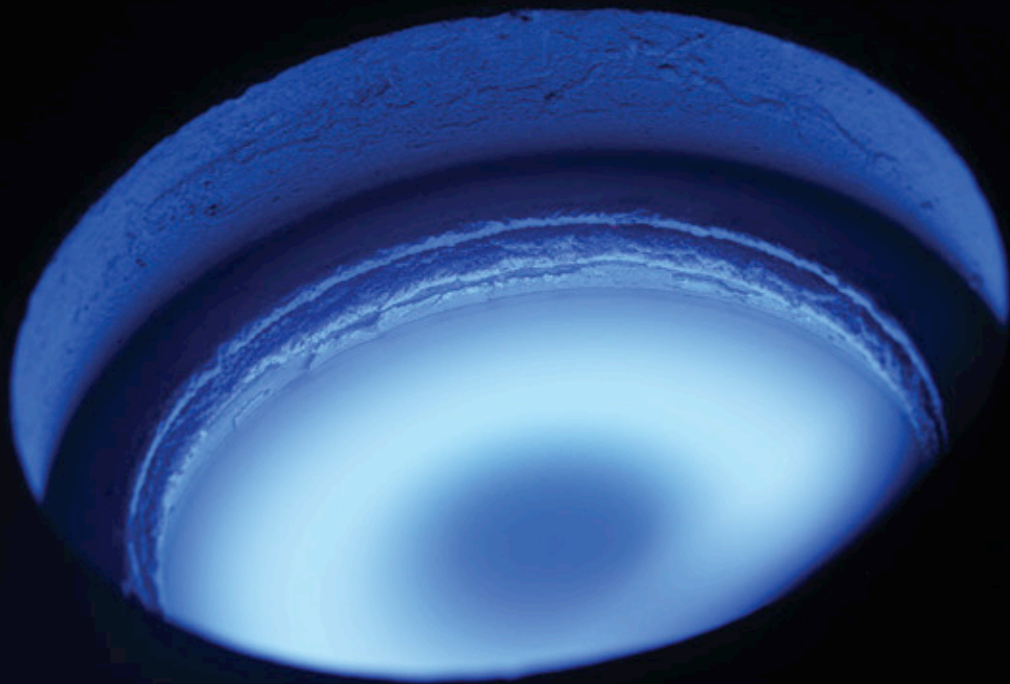


# Ninth International Conference on HIPIMS *Programme of Events*

Wednesday 27 June – Thursday 28 June 2018



## Programme of Events

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### Exhibitors



## Wednesday 27 June 2018

**8–8.30am**

Registration at Cutlers' Hall

**8.30–8.40am**

Welcome address by

Prof. Roger Eccleston, Board member Joint SHU-Fraunhofer IST HIPIMS Research Centre

Prof. Günter Bräuer, Director Fraunhofer IST

Prof. Arutiun P. Ehiasarian, Conference Chairman

### First morning session

**Moderator** – Ralf Bandorf, Fraunhofer IST, Germany

**8.40–9am**

HIPIMS superimposed sputtering of Al-doped zinc oxide films from rotatable targets

V. Sittinger<sup>1</sup>, S. Jung<sup>1</sup>, C. Britze<sup>1</sup>, H. Gerdes<sup>1</sup>, D. Schorn<sup>2</sup>, T. Wallendorf<sup>3</sup>, G. Bräuer<sup>1</sup>

<sup>1</sup> Fraunhofer Institute for Surface Engineering and Thin Films IST, Bienroder Weg 54e, 38108 Braunschweig, Germany

<sup>2</sup> MAGPULS Stromversorgungs Systeme GmbH, Im Unterfeld 19, 76547 Sinzheim

<sup>3</sup> IBW Technologieberatung, Niedstr. 6, 12159 Berlin

**9–9.20am**

Low-temperature (300°C) HiPIMS deposition of thermochromic VO<sub>2</sub> films with antireflection SiO<sub>2</sub> overlayers

D. Kolenaty, J. Vlcek, J. Houska, T. Kozak

Department of Physics and NTIS – European Centre of Excellence, University of West Bohemia, Univerzitni 8, 306 14 Plzen, Czech Republic

**9.20–9.40am**

Codeposition of Silicon-doped tantalum oxide films by HiPIMS for tunable resistive switching applications

Rajesh Ganesan<sup>1</sup>, Kerstin Thorwarth<sup>1</sup>, Hans-Josef Hug<sup>1</sup> David McKenzie<sup>2</sup> and Marcela Bilek<sup>2</sup>

<sup>1</sup> School of Physics, University of Sydney, Sydney, NSW 2006, Australia

<sup>2</sup> EMPA – Swiss Federal Labs for Material Science and Technology, Duebendorf CH 8600, Switzerland

**9.40–10am**

Reactive deep oscillation magnetron sputtering of Al-O-N films with tunable composition and properties

J. Vlcek, A. Belosludtsev, J. Houska, R. Cerstvy, S. Haviar

Department of Physics and NTIS – European Centre of Excellence, University of West Bohemia, Univerzitni 8, 306 14 Plzen, Czech Republic

**10–10.20am**

Current peak profiles and plasma optical emission spectra during HiPIMS of Zn/Al in an Ar and Ar/O<sub>2</sub> atmosphere

M. Zubkins, H. Arslan, J. Purans

Institute of Solid State Physics, Kengaraga 8, Riga, Latvia, LV-1063

**10.20–10.40am**

Coffee break

## Wednesday 27 June 2018

### Second morning session

Moderator – Papken Eh. Hovsepian, Sheffield Hallam University, UK

#### 10.40–11am

##### Erosion performance of CrAlYN/ CrN nanoscale multilayer coatings deposited on Ti6Al4V by HIPIMS

D. Ma<sup>a</sup>, T. J. Harvey<sup>a</sup>, R. G. Wellman<sup>b</sup>, A. P. Ehasarian<sup>c</sup>,  
P. Eh. Hovsepian<sup>c</sup>, A. A. Sugumaran<sup>c</sup>, Y. P. Purandare<sup>c</sup>  
and R. J. Wood<sup>a</sup>

<sup>a</sup>nCATS, University of Southampton, Southampton,  
SO17 1BJ, UK

<sup>b</sup>Surface Engineering, Roll-Royce plc, Derby,  
DE24 8BJ, UK

<sup>c</sup>National HIPIMS Technology Centre, Materials and  
Engineering Research Institute, Sheffield Hallam  
University, Sheffield, S1 1WB, UK

#### 11–11.20am

##### Industrial system solution approach utilizing HIPIMS for improved process optimization: a Ti-Cr-based anticorrosion coating case study

Krzysztof Ruda, Wojciech Gajewski, Paweł Lesiuk, Paweł  
Ozimek

TRUMPF Huettinger, Marecka 47, 05-220 Zielonka,  
Poland

#### 11.20–11.40am

##### Spoke formation in large scale rectangular magnetrons

Arutiun P. Ehasarian

National HIPIMS Technology Centre – UK, Materials  
and Engineering Research Institute, Sheffield Hallam  
University, Howard St, Sheffield, S1 1WB, UK

#### 11.40–12.00 noon

##### Structural and mechanical properties of DLC films deposited by Ne HIPIMS

Fábio Ferreira<sup>1</sup>, Ricardo Serra<sup>1</sup>, A. Cavaleiro<sup>1,2</sup>  
and João Oliveira<sup>1</sup>

<sup>1</sup>SEG-CEMMPRE-Department of Mechanical  
Engineering, University of Coimbra, Rua Luis Reis  
Santos, 3030-788, Coimbra, Portugal

<sup>2</sup>LED&Mat-IPN, Instituto Pedro Nunes, Laboratório de  
Ensaios Desgaste e Materiais, Rua Pedro Nunes, 3030-  
199 Coimbra, Portugal

#### 12.00–1.45pm

##### Lunch break

#### 1.45–2.00pm

##### Conference photograph

## Wednesday 27 June 2018

### First afternoon session

**Moderator** – Roel Tietema, Hauzer Techno Coating, The Netherlands

#### 2–2.20pm

#### Graphene Growth by Using HIPIMS

Cheng-Ming Tseng, En-Yi Liao, Chun-Ming Chen, Ping-Yen Hsieh, Tsung-Han Chen, Ying-Hung Chen and Ju-Liang He

Department of Materials Science and Engineering, Feng Chia University, Taichung City, Taiwan

#### 2.20–2.40pm

#### High sp<sup>3</sup> DLC with iPVD through Modified High Impulse Magnetron Sputtering

Ian Haehnlein<sup>1,2</sup>, Baohua Wu<sup>1,3</sup>, Jake McLain<sup>2</sup>, Brian Jurczyk<sup>2</sup> and David N. Ruzic<sup>1</sup>

<sup>1</sup> Department of Nuclear, Plasma, and Radiological Engineering, University of Illinois at Urbana-Champaign, IL 61801, USA

<sup>2</sup> Starfire Industries, IL 61801, USA

<sup>3</sup> Southwest Jiaotong University, Chengdu 610031, China

#### 2.40–3.00pm

#### Controlling stoichiometry and ionization of reactive HIPIMS processes by using plasma emission monitoring

J. Rieke<sup>1</sup>, R. Bandorf<sup>2</sup>, H. Gerdes<sup>2</sup>, T. Schütte<sup>3</sup> and G. Bräuer<sup>1,2</sup>

<sup>1</sup> Institute for Surface Technology IOT TU-Braunschweig,

<sup>2</sup> Fraunhofer IST,

<sup>3</sup> Plasus GmbH

#### 3.00–3.20pm

#### HiPIMS meets Diamond

Toni Leyendecker, Oliver Lemmer, Werner Kölker, Stephan Bolz and Christoph Schiffers

CemeCon AG, Adenauerstr. 20 A4, 52146 Würselen, Germany

#### 3.20–3.40pm

The implementation of a reversed voltage pulse technology enables enhanced coating properties for glass, plastics, fiber and other non-conductive substrates.

A special consideration of this work will be given to medical coatings of biocompatible polymers on implantable devices.

Gerhard Eichenhofer<sup>1,2</sup>, Dr. Ivan Fernandez-Martinez<sup>2,4</sup>, Michael Banghard<sup>3</sup> and Carlos de la Viesca<sup>5</sup>

<sup>1</sup> 4A-PLASMA, Germany;

<sup>2</sup> hiP-V-Collaboration, Germany, Spain, Sweden;

<sup>3</sup> NMI, Natural and Medical Sciences Institute at the University of Tübingen, Germany;

<sup>4</sup> Nano4Energy, S.L. Spain;

<sup>5</sup> INGENIERIA VIESCA, S.L. Spain;

#### 3.40–4.00pm

#### Coffee break

### Wednesday 27 June 2018

#### Second afternoon session

Moderator – Gerry van der Kolk, IonBond, The Netherlands

##### 4.00–4.20pm

#### Molybdenum back contacts for photovoltaic applications deposited by HIPIMS

Daniel A. L. Loch, Arutiun P. Ehasarian  
HIPIMS Technology Centre, Sheffield Hallam University,  
Sheffield, UK

##### 4.20–4.40pm

#### Ar-Nb plasma characterization and thin film properties in HiPIMS regimes for coating of superconducting cavities

Fabio Avino, Alban Sublet, Sergio Calatroni, Pedro Costa Pinto, Thibaut Richard, Guillaume Rosaz, Mauro Taborelli, Wil Vollenberg, Alexej Grudiev, Kai Papke.  
CERN, Switzerland

##### 4.40–5.00pm

#### The study of deposition method of NbN film on Cu substrate By HIPIMS

Li Xiao, Xiangyang Lu, Datao Xie, Weiwei Tan, Deyu Yang, Yujia Yang  
Peking University, Beijing, China

##### 5.00–5.20pm

#### Bipolar High Power Impulse Magnetron Sputtering: A new approach to control the metal ion flux

Ioana-Laura Velicu<sup>1</sup>, Corneliu Porosnicu<sup>2</sup>, Ilarion Mihăilă<sup>3</sup>, Ion Burducea<sup>4</sup>, Alin Velea<sup>5</sup>, Daniel Cristea<sup>6</sup>, Daniel Munteanu<sup>6</sup> and Vasile Tiron<sup>7</sup>

<sup>1</sup> Faculty of Physics, Alexandru Ioan Cuza University, Iasi-700506, Romania

<sup>2</sup> National Institute for Lasers, Plasma and Radiation Physics, 077125, Bucharest, Romania

<sup>3</sup> Integrated Center of Environmental Science Studies in the North-Eastern Development Region (CERNESIM), Alexandru Ioan Cuza University of Iasi, Iasi-700506, Romania

<sup>4</sup> Horia Hulubei National Institute of Physics and Nuclear Engineering, IFIN-HH, Magurele 077125, Romania

<sup>5</sup> The National Institute of Materials Physics, Magurele 077125, Romania

<sup>6</sup> Faculty of Materials Science and Engineering, Department of Materials Science, Transilvania University, Brasov 500068, Romania

<sup>7</sup> Research Department, Alexandru Ioan Cuza University, Iasi-700506, Romania

##### 7.30–11pm

#### Conference dinner, Cutlers' Hall, Sheffield

## Thursday 28 June 2018

### First morning session

Moderator – Arutiun P. Ehasarian, Sheffield Hallam University, UK

#### 8.30–9am

#### BeW coatings deposited by hybrid HiPIMS/dcMS co-sputtering system as plasma facing material for fusion applications

C. Porosnicu<sup>1</sup>, P. Dinca<sup>1</sup>, O.G. Pompilian<sup>1</sup>, B. Butoi<sup>1</sup>, V. Tiron<sup>2</sup>, I. Burducea<sup>3</sup>, I.-L. Velicu<sup>4</sup> and C.P. Lungu<sup>1</sup>

<sup>1</sup>National Institute for Lasers, Plasma and Radiation Physics, Bucharest-077125, Romania

<sup>2</sup>Research Department, Alexandru Ioan Cuza University, Iasi-700506, Romania

<sup>3</sup>Horia Hulubei National Institute of Physics and Nuclear Engineering, IFIN-HH, Magurele 077125, Romania

<sup>4</sup>Faculty of Physics, Alexandru Ioan Cuza University, Iasi-700506, Romania

#### 9–9.20am

#### Chromium Target composition in reactive high-power impulse magnetron sputtering characterized by in-vacuum X-ray photoelectron spectroscopy

Vincent Layes<sup>1</sup>, Carles Corbella<sup>1</sup>, Sascha Monjé<sup>1</sup>, Volker Schulz-von der Gathen<sup>1</sup>, Achim von Keudell<sup>1</sup> and Teresa de los Arcos<sup>2</sup>

<sup>1</sup>Institute for Experimental Physics II, Ruhr-University Bochum, Universitätsstr. 150, 44780 Bochum, Germany

<sup>2</sup>Technical and Macromolecular Chemistry, Paderborn University, Warburgstr. 100, 33098 Paderborn, Germany

#### 9.20–9.40am

#### Properties of spokes observed with a linear magnetron

André Anders<sup>1</sup> and Yuchen Yang<sup>2</sup>

<sup>1</sup>Leibniz Institute of Surface Engineering (IOM), Permoserstr. 15, 04318 Leipzig, Germany

<sup>2</sup>Institute of High Energy Physics, Chinese Academy of Sciences, Academy of Sciences, Beijing, China

#### 9.40–10am

#### Control of voltage and current peak shape for reactive HIPIMS deposition

Wojciech Gajewski, Anna W. Oniszczyk, Piotr Rózański, Paweł Lesiuk, Paweł Ozimek

TRUMPF Huettinger, Marecka 47, 05-220 Zielonka, Poland

#### 10–10.20am

#### Advantages associated with applying a Positive Pulse option to a HIPIMS power supply

Jason Hrebik

Kurt J. Lesker Company, USA

#### 10.20–10.40am

#### Coffee break

## Thursday 28 June 2018

### Second morning session

Moderator – Volker Sittinger, Fraunhofer IST, Germany

#### 10.40–11am

##### Gas rarefaction in HiPIMS – comparison of a particle simulation and volume-averaged models

T. Kozak<sup>1</sup>, J. Lazar<sup>2</sup>

<sup>1</sup> Department of Physics and NTIS-European Centre of Excellence, University of West Bohemia, Univerzitni 8, 30614 Plzen, Czech Republic

<sup>2</sup> New Technologies – Research Centre, University of West Bohemia, Univerzitni 8, 30614 Plzen, Czech Republic

#### 11–11.20am

##### Novel HIPIMS deposited nanostructured CrN/NbN coatings for environmental protection of steam turbine components

P. Eh. Hovsepian<sup>a</sup>, A. P. Ehasarian<sup>a</sup>, Y. P. Purandare<sup>a</sup>, P. Mayr<sup>b</sup>, K. G. Abstoss<sup>b</sup>, M. Mosquera Feijoo<sup>c</sup>, W. Schulz<sup>c</sup>, A. Kranzmann<sup>c</sup>, M.I. Lasanta<sup>d</sup>, J.P-Trujillo<sup>d</sup>

<sup>a</sup> UK National HIPIMS Technology Centre, Materials and Engineering Research Institute, Howard Street, Sheffield Hallam University, Sheffield, S1 1WB, UK.

<sup>b</sup> Welding Engineering Institute of Joining and Assembly, Technische Universität Chemnitz, Reichenhainer Strasse 70, 09126 Chemnitz, Germany

<sup>c</sup> BAM, Federal Institute for Materials Research and Testing, Unter den Eichen 87 12205 Berlin, Germany.

<sup>d</sup> Grupo de Investigación Ingeniería de Superficies y Materiales Nanoestructurados, Facultad de Ciencias Químicas, Universidad Complutense de Madrid, Spain

#### 11.20–11.40am

##### Coated Shoulders for Friction Stir Welding of Aluminium Alloys

Arunprabhu A. Sugumaran<sup>a</sup>, Arutiun P. Ehasarian<sup>a</sup>, Yashodhan Purandare<sup>a</sup>, Papken Eh. Hovsepian<sup>a</sup>, Peter Hatto<sup>b</sup> and Jeroen DeBacker<sup>c</sup>

<sup>a</sup> National HIPIMS Technology Centre, Materials and Engineering Research Institute, Sheffield Hallam University, City Campus, Howard Street, Sheffield S1 1WB, United Kingdom

<sup>b</sup> Ionbond UK, Number One Industrial Estate, Medomsley Road, Consett, Durham, DH8 6TS, United Kingdom

<sup>c</sup> TWI Ltd., United Kingdom

#### 11.40–2pm

##### Lunch

#### End of conference



## Poster presentations

Exhibition Hall, 27 and 28 June 2018

- 1. Optimization of magnetic field configuration for Titanium Nitride deposition using HIPIMS**  
Anas Ghailane, Heinz Busch, Jones Alami  
Mohammed VI Polytechnic University, Benguerir, Morocco
- 2. Probing the Electron Density of Spokes Using Target Inserts**  
Ante Hecimovic, Julian Held, Wolfgang Breilmann, Christian Maszl, Volker Schulz-von der Gathen and Achim von Keudell  
Experimental Physics II, Ruhr-University Bochum, Universitätsstr. 150, 44780 Bochum, Germany
- 3. Effect of pulse power on controlled reactive HiPIMS deposition of ZrO<sub>2</sub> films examined by an optical emission spectroscopy**  
A.D. Pajdarová and J. Vlček  
Department of Physics and NTIS – European Centre of Excellence, University of West Bohemia, Univerzitní 8, 306 14 Plzeň, Czech Republic
- 4. Controlling the polymorphic composition of TiO<sub>2</sub> thin films by modifying the target surface conditions using HiPIMS deposition parameters**  
G. Christidis<sup>a</sup>, R. Ganesan<sup>b,c</sup>, V. Shklover<sup>a</sup>, K. Thorwarth<sup>b</sup>, M. Bilek<sup>c</sup>, H.-J. Jug<sup>b</sup>, J. Leuthold<sup>a</sup>  
<sup>a</sup>ETH Zurich, Institute of Electromagnetic Fields (IEF), 8092 Zurich, Switzerland  
<sup>b</sup>EMPA, Swiss Federal Labs for Material Science and Technology, 8600 Dübendorf, Switzerland  
<sup>c</sup>The School of Physics, The University of Sydney, 2006 NSW, Australia
- 5. Low-temperature deposition of thermochromic VO<sub>2</sub> films on glass and kapton using reactive deep oscillation magnetron sputtering**  
M. Prochazka, S. Babaei Tooski, J. Vlcek and R. Cerstvy  
Department of Physics and NTIS-European Centre of Excellence, University of West Bohemia, Univerzitni 8, 30614 Plzen, Czech Republic
- 6. Niobium coatings onto complex accelerating structures by HiPIMS**  
Guillaume Rosaz, Fabio Avino, Sergio Calatroni, Thibaut Richard, Alban Sublet, Mauro Taborelli  
CERN – CH 1211 Geneva
- 7. Deposition of Niobium for superconducting accelerator on copper by High Power Impulse Magnetron Sputtering**  
Weiwei Tan, Xiangyang Lu, Datao Xie, Li Xiao, Yujia Yang, Boting Li, Deyu Yang,  
Institute of Heavy Ion Physics, Peking University, China
- 8. Laser Annealing for Niobium Film on Copper Deposited by HiPIMS**  
Yujia Yang, Xiangyang Lu, Datao Xie, Weiwei Tan, Li Xiao, Deyu Yang, Boting Li  
Peking University

### 9. Dual-HiPIMS system as source of fusion related W-Al composite layers having helium and deuterium inclusions

P. Dinca<sup>a</sup>, V. Tiron<sup>b</sup>, I. Mihaila<sup>c</sup>, I.-L. Velicu<sup>d</sup>, C. Porosnicu<sup>a</sup>, B. Butoi<sup>a</sup>, A. Velea<sup>e</sup>, E. Grigore<sup>a</sup>, C. Costin<sup>c</sup>, C.P. Lungu<sup>a</sup>

<sup>a</sup>National Institute for Lasers, Plasma and Radiation Physics, Bucharest-077125, Romania

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<sup>c</sup>Integrated Center of Environmental Science Studies in the North-Eastern Development Region (CERNESIM), Alexandru Ioan Cuza University of Iasi, Iasi-700506, Romania

<sup>d</sup>Faculty of Physics, Alexandru Ioan Cuza University, Iasi-700506, Romania

<sup>e</sup>National Institute of Material Physics, Bucharest-077125, Romania

### 10. First HiPIMS activities at Politecnico di Milano

D. Dellasega, A. Maffinia; F. Mirania, A. Pazzagliaa, M. Passonia

Dipartimento di Energia, Politecnico di Milano, Milano, Italy

### 11. Influence of spokes on the ionized metal flux fraction in chromium high power impulse magnetron sputtering

B Biskup, C Maszl, W Breilmann, J Held, M Böke, J Benedikt and A von Keudell

Experimental Physics II, Ruhr-University Bochum, Universitätsstr. 150, 44780 Bochum, Germany

### 12. HIPIMS for pretreatment and coating of plastics

H. Gerdes, R. Bandorf, G. Bäuer

Fraunhofer Institute for Surface Engineering and Thin Films IST, Bienroder Weg 54e, 38108 Braunschweig, Germany

### 13. Effect of chamber pressure on defect generation and their influence on corrosion and tribological properties of HIPIMS deposited CrN/NbN Coatings

Barnali Biswas<sup>1</sup>, Y. Purandare, A. Sugumaran<sup>1</sup>, Papken Eh. Hovsepiyan<sup>1</sup> and Imran Khan<sup>2</sup>

<sup>1</sup>National HIPIMS Technology Centre, Materials and Engineering Research Institute, Sheffield Hallam University, City Campus, Howard Street, Sheffield S1 1WB, United Kingdom

<sup>2</sup>Zimmer-Biomet UK Limited, Dorcan Industrial Estate, Murdoch Road, Swindon SN3 5HY, United Kingdom





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