W.\*  
<sup>\*</sup>SuCoTec AG, Switzerland
- 16:20 HM 37 **Novel TiAlN Coating by Medium Temperature Low Pressure CVD**  
Pitonak R.\*, Koepf A.\*<sup>\*</sup>, Weissenbacher R.\*<sup>\*</sup>, Keckes J.\*\*<sup>\*</sup>, Stefanelli M.\*\*<sup>\*</sup>, Todt J.\*\*<sup>\*</sup>, Endler I.\*\*<sup>\*\*\*</sup>, Höhn M.\*\*<sup>\*\*\*</sup>  
<sup>\*</sup>Boehlerit GmbH & Co. KG, Austria  
<sup>\*\*</sup>Montanuniversität Leoben, Austria  
<sup>\*\*\*</sup>Fraunhofer IKTS-Dresden, Germany
- 16:40 HM 38 **Structure and Properties of Al<sub>2</sub>O<sub>3</sub> Coatings Prepared by LPCVD with AlCl<sub>3</sub> and N<sub>2</sub>O**  
Höhn M.\*, Endler I.\*  
<sup>\*</sup>Fraunhofer Institut IKTS Dresden, Germany
- 17:00 HM 39 **Thermal Stability and Cutting Performance of Titanium or Zirconium Doped κ-Al<sub>2</sub>O<sub>3</sub> Coatings by Chemical Vapor Deposition**  
Okude M.\*, Tomita K.\*<sup>\*</sup>, Yamaguchi K.\*<sup>\*</sup>, Osada A.\*<sup>\*</sup>  
<sup>\*</sup>Mitsubishi Materials Corporation, Japan

# Oral Sessions

17:20 HM 40 **Thermal Stress Relaxation of Dry-Blasted  $\alpha$ - and  $\kappa$ - $\text{Al}_2\text{O}_3$  CVD Hard Coatings**  
Schalk N.\*, Mitterer C.\*\*, Czettl C.\*\*\*, Penoy M.\*\*\*\*, Michotte C.\*\*\*\*  
\*Materials Center Leoben Forschung GmbH, Austria  
\*\*Montanuniversität Leoben, Austria  
\*\*\*CERATIZIT Austria GmbH, Austria  
\*\*\*\*CERATIZIT Luxembourg S.à.r.l., Luxembourg

17:40 End of Session

## Thursday, 6 June, 08:00 – 10:10 Hard Materials – Physical Vapor Deposition 1

Chair: Mitterer Ch., Montanuniversität Leoben, Austria

Yamamoto K., Kobe Steel Ltd., Japan

Location: Walter Schwarzkopf Hall, WSH

08:00 HM 42 **Combinatorial Materials Science: From Materials Discovery and Optimization to Materials Design Approaches for Thin Films and Bulk Materials (Keynote)**  
Schneider J.M.\*  
\*RWTH Aachen University, Germany

08:30 HM 43 **Impact of Al on Structure and Mechanical Properties of NbN and TaN**  
Zehua Z.\*, Rachbauer R.\*, Holec D.\*, Mayrhofer P.\*\*  
\*Montanuniversität Leoben, Austria  
\*\*Vienna University of Technology, Austria

08:50 HM 44 **About the Synthesis of Next Generation High Oxidation Resistant Hard Coatings by Means of Novel High Ionization Hybrid PVD Processing**  
Erkens G.\*, Vetter J.\*, Müller J.\*, Krienke T.\*  
\*Sulzer Metaplas GmbH, Germany

09:10 HM 45 **Phase Formation at the Surface of Al-Hf Targets in Reactive Cathodic Arc Evaporation and the Correlation with the Synthesized Coatings**  
Maeder X.\*, Döbeli M.\*\*, Dommann A.\*, Neels A.\*, Polcik P.\*\*\*, Rachbauer R.\*\*\*\*, Rudigier H.\*\*\*\*, Widrig B.\*\*\*\*, Ramm J.\*\*\*\*\*  
\*Centre Suisse d'Electronique et de Microtechnique CSEM SA, Switzerland  
\*\*Ion Beam Physics, ETH Zurich, Switzerland  
\*\*\*PLANSEE Composite Materials GmbH, Germany  
\*\*\*\*OC Oerlikon Balzers AG, Liechtenstein

09:30 HM 46 **Influence of Si on the Arc Evaporation Behaviour of Al-Cr Targets and Structural Evolution of  $(\text{Al}_{0.7}\text{Cr}_{0.3})\text{O}_3$  Oxide Coatings**  
Paulitsch J.\*, Rachbauer R.\*\*, Ramm J.\*\*\*, Polcik P.\*\*\*, Mayrhofer P.H.\*\*\*\*  
\*Christian Doppler Laboratory for Application Oriented Coating Development at the Institute of Materials Science and Technology, Vienna University of Technology, Austria  
\*\*OC Oerlikon Balzers AG, Liechtenstein  
\*\*\*PLANSEE Composite Materials GmbH, Germany  
\*\*\*\*Institute of Materials Science and Technology, Vienna University of Technology, Austria

# Oral Sessions

**09:50 HM 47 Spatial Correlation of Tensile Residual Stress and Thermal Fatigue Damage in Coated Cemented Carbide Milling Inserts**

Tepperneegg T., Kluensner T., Tritremmel C., Czetti C., Keckes J., Wroblewski T., Ebner R., Pippan R.

\*Materials Center Leoben Forschung GmbH, Austria

\*\*CERATIZIT Austria GmbH, Austria

\*\*\*Montanuniversität Leoben, Austria

\*\*\*\*HASYLAB, DESY, Germany

\*\*\*\*\*Erich Schmid Institute of Materials Science, Austria

**10:10 – 10:30 Break**

## Thursday, 6 June, 08:30 – 10:10 Special Interest Session: Refractory Metals – Powder Production and Recycling

Chair: Apelian D., Worcester Polytechnic Institute, USA  
Guzmán M.E., Molibdenos y Metales S.A., Chile

Location: CERATIZIT Building, CT

**08:30 RM 30 Thermal Plasma Decomposition as the Production Method of Metal Powders**

Woch M., Lis M., Kolacz D., Kami ska M., Staszewski M.

\*Institute of Non-Ferrous Metals, Gliwice, Poland

**08:50 RM 31 Processing of Tungsten Values of Flot-Grade Tungsten Ore Concentrates via the High Temperature-Roasting in Sodium Carbonate**

Singh Gaur R.P., Braymiller S.A., Wolfe T.A.

\*Global Tungsten & Powders Corp., USA

**09:10 RM 32 Aqueous Process Modeling to Determine of Free Energy of Formation for Ammonium Paratungstate and Future Process Capabilities**

Christian J.B., Trasorras J.R.

\*Global Tungsten & Powders Corp., USA

**09:30 RM 33 Ammonium Metatungstate Produced via Roasting of Ammonium Paratungstate**

Lunk H.-J., Fait M.J.G., Feist M., Frisk T.A.

\*Global Tungsten & Powders Corp., USA

\*\*Leibniz-Institut für Katalyse, Germany

\*\*\*Humboldt-Universität zu Berlin, Institut für Chemie, Germany

\*\*\*\*Global Tungsten & Powders Corp., Germany

**09:50 RM 34 Formation and Growth of Columnar-Shape W-Cu Oxide Particle**

Tao L., Jinglian F., Yaofeng G.

\*Central South University, China

**10:10 – 10:30 Break**

# Oral Sessions

## Thursday, 6 June, 10:30 – 12:30 Hard Materials – Physical Vapor Deposition 2

Chair: Mayrhofer P., Vienna University of Technology, Austria  
Polcik P., PLANSEE Composite Materials GmbH, Germany  
Location: Walter Schwarzkopf Hall, WSH

- 10:30 HM 48 Means to Improve Thermal Stability of TiAlN Hard Coatings**  
Oden M.\*  
\*Linköping University, Sweden
- 10:50 HM 49 Microstructure of Cathodic Arc Evaporated (Al,Ti)N Hard Coatings Deposited at Different Orientations to the Target**  
Rafaja D.\*, Wüstefeld C.\*, Heger D.\*, Šíma M.\*\*, Jílek M.\*\*  
\*TU Bergakademie Freiberg, Germany  
\*\*SHM Sump perk, Czech Republic
- 11:10 HM 50 Advances in Deposition Equipment and Process Technology for HiPIMS Coatings for Cutting Tools**  
Hultman L.\*, Greczynski G.\*, Lemmer O.\*\*\*, Leyendecker T.\*\*, Schiffers C.\*\*  
\*Linköping University, Sweden  
\*\*CemeCon AG, Germany
- 11:30 HM 51 Application of (Ti,Cr,Al,Si)N PVD Coatings in Hard Machining of PM High Speed Steel**  
Bobzin K.\*, Klocke F.\*\*\*, Arntz K.\*\*\*, Baccivan N.\*, Ewering M.\*, Stalpers L.\*, Brugnara R.H.\*  
\*RWTH Aachen University, Germany  
\*\*Fraunhofer Institute for Production Technology, Germany
- 11:50 HM 52 Effect of Grain Size of Targets on Arc Behavior and Coating Characteristics for AlTiN and AlCrN Coatings Deposited by CARC<sup>+</sup> Technology from Powder Metallurgical Targets**  
Papa F.\*, Viskocil J.\*\*, Polcik P.\*\*\*  
\*Hauzer Techno Coating BV, The Netherlands  
\*\*HVM PLasma Ltd., Czech Republic  
\*\*\*PLANSEE Composite Materials GmbH, Germany
- 12:10 HM 53 Development of New Cathodic Arc Source and its Application**  
Yamamoto K.\*, Abe M.\*, Tanifuji S.\*  
\*Kobe Steel Ltd., Japan
- 12:30 – 13:30 Lunch Break**

## Thursday, 6 June, 13:30 – 15:40 Refractory Metals – P/M Processes 1

Chair: Kieback B., Fraunhofer IFAM /TU Dresden, Germany  
Tabernig B., PLANSEE SE, Austria  
Location: Walter Schwarzkopf Hall, WSH

- 13:30 RM 35 Self-Similar Microstructure and Property Trajectories for Sintering (Keynote)**  
German B.\*  
\*San Diego State University, USA

# Oral Sessions

- 14:00 RM 36 **Mass Production and Joining via Multicomponent Tungsten Powder Injection Molding**  
Antusch S., Plotter V., Rieth M.\*  
\*KIT-IAM, Germany
- 14:20 RM 37 **Microstructure and Compression Strength of Fast Sintered Mo-TiC Composites**  
Martin U., Ohser-Wiedemann R.\*, Weck C.\*, Martin S.\*, Korpala G., Oertel C.-G.\*\*  
\*Technische Universität Bergakademie Freiberg, Germany  
\*\*Technische Universität Dresden, Germany
- 14:40 RM 38 **Preparation and Properties of W-TiC with Ultra-Fine Grain by SPS Sintering Method**  
Xiang C., Liu H., Huang Y., Zhang H.\*, Li Z.\*, Tang H.\*  
\*Northwest Institute for Non-ferrous Metal Research, China
- 15:00 RM 39 **Laser Additive Manufacturing - A New Manufacturing Technology for Parts of Composites with Refractory Metals?**  
Weisheit A., Dobrzanski D.\*, Valentin M.\*\*, Ocylok S., Wissenbach K.\*, Kelbassa I.\*  
\*Fraunhofer Institute for Laser Technology, Germany  
\*\*Chair for Laser Technology, RWTH Aachen, Germany
- 15:20 RM 40 **Energy Dissipation and Sinter Mechanisms in a Laser Supported Generative Fabrication Process Using  $\mu\text{m}$ -Scaled Powders**  
Streek A., Regenfuss P., Exner H.\*  
\*Hochschule Mittweida, Germany
- 15:40 – 16:00 **Break**

## Thursday, 6 June, 16:00 – 17:20 Refractory Metals – P/M Processes 2

Chair: Johnson J.L., ATI Firth Sterling, USA  
Tang H., Northwest Institute for Non-ferrous Metal Research, China  
Location: Walter Schwarzkopf Hall, WSH

- 16:00 RM 41 **Laminated Hybrid of Tungsten Base Alloys**  
Chaiat D.\*  
\*Tungsten Powder Technology, Israel
- 16:20 RM 42 **Aluminum Deposition onto Molybdenum and Tungsten Applying Cold Spray Technology: Study of Morphology, Cold Spray Parameters, Diffusion Kinetics and Alloy Formation**  
Wiltner A., Klöden B., Dittrich F., Weißgärber T., Kieback B., Schreiber J.M.\*\*, Eden T.J.\*\*,  
Potter J.K.\*\*, Smid I.\*\*  
\*Fraunhofer Institute IFAM, branch lab Dresden, Germany  
\*\*Penn State, Engineering Science & Mechanics and Applied Research Laboratory, USA
- 16:40 RM 43 **A Study of Welding Behavior for Molybdenum with and without Lanthanum Oxide Additions**  
Leonhardt T., Gould J.\*\*  
\*Rhenium Alloys Inc., USA  
\*\*EWI, USA

# Oral Sessions

17:00 RM 44 **Microstructure and Properties of Welded Joints of a Multicomponent Nb–Ti–Al Alloy by Vacuum Electron Beam Welding**  
Bai R.\*, Zheng X.\*, Cai X.\*, Wang F.\*, Wang D.\*, Xia M.\*, Xue S.\*, Li Z.\*  
\*Northwest Institute for Non-ferrous Metal Research, China

17:20 End of Session

## Friday, 7 June, 08:30 – 10:30 Hard Materials – Mechanical Properties

Chair: Roebuck B., National Physical Laboratory, United Kingdom  
Llanes L., Universitat Politècnica de Catalunya, Spain

Location: Walter Schwarzkopf Hall, WSH

08:30 HM 54 **Toughening and Fatigue Micromechanisms in Hardmetals: FESEM/FIB Tomography Characterization**

Tarragó J.M.\*, Schneider L.\*\*, Jiménez-Piqué E.\*, Turón M.\*, Llanes L.\*

\*Universitat Politècnica de Catalunya, Spain

\*\*Sandvik Hard Materials, United Kingdom

08:50 HM 55 **High Resolution Observation and Comparison of Crack Propagation in Hardmetals during Monotonic and Fatigue Fracture**

Mingard K.\*, Nunn J., Mildeva P., Bennett E.\*, Lord J.D.\*, Roebuck B.\*, Gee M.\*, Jones H.\*

\*NPL, United Kingdom

09:10 HM 56 **Fatigue Testing of Hardmetals in the Gigacycle Range**

Betzwar-Kotas A.\*, Weiss B.\*, Dannerger H.\*\*, Sánchez-Moreno J.M.\*\*\*, Mingard K.\*\*\*\*

\*University of Vienna, Austria

\*\*Vienna University of Technology, Austria

\*\*\*CEIT, Spain

\*\*\*\*NPL, United Kingdom

09:30 HM 57 **Damage Induced under Contact Fatigue on Ceramic-Coated Hardmetals**

Llanes L.\*, Tarrés E.\*\*, Ramírez G.\*, Yang J.\*, Jiménez-Piqué E.\*, Salán N.\*, Mateo A.\*

\*Universitat Politècnica de Catalunya, Spain

\*\*Sandvik Hard Materials, United Kingdom

09:50 HM 58 **Evolution of the Microstructure During Creep Testing of WC-Co Based Cemented Carbides**

Yousfi M.A.\*, Nordgren A.\*\*, Falk L.K.L.\*, Andrén H.-O.\*

\*Chalmers University of Technology, Sweden

\*\*Sandvik Coromant, Sweden

10:10 HM 59 **Abrasion Simulation for WC/Co Hardmetals**

Gee M.\*, Gant A.\*, Nunn J.\*, Jones H.\*, Mingard K.\*

\*National Physical Laboratory, United Kingdom

10:30 – 10:50 Break

# Oral Sessions

## Friday, 7 June, 10:50 – 12:50 Refractory Metals – Characterization

Chair: Stöver D., Forschungszentrum Jülich GmbH, Germany

Hoose A., PLANSEE SE, Austria

Location: Walter Schwarzkopf Hall, WSH

- 10:50 RM 45 Mechanical Characterization of Refractory Metal/Ceramic Interfaces by Nanoindentation**  
Drory M.D.\*, Ujari P.U.\*  
\*Philips Healthcare, USA
- 11:10 RM 46 Anisotropic Fracture Behavior of Tungsten Based Materials – Rolled Lanthanum Oxide Dispersion Strengthened Tungsten**  
Wurster S.\*, Krämer L.\*, Leitner T.\*\*\*, Pippan R.\*  
\*Erich Schmid Institute of Materials Science, Austria  
\*\*University of Leoben, Austria
- 11:30 RM 47 A Study of Mechanical Properties and Microstructure of Tungsten Heavy Alloys Using Modified Taylor Method**  
Kaczorowski M.\*, Cybula L.\*, Kaniewski J.\*  
\*Warsaw University of Technology, Poland
- 11:50 RM 48 Chemistry of the Hf-Rich Carbides in the Molybdenum-Based Alloy MHC**  
Pöhl C.\*, Schatte J.\*\*\*, Leitner H.\*  
\*Montanuniversität Leoben, Austria  
\*\*PLANSEE SE, Austria
- 12:10 RM 49 Pore-Boundary Interaction in Sintered Niobium**  
Zilnyk K.\*, Leite G.S.\*, Sandim H.\*  
\*EEL - USP, Brazil
- 12:30 RM 50 Microstructural Features of Switched Cu-Cr Surface Melt Layers**  
von Klinski-Wetzel K.\*, Kowanda C.\*\*\*, Rettenmaier T.\*\*\*, Heilmaier M.\*, Hinrichsen V.\*\*\*, Müller F.E.H.\*\*  
\*Karlsruhe Institute of Technology, Germany  
\*\*PLANSEE Powertech AG, Switzerland  
\*\*\*Darmstadt University of Technology, Germany
- 12:50 Farewell Address**  
Sigl L.S.\*  
\*Seminar Chairman of the 18th Plansee Seminar, PLANSEE SE, Austria
- 13:00 End of Seminar**

# Poster Sessions

## Monday, 3 June, 16:00 – 17:50 Poster Session Hard Materials – Applications

Location: CERATIZIT Building, CT

- HM 60 Tribological Behavior of Hardfacing Materials in PWR Environment**  
Chitty W.-J.\*, Cedat D.\*, Falcand C.\*, Bobin I.\*  
\*AREVA, France
- HM 62 Design Optimization of Complex Shaped Cutting Tool Systems on the Examples of a Lightweight Crankshaft Milling Cutter and a Lightweight Turn Chasing Wheel System**  
Hosp A.\*, Valentini B.\*\*<sup>†</sup>, Gerzskovitz S.\*\*<sup>†</sup>, Brandhofer H.\*<sup>†</sup>, Schleinkofer U.\*<sup>†</sup>, Plankensteiner A.\*\*  
\*CERATIZIT Austria GmbH, Austria  
\*\*PLANSEE SE, Austria
- HM 63 High Performance Ultrafine Cemented Carbides and Its Application**  
Wei C.\*, Song X.\*<sup>†</sup>, Fu J.\*<sup>†</sup>, Liu X.\*<sup>†</sup>, Nie Z.\*<sup>†</sup>, Guo G.\*<sup>†</sup>  
\*Beijing University of Technology, China

## Monday, 3 June, 16:00 – 17:50 Poster Session Hard Materials – Materials

Location: CERATIZIT Building, CT

- HM 64 Effect of Ni<sub>3</sub>Al on the WC Morphology in WC-Co-Ni<sub>3</sub>Al Composites**  
Long J.\*, Zhang Z.\*<sup>†</sup>, Xu T.\*<sup>†</sup>, Zhang W.\*\*<sup>†</sup>, Wei X.\*<sup>†</sup>, Lu B.\*\*<sup>†</sup>  
\*State Key Laboratory of Cemented Carbide, China/ Zhuzhou Cemented Carbide Group Corp.Ltd., China  
\*\*Zhuzhou Cemented Carbide Group Corp. Ltd., China
- HM 65 Design, Processing and Mechanical Behaviour of Cermet/WC-Co Laminates**  
Gotor F.J.\*, Córdoba J.M.\*<sup>†</sup>, Torres Y.\*\*<sup>†</sup>, Guicciardi S.\*\*\*<sup>†</sup>, Medri V.\*\*\*<sup>†</sup>  
\*Instituto de Ciencia de Materiales de Sevilla, Spain  
\*\*Departamento de Ingeniería Mecánica y de los Materiales-Universidad de Sevilla, Spain  
\*\*\*Institute of Science and Technology for Ceramics, Faenza, Italy
- HM 66 On the Formation of Precipitations in Highly (Cr,V)-Doped Cemented Carbides**  
Toufar C.\*, Schubert W.-D.\*<sup>†</sup>, Hashiya M.\*\*<sup>†</sup>, Kubo Y.\*\*<sup>†</sup>  
\*Vienna University of Technology, Austria  
\*\*Hitachi Tool Engineering, Japan
- HM 67 Microstructure and Properties of Cemented Carbides Prepared by In-situ Synthesized Composite Powder**  
Wei C.\*, Song X.\*<sup>†</sup>, Fu J.\*<sup>†</sup>, Liu X.\*<sup>†</sup>, Wang H.\*<sup>†</sup>, Gao Y.\*<sup>†</sup>, Wang Y.\*<sup>†</sup>  
\*Beijing University of Technology, China



# Poster Sessions

- HM 68 A Thermodynamic Description of the Al-C-Ni-W Quaternary Cemented Carbide System**  
Wang Y., Chen C.\*, Zhang Z.\*\*, Long J.\*\*, Xu T\*\*, Du Y.\*  
\*Central South University, China  
\*\*State Key Laboratory of Cemented Carbide, China
- HM 69 PM Processing and Characterization of Fe-Cu-Co-Diamond Composites**  
Oliveira L.\*, Gomes U.U.\*\*, Costa F.A.\*\*, Figueira M.\*  
\*State University of North Fluminense, Brazil  
\*\*Federal University of Rio Grande do Norte, Brazil
- HM 70 Microstructure Evolution of WC-TiC-Co Cemented Carbides During Reactive Sintering**  
Tarraste M.\*, Juhani K., Pirso J.\*, Viljus M.\*, Traksmaa R.\*, Letunovitš S.\*  
\*Tallinn University of Technology, Estonia
- HM 71 The Influence of TiC Powder to Reactive Sintered TiC-NiMo Cermets Microstructure and Mechanical Properties**  
Jõelet M., Pirso J.\*, Juhani K.\*, Viljus M.\*  
\*Tallinn University of Technology, Estonia
- HM 72 Surface- and Interface-Zone Evolution of Cermets and Cermet/Hardmetal Laminates**  
Wawrzik S., De Barros T.\*\*, Lengauer W.\*  
\*Vienna University of Technology, Austria  
\*\*Polytech Clermont-Ferrand, France
- HM 73 Interdependencies of Grain-Growth Inhibitor Diffusion in WC-Co Hardmetals**  
Buchegger C., Langlade J.\*\*, Lengauer W.\*  
\*Vienna University of Technology, Austria  
\*\*CNRS, France
- HM 75 Structural Ceramics in Functionally Gradient**  
Bertoletti M.C.\*, Machado I.F., Fredericci C.\*\*  
\*University of São Paulo, Brazil  
\*\*Center for Processes and Products Technology (CTPP), São Paulo, Brazil
- HM 76 Sintering Features and Mechanical Properties of WC-316L Composite**  
Santos A.\*, Gomes U.U., Furukava M.\*, Franciné C.\*, Pereira C.\*, Figueira M.\*\*  
\*UFRN, Brazil  
\*\*UFEN, Brazil
- HM 77 Grain Growth During Sintering of Tungsten Carbide Ceramics**  
Poetschke J., Richter V.\*, Gestrich T.\*, Michaelis A.\*  
\*Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany
- HM 78 Effects of a TiC Coating on Diamonds: Structure, Microstructure and Mechanical Properties**  
Oliveira L.\*, Cabral S.\*, Figueira M.\*  
\*State University of North Fluminense, Brazil

# Poster Sessions

- HM 79 Nickel-Based Binding Phase Effect Upon Selected Properties of Supercoarse Sintered Carbides**  
Richter J.\*; [Krajzel J.\\*\\*](#)  
\*Silesian University of Technology, Poland  
\*\*Wegliki Spiekane BAILDONIT, Poland
- HM 80 Microstructure and Properties of Ultrafine WC-Co-VC Hard Alloy with Different Co Content**  
Shi K.\*; Dong K.\*\*; Jiang Q.\*\*; [Zhou K.\\*](#)  
\*Central South University, China  
\*\*Zigong Cemented Carbide Co., Ltd., China
- HM 81 Controlling Cobalt Capping in Sintering Process for Cermets**  
Englund S.\*; Haglöf F.\*; [García J.\\*](#)  
\*Sandvik Coromant R&D, Sweden
- HM 82 The International Journal of Refractory Metals and Hard Materials – An Update**  
[Ortner H.M.\\*](#); Smid I.\*\*; Fang Z.\*\*\*  
\*Darmstadt University of Technology, Austria  
\*\*Penn State, Engineering Science & Mechanics and Applied Research Laboratory, USA  
\*\*\*The University of Utah, USA

## Tuesday, 4 June, 10:20 – 12:20 Poster Session Refractory Metals – Applications

Location: Bildungszentrum, BZ

- RM 51 Sputtering of Rotary and Planar Mo Targets**  
[Sun S.\\*](#); Zhang Q.\*; Zeman G.\*  
\*H.C. Starck, USA
- RM 52 Chemical Vapor Deposition of Tungsten Coatings on X-Ray Rotating Light Anodes Made of Carbon-Based Materials**  
Huot G.\*; [Fellmann V.\\*](#); Poirel H.\*  
\*ACERDE SAS, France
- RM 53 Antimicrobial Surfaces for Health Care Applications Using Molybdenum Oxide**  
[Lackner M.\\*](#); Lunk H.-J.\*\*; Guggenbichler J.P.\*  
\*AMiSTec GmbH & Co. KG, Austria  
\*\*Global Tungsten & Powders Corp., USA
- RM 54 The Effect of the Grain Structure on Forging Deformation of the Tubular Sputtering Target**  
[Li J.\\*](#); Wang J.\*; An G.\*; Zhang C.\*; Liu R.Z.\*  
\*Jinduicheng Molybdenum Group Co., Ltd., China
- RM 55 Optimization of the Surface Structure of Heating Filaments with Regard to their Apparent Thermal Emissivity**  
[Valentini B.\\*](#); Plankensteiner A.\*  
\*PLANSEE SE, Austria

# Poster Sessions

- RM 56 Improvement of the Microstructure in High-Pressure Die-Castings**  
Tucan K.-P., Hofer P.  
\*Österreichisches Gießerei-Institut, Austria
- RM 57 Up-Scaling of Vertical Target Plasma Facing Units for the ITER Divertor**  
Huber T., Zabernig A., Wagner J., Löffler C., Trost C., Schulmeyer W., Sigl L.S.  
\*PLANSEE SE, Austria
- RM 58 New Design Solutions for Thermal Insulation Systems for High-Temperature Furnaces**  
Valentini B., Plankensteiner A., Grohs C.  
\*PLANSEE SE, Austria
- RM 59 High Temperature Corrosion Resistant Thermal Spray Coated and HIPed FeNiCrAl for Oxycombustion Application**  
Oksa M., Tuurna S., Lagerbom J., Virta J., Yli-Olli S., Suhonen T.  
\*VTT Technical Research Centre of Finland, Espoo, Finland  
\*\*VTT Technical Research Centre of Finland, Tampere, Finland
- RM 60 Thermal Shock Response of Tungsten Grades at High Base Temperatures**  
Wirtz M., Linke J., Pintsuk G., Uytendhouwen I.  
\*Forschungszentrum Jülich, Germany  
\*\*SCK CEN Mol, Belgium
- RM 61 Possible Applications of Tungsten Materials in Power Production and Future Large-Scale Projects**  
Rieth M., Reiser J., Hoffmann A., Knabl W., Schulmeyer W., Commin L., Antusch S.  
\*KIT, Germany  
\*\*PLANSEE SE, Austria
- RM 62 Long Term Behavior and New Applications of SIBOR - an Oxidation Protection System for Mo and its Alloys**  
Januschewsky J., Engelhardt S., Dreiling I., Kathrein M., Kestler H., Sigl L.S.  
\*PLANSEE SE, Austria  
\*\*Institute of Materials Science, TU Dresden, Germany
- RM 121 Gas Phase Emitter Effect in Metal Halide Lamps**  
Ruhrmann C., Höbing T., Bergner A., Suijker J., Mentel J., Awakowicz P.  
\*Electrical Engineering and Plasma Technology, Ruhr University Bochum, Germany  
\*\*Philips Lighting, Category Prof. Lamps, The Netherlands
- RM 122 On the Reduction of Ignition Voltage of HID Lamps by Conductive Layers**  
Bergner A., Gröger S., Höbing T., Ruhrmann C., Mentel J., Awakowicz P.  
\*Electrical Engineering and Plasma Technology, Ruhr University Bochum, Germany
- RM 123 Emitter Effect of Thorium on Hot Cathodes in a DC Argon Discharge**  
Höbing T., Bergner A., Ruhrmann C., Mentel J., Awakowicz P.  
\*Electrical Engineering and Plasma Technology, Ruhr University Bochum, Germany

# Poster Sessions

## Tuesday, 4 June, 10:20 – 12:20 Poster Session Refractory Metals – Materials

Location: Bildungszentrum, BZ

**RM 63 Dynamic Behavior and Failure Characteristics of an Extruded Tungsten Heavy Alloy at Elevated Temperatures**

Fan J.L.\*

\*State Key Laboratory for Powder Metallurgy of Central South University, China

**RM 64 Method of Manufacturing of Composite Based on Powder Chromium**

Slys I.\*, Brodnikovskiyi M.\*, Brodnikovskiyi I.\*

\*Frantcevykh institute for problems of materials science, Ukraine

**RM 65 New High-Temperature Protective Coatings for Carbon-Based Composite Materials**

Terentieva V.\*, Astapov A.\*

\*Moscow Aviation Institute (State University of Aerospace Technologies), Russia

**RM 66 The Effect of Melt Cooling Rate on the Structure and High Temperature Mechanical Properties of Nb-18.7 at.% Si Alloy**

Karpov M.\*, Vnukov V.\*, Korzhov V.\*, Stroganova T.\*, Zheltyakva I.\*, Prokhorov D.\*, Gnesin I.\*, Kiyko V.\*, Kolobov Y.\*\*

\*Institute of Solid State Physics RAS, Russia

\*\*Belgorod State University, Russia

**RM 67 Structure and Mechanical Properties of Nb-Al System Alloys with Intermetallic Hardening**

Karpov M.\*, Vnukov V.\*, Korzhov V.\*, Zheltyakva I.\*, Prokhorov D.\*, Gnesin I.\*, Kiyko V.\*, Kolobov Y.\*\*

Goloso E.\*\*

\*Institute of Solid State Physics RAS, Russia

\*\*Belgorod State University, Russia

\*\*\*Institute of Experimental Mineralogy RAS, Russia

**RM 68 Study on New TIG-Electrodes Containing a Mix of Metal Oxides**

Gobran H.\*, Zimmermann M.\*\*

Goryeva T.\*

\*Bayerische Metallwerk GmbH, Germany

\*\*Gesellschaft für Wolfram Industrie GmbH, Germany

**RM 69 The Thermal Properties and Microstructures of Tungsten Thick Coatings for Plasma Facing Components by Chemical Vapor Deposition**

Song J.\*, Yu Y.\*, Peng F.\*, Zhuang Z.\*\*

Lian Y.\*\*\*, Liu X.\*\*\*

\*Xiamen Honglu Tungsten & Molybdenum Industry Co. Ltd, China

\*\*China National R&D Center for Tungsten Technology, Xiamen Tungsten Co. Ltd, China

\*\*\*Fusion Reactor Design & Material Division, Southwestern Institute of Physics, China

**RM 70 Mechanical Properties of Molybdenum Alloys Subjected to Dilute Carbon Monoxide Gas Heating**

Nagae M.\*, Ise N.\*, Kadokura T.\*\*

Takida T.\*\*

Ikegaya A.\*\*

Takada J.\*\*\*

Hiraoka Y.\*\*\*\*

\*Research Institute for Applied Science (RIAS), Japan

\*\*A.L.M.T. TECH Inc., Japan

\*\*\*Okayama University, Japan

\*\*\*\*Okayama University of Science, Japan

# Poster Sessions

- RM 71 Manufacturing of Mo Preforms With Defined Porosity for Subsequent Reactive Infiltration**  
Dadal E.\*, Gierl C.\*, Danninger H.\*, Sencekova L.\*\*, Izdinsky K.\*\*, Simancik F.\*\*  
\*TU Wien, Austria  
\*\*UMMS-SAV, Slovakia
- RM 72 Alloying Cr-Cr<sub>3</sub>Si with Germanium: A Modification Towards an Alloy for Ultra High Temperature Applications**  
Soleimani-Dorcheh A.\*, Galetz M.C.\*, Donner W.\*\*, Schütze M.\*  
\*DECHEMA Forschungsinstitut, Germany  
\*\*Department of Materials Science, Darmstadt University of Technology, Germany
- RM 73 Preparation for Mo/Cu FGM With Continuous Gradient**  
Wu Z.\*, Li X.-W.\*, Bu C.-Y.\*  
\*JDC Molybdenum Co., LTD, China
- RM 87 High Thermal Conductivity Diamond-Metal Composite Prepared by High-Pressure-High-Temperature Technique for Heat Sinks**  
Chen H.\*, Li S.\*, Jia C.\*\*  
\*ShenZhen HAIMINGRUN Industrial CO.LTD, China  
\*\*Department of Advanced Materials & Technology, University of Science Technology Beijing, China
- RM 74 The Influence of a Mo<sub>5</sub>SiB<sub>2</sub> Interlayer on the Oxidation and Diffusion Behavior of Boron Containing MoSi<sub>2</sub> and Mo<sub>5</sub>Si<sub>3</sub> Coatings on Mo-9Si-8B Alloys**  
Lange A.\*, Braun R.\*, Kestler H.\*\*, Heilmaier M.\*\*\*  
\*German Aerospace Center, Germany  
\*\*PLANSEE SE, Austria  
\*\*\*Karlsruhe Institute of Technology, Germany
- RM 75 Characterization of the Precipitation Mechanism in the Molybdenum Based Alloy MHC**  
Lang D.\*, Pöhl C.\*, Schatte J.\*\*, Leitner H.\*  
\*Montanuniversität Leoben, Austria  
\*\*PLANSEE SE, Austria
- RM 77 The Effect of Molybdenum Powder Micro-Morphology on Properties of Molybdenum Products**  
An G.\*, Liu R.Z.\*, Li J.\*, Sun Y.J.\*, Sun J.\*\*  
\*Jinduicheng Molybdenum Group Co., Ltd., China  
\*\*Xi'an Jiaotong University, China
- RM 78 (Mo,W)<sub>2</sub>Si<sub>3</sub> and (Mo, W)Si<sub>2</sub> Silicides Interaction with Carbon**  
Gnesin B.\*, Gnesin I.\*, Nekrasov A.\*\*  
\*ISSP, Russia  
\*\*IEM, Russia
- RM 79 Characteristics of a Multicomponent and Low-Density Nb-Ti-Al Alloy**  
Feng W.\*, Xin Z.\*, Run B.\*, Xiaomei C.\*, Xiaoming Z.\*, Zhongkui L.\*  
\*Northwest Institute for Non-ferrous Metal Research, China
- RM 80 The Reaction Behavior of Carbon in TZM Alloy**  
Lai Ping L.\*, Jing L.\*, Xiao Hui L.\*, Guodong W.\*, Xin Z.\*  
\*Northwest Institute for Non-ferrous Metal Research, China

# Poster Sessions

- RM 81** **Microstructure and Tensile Properties of Mo Alloy Wire Synthetically Strengthened by Nano-Y<sub>2</sub>O<sub>3</sub> and Nano-CeO<sub>2</sub>**  
Liu R., Feng P., Yang Q., Zhao H.\*  
\*JDC Moly coporation, China
- RM 82** **Controllable Synthesis of One Dimensional W/WO<sub>2.72</sub> Heterostructure Via Chemical Vapor Deposition**  
Liu X., He Y.\*  
\*Central South University, China
- RM 83** **Microstructure and Mechanical Properties of Mo-La<sub>2</sub>O<sub>3</sub>-ZrB<sub>2</sub> Alloys**  
Zhang G., Zhang H., Sun Y\*\*, Liu G.\*\*\*, Liu D.\*\*  
\*Xi'an University of Technology, China  
\*\*Jinduicheng Molybdenum Co. Ltd. of China, China  
\*\*\*Xi'an Jiaotong University, China
- RM 84** **Evolution of Microstructure and Strength in Doped Tungsten Wire**  
Schade P.  
\*HTM Consulting, Germany
- RM 85** **Preparation of Tungsten and Molybdenum Plates with Uniform Grain Structure**  
Zhang Z., Wei X., Xu T., Zhang W., Fu C\*\*, Long J.\*  
\*State Key Laboratory of Cemented Carbide, China/ Zhuzhou Cemented Carbide Group Corp.Ltd., China  
\*\*Zhuzhou Cemented Carbide Group Corp.Ltd., China
- RM 86** **Pyrovacuum Refining of V-Cr-Ti Alloys Produced by Aluminothermic Reduction**  
Uttam J., Kumar S\*\*, Mukherjee A\*\*, Krishnamurthy N.\*\*  
\*Bhabha Atomic Research Centre, India  
\*\*Bhabha Atomic Research Centre, India
- RM 76** **Bulk Rhenium Production Based on Plasma Reduction of Ammonium Perrhenate**  
Samokhin A., Alexeev N., Don G\*\*, Novikov A\*\*, Fadeev A., Blagoveschensky Y.\*  
\*Institute of Metallurgy and Materials Science, Russia  
\*\*DRAGTSVETMET, Russia
- RM 94** **Densification Behavior of Pure Tantalum Powder by Conventional and Spark Plasma Sintering**  
Kim Y., Lee J\*\*, Hwang J\*\*, Hong S.H\*\*, Kim E.-P\*\*\*, Lee S.\*\*\*  
\*Agency for Defense Development/ Korea Advanced Institute of Science and Technology, South Korea  
\*\*Korea Advanced Institute of Science and Technology, South Korea  
\*\*\*Agency for Defense Development, South Korea

# Poster Sessions

## Wednesday, 5 June, 13:30 – 15:40 Poster Session Hard Materials – Modeling, Characterization & Testing

Location: Bildungszentrum, BZ

- HM 83 Plastic Yield Behaviors of Extra Coarse-Grained WC-Co Hardmetals**  
Wu C.\*, Nie H.\*, Zeng Q.\*, Feng Y.\*  
\*China National R&D Center for Tungsten Technology, China
- HM 84 Effect of Binder Content on Fracture Toughness  $K_{IC}$  of Cermet and Cemented Carbide**  
Ogura T.\*, Shoji T.\*, Matsuno K.\*, Kitamura K.\*, Terada O.\*, Hayashi K.\*  
\*Fuji Die Co., Ltd., Japan
- HM 85 Creep Behaviour of Hardmetals with Alternative Binder Alloys at Elevated Temperatures**  
Buchegger C.\*, Lengauer W.\*  
\*Vienna University of Technology, Austria
- HM 86 Multiscale Modeling of Mechanical Performance of P/M Microstructures**  
Laukkanen A.\*, Virta J.\*, Varis T.\*, Fortino S.\*, Andersson T.\*, Laitinen T.\*  
\*VTT Technical Research Centre of Finland, Finland
- HM 88 Correlation of Impact/Wear Behavior to Physical Properties of WC-Co Mining Grades**  
Jewett T.\*, Useldinger R.\*\*\*, Payne B.\*  
\*Global Tungsten & Powders Corp., USA  
\*\*CERATIZIT Luxembourg S.à.r.l., Luxembourg
- HM 89 Sinterability, Microstructure and Tribological Behaviour of WC-Ni-Co-Cr Hardmetals**  
Sánchez-Moreno J.M.\*, Aristizabal M.\*, Arizmendi M.\*\*\*, Fernandez J.\*\*\*, Ibarreta F.\*\*\*, Martinez R.\*\*\*  
\*CEIT-Centro de Estudios e Investigaciones, Spain  
\*\*TECNUN, Spain  
\*\*\*FMD-CARBIDE, Spain
- HM 90 Parallel Beam Glancing X-Ray Diffraction: a New Technique for Measuring Surface Residual Stresses**  
Sánchez-Moreno J.M.\*, Iparraguirre I.\*, Rodriguez N.\*  
\*CEIT-Centro de Estudios e Investigaciones, Spain
- HM 91 In-Situ Mechanical Characterisation of WC-Co Hardmetals Using Micro-Beam Testing**  
Trueba M.\*, Rodriguez N.\*\*\*, Iparraguirre I.\*, Elizalde R.\*, Ocaña I.\*, Sánchez-Moreno J.M.\*,  
Martinez-Esnaola J.M.\*  
\*CEIT and TECNUN, Spain  
\*\*CEIT-Centro de Estudios e Investigaciones, Spain
- HM 92 Micro-Defects in Ground Tungsten Carbide Revealed by (Sub-) Surface Investigations**  
Fisslthaler E.\*, Knitel S.\*\*\*, Feistritzer S.\*\*\*, Werner G.\*\*  
\*Graz Centre for Electron Microscopy, Austria  
\*\*Institute for Electron Microscopy, Graz University of Technology, Austria  
\*\*\*Tribo Hartstoff GmbH, Germany

# Poster Sessions

- HM 94 Advanced Cross-Sectional Characterization of Hard Coatings**  
Tkadletz M., Mitterer C.\*\*, Keckes J.\*\*\*, Rebelo de Figueiredo M.\*\*\*\*, Hosemann P.\*\*\*\*, Burghammer M.\*\*\*\*\*,  
Sartory B., Czetti C.\*\*\*\*\*  
\*Materials Center Leoben Forschung GmbH, Austria  
\*\*Department of Physical Metallurgy and Materials Testing, Montanuniversität Leoben, Austria  
\*\*\*Department of Materials Physics, Montanuniversität Leoben, Austria  
\*\*\*\*Department of Nuclear Engineering, University of California at Berkeley, USA  
\*\*\*\*\*ESRF, France  
\*\*\*\*\*CERATIZIT Austria GmbH, Austria
- HM 95 Micro Facets at WC/Co Interfaces in VC-Doped WC-Co Alloys with a Variation of Carbon Content**  
Yamamoto T., Sugiyama I.\*\*, Mizumukai Y.\*\*, Taniuchi T.\*\*\*, Shirase F.\*\*\*, Okada K.\*\*\*, Ikuhara Y.\*\*  
\*Nagoya University, Japan  
\*\*Tokyo University, Japan  
\*\*\*Mitsubishi Materials Corp., Japan
- HM 96 An Innovative Nondestructive Method for the Inspection of Brazed Cutting Tools**  
Tillmann W.\*, Sievers N., Zielke R.\*, Kluger S.\*, Liedtke F.\*\*  
\*Technical University Dortmund, Germany  
\*\*University of Dortmund, Germany
- HM 97 Tribological Profile of Binderless Niobium Carbide**  
Mathias W., Hardy M.\*\*  
\*BAM Federal Institute for Material Research and Testing, Germany, Germany  
\*\*Niobelcon BV, Belgium, Belgium
- HM 98 Correlation of WC Grain Size Distribution to Hardness and Coercivity**  
Persson T., Schwind M.\*  
\*Seco Tools AB, Sweden
- HM 99 The Corrosion Behaviour of WC-TiC-Co Cemented Carbides in Alkaline Solutions**  
Lin N., He Y.\*, Liu X.\*, Wu C.\*\*  
\*Central South University, China  
\*\*China National R&D Center for Tungsten Technology, China
- HM 100 Microstructure Analysis and Mechanical Properties of NbC-Co/Ni/Cu/Fe<sub>3</sub>Al Cemented Carbides**  
Huang S., Vanmeenseel K., Hardy M.\*\*, Vleugels J.\*  
\*Katholieke Universiteit Leuven, Belgium  
\*\*Niobelcon BV, Belgium, Belgium
- HM 101 On the Formation Mechanism of TaC/TaNbC Aggregation in WC-Co Cemented Carbides**  
Qu J., Xie W.\*, Huang W.\*, Chen X.\*, Wen G.\*, Wang S.\*, Xiao C.\*\*, Xiong W.\*\*  
\*Zhuzhou Cemented Carbide Cutting Tools Co., Ltd., China  
\*\*Huazhong University of Science and Technology, China



# Poster Sessions

## HM 102 Fatigue Behavior of Cemented Carbide Based Forming Tools

Andreas K.\*, Merklein M.\*, Engel U.\*

\*University of Erlangen-Nuremberg, Germany

## HM 103 Fatigue Behavior of a WC-Ni Cemented Carbide

Tarragó J.M.\*, Ferrari C.\*, Reig B.\*\*\*, Coureaux D.\*, Schneider L.\*\*\*, Llanes L.\*

\*Universitat Politècnica de Catalunya, Spain

\*\*Sandvik Hard Materials - Sandvik Española S.A., Spain

\*\*\*Sandvik Hard Materials, United Kingdom

## HM 104 Structural Determination of (Cr,Co)<sub>3</sub>C<sub>2</sub>

Kaplan B.\*, Blomqvist A.\*, Århammar C.\*, Selleby M.\*\*\*, Norgren S.\*\*\*

\*Sandvik Coromant R&D Materials and Processes, Sweden

\*\*KTH Royal Institute of Technology, Sweden

\*\*\*Sandvik Mining R&D Rock Tools, Sweden

## HM 105 Mechanical Strength of WC-Co: Influence of Temperature, Microstructure and Testing Configuration

Torres Y.\*, Bermejo R.\*\*, Gotor F.J.\*\*\*, Llanes L.M.\*\*\*\*, Chicardi E.\*\*\*

\*Universidad de Sevilla, Spain

\*\*Montanuniversität Leoben, Austria

\*\*\*Instituto de Ciencia de Materiales de Sevilla, Spain

\*\*\*\*Universidad Politécnica de Cataluña, Spain

## HM 106 CSUTDCC and CSUDDCC – The Development and Applications of New Thermodynamic and Diffusivity Databases for Cemented Carbides

Peng Y.\*, Zhou P.\*, Chen W.\*, Zhang W.\*, Du Y.\*, Wang S.\*\*, Wen G.\*\*, Xu T.\*\*\*, Zhang Z.\*\*\*

\*Central South University, China

\*\*Zhuzhou Cemented Carbide Cutting Tools Co., Ltd., China

\*\*\*State Key Laboratory of Cemented Carbide, China

## Wednesday, 5 June, 16:00 – 17:40 Poster Session Refractory Metals – P/M Processes

Location: Bildungszentrum, BZ

## RM 88 High Strength Gradient Structural Tantalum With High Nitrogen Content

Zhang Y.\*, Zhang X.\*, Bai X.\*, Cai X.\*, Wang F.\*, Wang H.\*, Li Z.\*, Yu Z.\*

\*Northwest Institute for Non-ferrous Metal Research, China

## RM 89 Rapid Sinter Pressing - From Powder to Fully Dense Parts in Seconds

Neubauer E.\*, Garcia L.\*, Kitzmantel M.\*

\*RHP-Technology GmbH & Co KG., Austria

## RM 90 Solid Solution Hardening of Molybdenum-Titanium-Alloys

Löffler C.\*, Ohser-Wiedemann R.\*\*, Martin U.\*\*, Freudenberger J.\*\*, Heger D.\*\*, Martin S.\*\*, Schreiber G.\*\*

\*PLANSEE SE, Austria

\*\*TU Bergakademie Freiberg, Germany

# Poster Sessions

- RM 91 Microstructure and Ductility of Mechanical Milled and Fast Sintered Mo-W Alloys**  
Martin U.\*, Ohser-Wiedemann R.\*, Kestler H.\*\*, Tabernig B.\*\*, Klemm V.\*, Müller A.\*, Schreiber G.\*  
\*Technische Universität Bergakademie Freiberg, Germany  
\*\*PLANSEE SE, Austria
- RM 92 Influence of Heating Rate and Manufacturing Speed on P/M Silver Diamond Composites**  
Kitzmantel M.\*, Castillo P.\*\*, Neubauer E.\*\*, Hell J.\*\*\*, Kapaun W.\*\*  
\*RHP-Technology/TU Wien, Austria  
\*\*RHP-Technology, Austria  
\*\*\*TU Wien, Austria
- RM 95 Densification of a W-25wt%Ag Powder Prepared by High Energy Milling**  
Costa F.A.\*, Silva A.G.\*\*, Rezende L.\*, Gomes U.U.\*, Filgueira M.\*\*  
\*UFRN, Brazil  
\*\*UENF, Brazil
- RM 96 Effects of Ti on the Joint Strength of W-20vol%Cu Composite Using Ag-Cu-Ti Filler Foils**  
Itohara T.\*, Nosaki K.\*, Hiraoka Y.\*, Hanado H.\*\*  
\*Okayama University of Science, Japan  
\*\*Kawaso Texcel Co.Ltd, Japan
- RM 97 Pre-Sintering Behaviour of Mo-Powders**  
Edtmaier C.\*, Schubert W.-D.\*, Gierl C.\*, Pilz L.\*, Plankensteiner A.\*\*, Huber K.\*\*  
\*TU Wien, Austria  
\*\*PLANSEE SE, Austria
- RM 98 Technical and Economical Comparison of Different Powder Pressing Concepts under the Aspect of Energy Efficiency**  
Schmidt H.-C.\*  
\*DORST TECHNOLOGIES, Germany
- RM 99 Bodies of Cermet-Like Materials by Laser Micro Sintering**  
Horn M.\*, Regenfuss P.\*, Exner H.\*  
\*Hochschule Mittweida, Germany
- RM 100 Fabrication of a Nanocrystalline Surface Layer on Bulk Tantalum by Means of a Sliding Friction Treatment**  
Zhang Y.\*, Yu Z.\*, Dong F.\*, Yuan S.\*, Yu S.\*, Niu J.\*, Ma X.\*, Zhang Y.\*, Liu C.\*, Wen B.\*  
\*Northwest Institute for Non-ferrous Metal Research, China
- RM 101 Analysis of Powder Deposition in Laser Additive Manufacturing**  
Seyda V.\*, Nagel M.\*, Garlof S.\*, Emmelmann C.\*  
\*Institute of Laser and System Technologies (ILAS), Hamburg University of Technology (TUHH), Germany

# Poster Sessions

## Thursday, 6 June, 10:30 – 12:30 Poster Session Refractory Metals – Modeling & Simulation, Characterization, Powder Production & Recycling

Location: Bildungszentrum, BZ

### RM 102 Effects of Trace TiC on Microstructure and Properties of Molybdenum Alloy

Fan J.\*, Qian Z.\*, Cheng H.\*, Tian J.\*

\*State Key Laboratory of Powder Metallurgy, China

### RM 103 Extension of Master Decomposition Curves Concepts to Model Reduction of MoO<sub>3</sub> to Mo

Enneti R.K.\*, Cook B.\*

\*Global Tungsten & Powders Corp., USA

### RM 104 Thermal Diffusivity Measurement of Tungsten and Tungsten Alloys at Very High Temperatures

Pintsuk G.\*, Gormann F.\*

\*Forschungszentrum Jülich, Germany

### RM 105 P/M Manufacturing of Niobium Silicide Based Materials

Drawin S.\*

\*ONERA, France

### RM 106 Texture Effect on Tantalum Sputtering Yield

Tang P.\*

\*H.C. Starck, USA

### RM 107 Arc Erosion of Various Pure Element Thin Films

Vüllers F.T.N.\*, Kowanda C.\*\*\*, Müller F.E.H.\*\*\*, Diener M.\*, Spolenak R.\*

\*Laboratory for Nanometallurgy, ETH Zurich, Switzerland

\*\*PLANSEE Powertech AG, Switzerland

### RM 108 Electric Plastic Effects of Tungsten Electrodes

Jiancan Y.\*, Yuchen X.\*, Wenguang Z.\*, Wang W.\*, Zuoren N.\*

\*Beijing University of Technology, China

### RM 109 Dynamic Abnormal Grain Growth in Commercial-Purity Molybdenum

Ciulik J.\*

\*M&M Engineering Associates, Inc., USA

### RM 110 Corrosion Properties of Tantalum Sheet Exposed to Air at Elevated Temperatures

Aimone P.\*

\*HC Starck, USA

# Poster Sessions

- RM 111 Grain Boundary Segregations in Technically Pure Molybdenum**  
Babinsky K.\*, Primig S.\*, Knabl W.\*\*, Lorich A.\*\*, Weingärtner T.\*\*\*, Weidow J.\*\*\*\*, Leitner H.\*  
\*Montanuniversität Leoben, Austria  
\*\*PLANSEE SE, Austria  
\*\*\*Karlsruher Institut für Technologie, Germany  
\*\*\*\*Chalmers University of Technology, Sweden
- RM 112 Diffusion Path and Growth of Intermediate Phases in Mo/(Si,B) Diffusion Couples**  
Kriegel M.\*, Foerster W.\*, Chmelik D.\*, Fabrichnaya O.\*, Januschewsky J.\*\*, Kathrein M.\*\*, Sigl L.S.\*\*, Rafaja D.\*  
\*TU Bergakademie Freiberg, Germany  
\*\*PLANSEE SE, Austria
- RM 113 Particle Generation in Thin Films**  
Zhang Q.\*, Tang P.\*, Hogan P.\*, Sun S.\*  
\*H.C. Starck, USA
- RM 114 Diffusion of Oxygen in Cell Structure Strengthening Ta-W-Hf Alloy**  
Xiaomei C.\*, Xiaoming Z.\*, Yusheng Z.\*, Feng W.\*, Hui W.\*  
\*Northwest Institute for Non-ferrous Metal Research, China
- RM 115 The Microstructure of Mo-Nb Alloy Single Crystals**  
Zhongwu H.\*, Zhongkui L.\*, Tao Y.\*, Linjiang G.\*, Jianping Z.\*\*  
\*Northwest Institute for Non-ferrous Metal Research, China  
\*\*Chinese Institute of Atomic Energy, China
- RM 116 Study on Quantitative Characterization of Molybdenum Powder Morphology**  
Han Q.\*, Cao W.\*  
\*Jinduicheng Molybdenum Co., Ltd., China
- RM 117 MoSi<sub>2</sub> Coating Formation on Molybdenum and Its High Temperature Oxidation Resistance**  
Wei L.\*, Jinglian F.\*, Lairong X.\*, Zhenyang C.\*, Haijun M.\*, Pengfei L.\*  
\*Central South University, China
- RM 118 Phase Equilibria in the Ni-Ti-W and Ni-Ti-Cr Systems**  
Gasik M.\*, Isomäki I.\*, Hämäläinen M.\*, Friman M.\*  
\*Aalto University School of Chemical Technology, Finland
- RM 119 Influence of the Milling Velocity on the Synthesis of a Nb-10wt.%Cu Composite Powder**  
Costa F.A.\*, Barbosa C.V.\*, Gomes U.U.\*, Filgueira M.\*\*, Silva A.G.\*\*  
\*UFRN, Brazil  
\*\*UFENF, Brazil
- RM 120 Structure and Properties of Secondary Tungsten Powder**  
Xi X.\*, Zhou Z.\*, Ma L.\*, Nie Z.\*  
\*Beijing University of Technology, China

# Poster Sessions

## Thursday, 6 June, 13:30 – 15:40 Poster Session Hard Materials – Powder, P/M Processes & Recycling

Location: CERATIZIT Building, CT

- HM 107** 'Violet Tungsten Oxide's In-Situ Reduction' Technology for the Preparation of Ultrafine Grained WC-Co Hardmetals  
Wu C.\*, Nie H.\*, Xiao M.\*, Xie H.\*  
\*China National R&D Center for Tungsten Technology, China
- HM 108** Incorporation of Titanium, Tantalum, and Vanadium into the Hexagonal WC Lattice  
Pasquazzi A.\*, Schubert W.D.\*, Halwax E.\*, Kremser G.\*\*  
\*Vienna University of Technology, Austria  
\*\*Wolfram Bergbau und Hütten AG, Austria
- HM 109** Hydrogen Reduction of Tungsten Oxides: Alkali Additions and Their Interaction on the Metal Nucleation Process  
Zimmerl T.\*, Schubert W.D.\*\*\*, Bock A.\*  
\*Wolfram Bergbau und Hütten AG, Austria  
\*\*Vienna University of Technology, Austria
- HM 110** Short-Term Recycling Technique for Tungsten Carbides Scraps  
Liu X.\*, Song X.\*, Wang Y.\*, Wei C.\*, Nie Z.\*, Guo G.\*  
\*Beijing University of Technology, China
- HM 111** Compaction Process of Pure Tungsten Carbide by Spark Plasma Sintering  
Chuvildeev V.\*, Boldin M.\*, Sakharov N.\*, Nokhrin A.\*, Blagoveshchenskiy Y.\*\*\*, Isaeva N.\*\*\*, Melnik Y.\*\*\*, Blagoveshchenskaya N.\*\*  
\*NIFTI UNN, Russia  
\*\*IMET RAS, Russia
- HM 112** Hard Alloys Production During Vacuum Sintering of Nanometric Tungsten Carbide-Cobalt Composition  
Blagoveshchenskiy Y.\*, Isaeva N.\*, Melnik Y.\*, Blagoveshchenskaya N.\*  
\*IMET RAS, Russia
- HM 113** Influence of Milling Conditions in Processing of Submicron to Near-Nano WC/Co Powders  
Caspers B.\*, Zumdick M.\*  
\*H.C. Starck GmbH, Germany
- HM 114** Thermal Compression Treatment of WC-Co and TiC-VC-NbC-WC-Ni-Cr Hard Alloys  
Kramar H.\*, Bodrova L.\*\*\*, Prokopiv M.\*\*\*, Marynenko S.\*\*  
\*Ternopil Ivan Pul'uj National Technical University, Ukraine  
\*\*Ternopil Ivan Pul'uj Nation, Ukraine  
\*\*\*2V. Bakul Institute for Superhard Materials, Ukraine

# Poster Sessions

- HM 115 Use of Mechanically Induced Self-Sustaining Reactions in the Design of Cermets Based on Complex Transition Metal Carbonitrides**  
Chicardi E.\*, Córdoba J.M.\*, Sayagués M.J.\*, Torres Y.\*\*, Gotor F.J.\*  
\*Instituto de Ciencia de Materiales de Sevilla (US-CSIC), Spain  
\*\*Universidad de Sevilla, Spain
- HM 116 Influence of Process Parameters on Microstructure and Density of an Ultrafine WC-6 Co Hard Metal Produced by Spark Plasma Sintering (SPS)**  
Zivcec M.\*, Broeckmann C.\*  
\*IWM RWTH Aachen, Germany
- HM 117 New Analytical Computer-Based Methods of Diagnostics of Characteristics of Powders of Superhard Materials**  
Bogatyreva G.\*, Petasyuk G.\*  
\*ISM - V.Bakul Institute of Superhard Materials, National Academy of Sciences of Ukraine, Ukraine
- HM 118 Magnetic Characteristics of Nanocarbon of Different Modifications**  
Bogatyreva G.\*, Shevchenko A.\*\*  
\*ISM - V.Bakul Institute of Superhard Materials, National Academy of Sciences of Ukraine, Ukraine  
\*\*IMP - G.Kurdyumov Institute of Metallophysics, National Academy of Sciences of Ukraine, Ukraine
- HM 119 The Synthesis of Borides of Refractory and Rare Earth Metals by Reduction-Distillation**  
Mukherjee A.\*, Kumar S.\*, Krishnamurthy N.\*  
\*Bhabha Atomic Research Centre, India
- HM 120 Study on Brush Wear and Processing Efficiency of Brush Mechanical Polishing**  
Zeng W.\*, Mou W.\*, Wang P.\*, Wang J.\*  
\*Zigong cemented carbide co.,LTD, China
- HM 121 Experimental and Theoretical Study of the Grain Growth Process of WC-Co Nano Composites**  
Kumar A.\*, Singh K.\*\*, Pandey O.P.\*\*  
\*Sri Guru Granth Sahib World University, India  
\*\*Thapar University, India

# Poster Sessions

## Thursday, 6 June, 13:30 – 15:40 Poster Session Hard Materials – Surface Engineering

Location: CERATIZIT Building, CT

- HM 122 Research of Zr-doped CVD- $\text{Al}_2\text{O}_3$  Coating for High Efficiency Cutting Process**  
Li X.\*, Chen X.\*, Yi Z.\*\*, Liu W.\*, Zhou W.\*\*\*  
\*Zhuzhou Cemented Carbide Cutting Tools Co., Ltd., China  
\*\*School of Materials Science and Engineering, Central South University, China  
\*\*\*Zhuzhou Cemented Carbide Cutting Tools Co., China
- HM 124 Industrial-Scale Sputter Deposition of  $\text{Cr}_{1-x}\text{Al}_x\text{N}$  Coatings with Various Compositions from Segmented Powder-Metallurgical Targets**  
Weirather T., Czetti C.\*\*, Polcik P.\*\*\*, Kathrein M.\*\*, Mitterer C.\*  
\*Montanuniversität Leoben, Austria  
\*\*CERATIZIT Austria GmbH, Austria  
\*\*\*PLANSEE Composite Materials GmbH, Germany
- HM 125 Frictionfree, Hard and Super-Hard Carbon-Based Coating for Industrial Application**  
Precht W.H.\*  
\*Technical University of Koszalin, Poland
- HM 126 Development of PVD Coatings Reducing Wear Caused by Comb Cracks in Interrupted Cutting**  
Maixner V.\*, Sima M.\*\*, Jilek M.\*\*, Flasar P.\*, Subrt J.\*  
\*Pramet Tools, s.r.o., Czech Republic  
\*\*SHM, s.r.o., Czech Republic
- HM 127 Deposition and Characterisation of Refractory Cermets Reinforced Ni-Based PTA Hardfacings**  
Zikin A., Yung D.-L.\*\*, Hussainova I.\*\*, Danninger H.\*\*\*, Priso J.\*\*, Gavrilovic A.\*\*\*\*  
\*AC2T Research GmbH, Austria  
\*\*Department of Materials Engineering, Tallinn University of Technology, Estonia  
\*\*\*Institute of Chemical Technologies and Analytics, Vienna University of Technology, Austria  
\*\*\*\*CEST Centre of Electrochemical Surface Technology, Austria
- HM 128 ZrN as a Diffusion Barrier Soating – Beyond Conventional Wear Applications**  
Pageorgiou V., Strakov H.\*, Lieberman V.\*, Bonetti R.\*  
\*lonbond AG, Switzerland
- HM 129 Precision ELID-Grinding of Cermets on a Surface Grinder**  
Kersschot B.\*, Qian J.\*, Reynaerts D.\*  
\*KU Leuven, Belgium

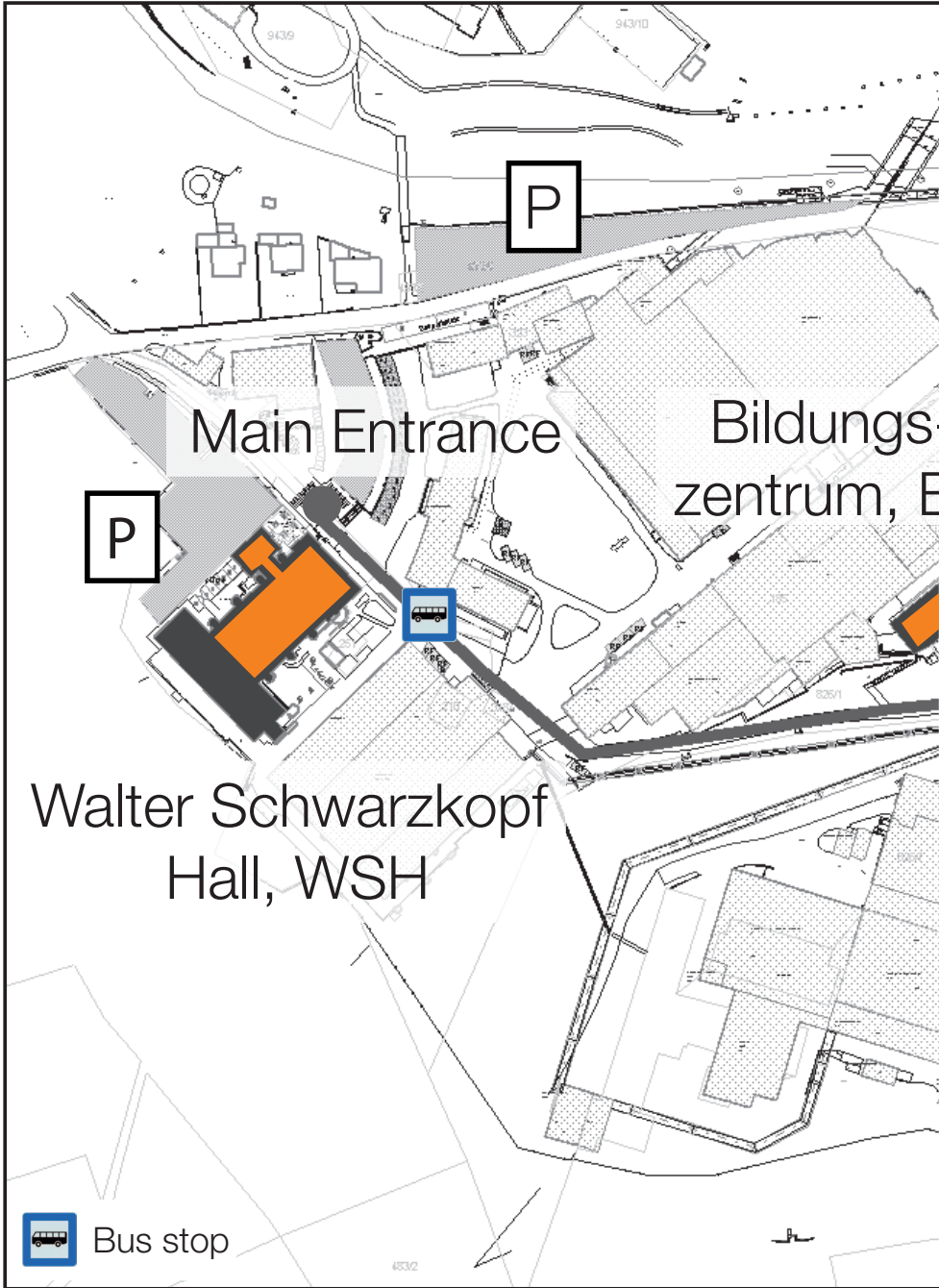
# Poster Sessions

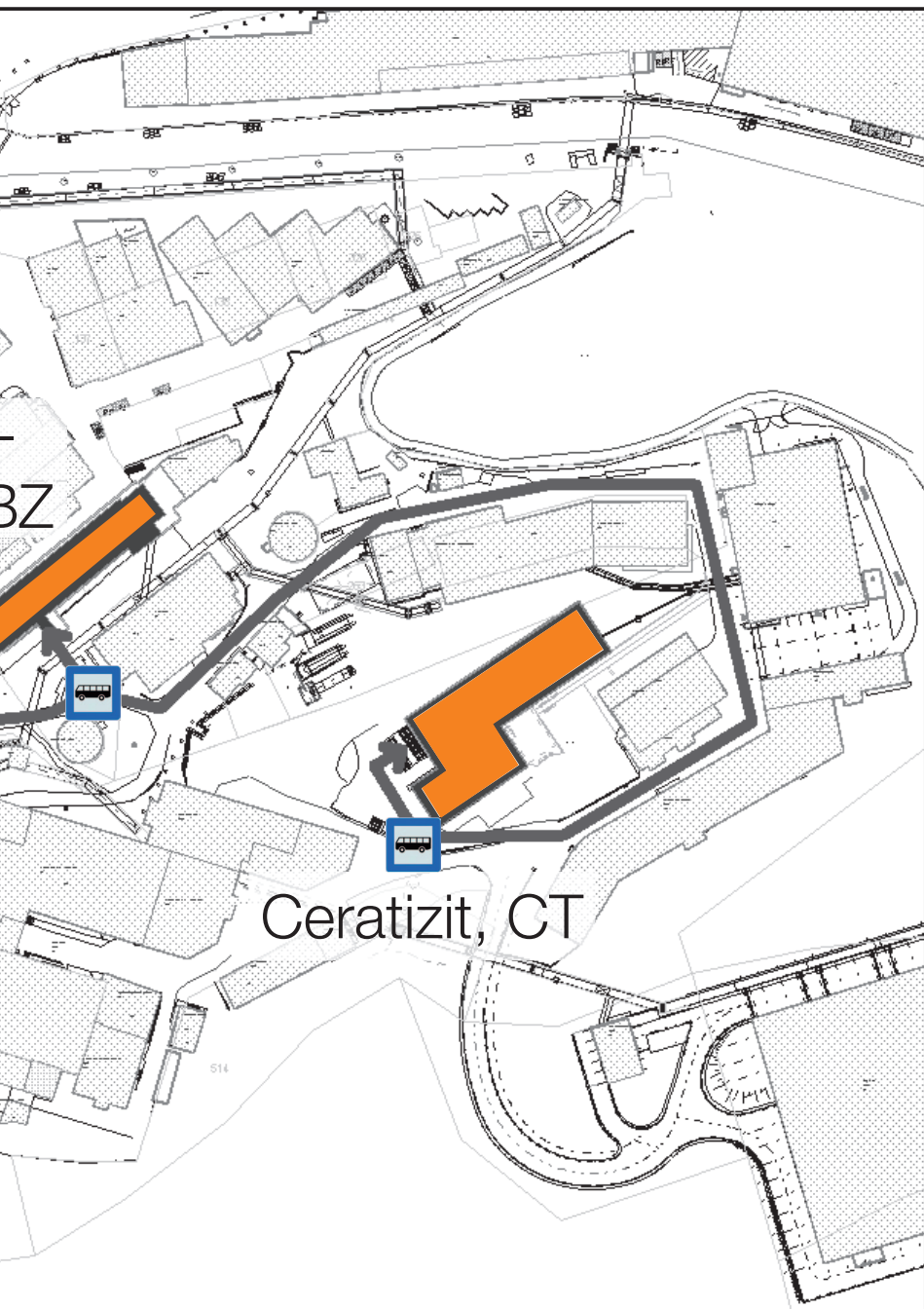
- HM 130 The Influence of Chromium and Ion Energy on Growth of  $\alpha$ -Alumina Films Deposited by ICP/CCP Plasma CVD at 780°C**  
Neubert M.\*, Poukhovoi A.\*, Pflitsch C.\*, Atakan B.\*, Buck V.\*  
\*University of Duisburg-Essen, Germany
- HM 131 Ultrafine Cermet Coating – Fabrication and Combination Properties**  
Wang H.\*, Song X.\*, Liu X.\*, Wei C.\*, Guo G.\*, Nie Z.\*  
\*Beijing University of Technology, China
- HM 144 Thermal Spray and Laser Applied TCHP Barrier Coatings for Extended Life**  
Keane J.M.\*, Hancox A.\*, Evans D.\*  
\*Allomet Corporation, USA
- HM 123 Increase of the Performance of CBN Tools by Residual Stress and Adhesion Optimized Hard Coating Systems**  
Frank H.\*, Michel H.\*, Mahr P.\*  
\*GFE - society of production engineering Schmalzkalden, Germany
- HM 132 Influence of V on Structure, Mechanical and Thermal Properties of Ti–Al–N**  
Li C.\*, Yong D.\*, Ying B P.\*, Wu M.\*\*\*, She Q W.\*\*\*, Jia L.\*\*  
\*Central South University, China  
\*\*Zhuzhou Cemented Carbide Cutting Tools Co., Ltd., China
- HM 134 Reactive and Non-Reactive Sputter Deposition of Metallic, Intermetallic and Ceramic Target Materials to Prepare Al-Cr-N Coatings**  
Sabitzer C.\*, Paulitsch J.\*\*\*, Polcik P\*\*\*\*, Arndt M.\*\*\*\*, Rachbauer R.\*\*\*\*, Mayrhofer P.H.\*\*  
\*Christian Doppler Laboratory for Application Oriented Coating Development at the Institute of Materials Science and Technology, Vienna University of Technology, Austria  
\*\*Institute of Materials Science and Technology, Vienna University of Technology, Austria  
\*\*\*PLANSEE Composite Materials GmbH, Germany  
\*\*\*\*OC Oerlikon Balzers AG, Liechtenstein
- HM 135 The Influence of CO and N<sub>2</sub> Atmosphere on Formation of Surface Gradient Layers in Cemented Carbides Experimental Study and Computer Simulation**  
Xie W.\*, Wen G.\*, Zhang W.\*\*\*, Peng Y.\*\*\*, Chen W.\*\*\*, Du Y.\*\*\*, Wang S.\*  
\*Zhuzhou Cemented Carbide Cutting Tools Co., Ltd., China  
\*\*State Key Laboratory of Powder Metallurgy, Central South University, China
- HM 136 Surface Coating of Ti(CN) Base Cermets**  
Zhou S.\*, Wang S.\*, Chen X.\*, Chen L.\*, Zhu L.\*, Li H.\*  
\*Zhuzhou Cemented Carbide Cutting Tools Co., Ltd., China
- HM 137 Phase Stability, Mechanical Properties and Thermal Stability of Y Alloyed Ti–Al–N Thin Films**  
Riedl H.\*, Hollerweger R.\*, Holec D.\*, Paulitsch J.\*\*\*, Rachbauer R.\*\*\*, Polcik P\*\*\*\*, Mayrhofer P.H.\*\*  
\*Christian Doppler Laboratory for Application Oriented Coating Development at the Institute of Materials Science and Technology, Vienna University of Technology, Austria  
\*\*Institute of Materials Science and Technology, Vienna University of Technology, Austria  
\*\*\*OC Oerlikon Balzers AG, Liechtenstein  
\*\*\*\*PLANSEE Composite Materials GmbH, Germany



# Poster Sessions

- HM 138 Thermal Stability and Oxidation Resistance of TiAlN/TaAlN Multilayer Coatings**  
Koller C.M.\*, Hollerweger R.\*, Paulitsch J.\*\*, Rachbauer R.\*\*\*, Polcik P.\*\*\*\*, Mayrhofer P.H.\*\*\*  
\*Christian Doppler Laboratory for Application Oriented Coating Development at the Institute of Materials Science and Technology, Vienna University of Technology, Austria  
\*\*Institute of Materials Science and Technology, Vienna University of Technology, Austria  
\*\*\*OC Oerlikon Balzers AG, Liechtenstein  
\*\*\*\*PLANSEE Composite Materials GmbH, Germany
- HM 139 Phase Stability, Thermal Stability and Oxidation Resistance of Arc-Evaporated Ti-Al-Ta-N Coatings**  
Hollerweger R.\*, Arndt M.\*\*, Rachbauer R.\*\*, Polcik P.\*\*\*, Paulitsch J.\*\*\*\*, Mayrhofer P.H.\*\*\*  
\*Christian Doppler Laboratory for Application Oriented Coating Development at the Institute of Materials Science and Technology, Vienna University of Technology, Austria  
\*\*OC Oerlikon Balzers AG, Liechtenstein  
\*\*\*PLANSEE Composite Materials GmbH, Germany  
\*\*\*\*Institute of Materials Science and Technology, Vienna University of Technology, Austria
- HM 140 Microstructure of TiAlN / AlTiRuN Multilayers Grown by Cathodic Arc Evaporation**  
Wüstefeld C.\*, Motylenko M.\*, Rafaja D.\*, Heger D.\*, Michotte C.\*\*, Czetti C.\*\*\*, Kathrein M.\*\*\*  
\*Technical University TU Bergakademie Freiberg, Germany  
\*\*CERATIZIT Luxembourg S.à.r.l., Luxembourg  
\*\*\*CERATIZIT Austria GmbH, Austria
- HM 141 Comparison of the Structure and Properties of TiAlN, CrAlN and TiAlN/CrAlN Multilayer Coatings Deposited by Cathode Arc Evaporation**  
Li J.\*, Chen L.\*, Wu M.\*, Pei F.\*, Wang S.\*  
\*Zhuzhou Cemented Carbide Cutting Tools Co., Ltd., China
- HM 142 The Influence of TiAlCO Layer on the Microstructure and Properties of CVD Al<sub>2</sub>O<sub>3</sub> Coating**  
Liu W.\*, Chen X.\*, Wei Q.\*\*, Li X.\*, She Q W.\*  
\*Zhuzhou Cemented Carbide Cutting Tools Co., Ltd., China  
\*\*Central South University, China
- HM 143 Novel Hard Coatings for High Performance Hot Working Tools**  
Rosso M.\*, Peter I.\*, Motoiu P.\*\*  
\*Politecnico di Torino, Italy  
\*\*Tehnoid com srl, Romania
- HM 41 In-Situ Residual Stress Analysis of Coated Cutting Tools at Thermal Cycling Conditions**  
Ramos Moore E.\*, García J.\*\*, Coelho R.\*\*\*, Pinto H.\*\*\*\*  
\*Universitaet des Saarlandes, Germany  
\*\*Sandvik Coromant R&D, Sweden  
\*\*\*Hemholtz Zentrum Berlin fuer Materialien und Energie GmbH, Germany  
\*\*\*\*Universidade de São Paulo, Brazil





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