



11TH INTERNATIONAL CONFERENCE ON HIPIMS

11TH INTERNATIONAL CONFERENCE ON HIPIMS PROGRAMME OF EVENTS



 National HIPIMS
Technology Centre

**Sheffield
Hallam
University**

 Network of Competence
INPLAS

 **Fraunhofer**
IST

Wednesday 16 June 2021

08:30-08:45

Welcome address by

Prof. Arutiun P. Ehiasarian, Conference Chairman,
 Dr. Lisa Mooney, Pro Vice-Chancellor (Research & Innovation), Sheffield Hallam University
 Prof. Christoph Herrmann, Director Fraunhofer IST

First morning block

Chairman: Prof. A.P. Ehiasarian, Sheffield Hallam University, UK

	Presentation time	LIVE Q&A	Introduction of the next talk
D. Elliott. <i>Surface Engineering Association, UK</i> Surface Engineering: The key to a Sustainable Future?	8:45- 9:00	9:00-9:05	9:05- 9:10
S. Turner <i>High Value Manufacturing Catapult</i> A low friction route to Net Zero.	9:10- 9:25	9:25-9:30	9:30-9:35
R.G Wellman <i>Rolls-Royce plc</i> Some current and future coating challenges in aero-engines.	9:35-9:50	9:50-9:55	9:55-10:05

9:55-10:05 Coffee Break and Exhibition

Wednesday 16 June 2021

Second morning block

Chairman: Prof. A.P. Ehiasarian, Sheffield Hallam University, UK

	Presentation time	LIVE Q&A	Introduction of the next talk
<p><u>R. Wood.</u> <i>The national Centre for Advanced Tribology at Southampton (nCATS)</i> Surface engineering of the leading edges of turbomachinery blades.</p>	10:05- 10:20	10:20-10:25	10:25- 10:30
<p><u>M. Stack.</u> <i>Department of Mechanical & Aerospace Engineering. University of Strathclyde, UK</i> Surface engineering in Renewable Energy: Mapping the weather on wear maps.</p>	10:30- 10:45	10:45-10:50	10:50-10:55
<p><u>M. Rainforth.</u> <i>Department of Material Science and Engineering. University of Sheffield, UK</i> Understanding tribological contact: how a detailed understanding can help design wear resistant materials.</p>	10:55-11:10	11:10-11:15	11:15-11:25

11:15-11:25 Coffee Break and Exhibition

Wednesday 16 June 2021

Third morning block

Chairman: Prof. A.P. Ehasarian, Sheffield Hallam University, UK

	Presentation time	LIVE Q&A	Introduction of the next talk
<p><u>Ping Xiao.</u> <i>Department of Materials, University of Manchester, UK.</i> SiAlN coating produced with magnetron sputtering on metal substrate for aero-engine and nuclear industry applications.</p>	11:25- 11:40	11:40-11:45	11:45- 11:50
<p><u>Peter K. Petrov</u> <i>Department of Materials, Imperial College London, Prince Consort Road, London SW7 2BP, UK</i> Thin film refractory plasmonic materials: deposition, optical properties, and temperature stability.</p>	11:50- 12:05	12:05-12:10	12:10-12:15
<p><u>Ryan Bower.</u> <i>Imperial College London, London, UK.</i> HIPIMS of transition metal nitrides for CMOS-compatible optoelectronic applications.</p>	12:15-12:30	12:30-12:35	12:35----

12:35-13:35 Lunch Break

Wednesday 16 June 2021

First afternoon block

Chairman: Dr. C. Constable, Ionbond UK

	Presentation time	LIVE Q&A	Introduction of the next talk
<p><u>A. Matthews.</u> <i>The University of Manchester. UK</i> Towards Digitalised Surface Manufacturing: The EPSRC DSM NetworkPlus .</p>	13:35- 13:50	13:50-13:55	13:55- 14:00
<p>A.P. Ehasarian¹, A. Sugumaran¹, P.Eh. Hovsepian¹, C. Davies², P. Hatto² ¹ National HIPIMS Technology Centre, Sheffield Hallam University, Howard St, Sheffield, S1 1WB, UK. ² Ionbond UK, Consett, c/o Durham, UK</p> Towards Creation of a Digital Twin of the Plasma Synthesis of Functional Materials by High Power Impulse Magnetron Sputtering and Other PVD Processes.	14:00- 14:15	14:15-14:20	14:20-14:25
<p><u>Christoph Herrmann</u> <i>Fraunhofer Institute for Surface Engineering and Thin Films (IST), Braunschweig, Germany.</i> Computational Engineering and Cyber-Physical Systems</p>	14:25-14:40	14:40-14:45	14:45-14:55
14:45-14:55 Coffee Break and Exhibition			

Wednesday 16 June 2021

Second afternoon block

Chairman: Dr. C. Constable, Ionbond UK

	Presentation time	LIVE Q&A	Introduction of the next talk
<p>J. Schneider. <i>Materials Chemistry, RWTH Aachen University, Germany.</i></p> <p>Unravelling the ion-energy-dependent structure evolution and its implications for the elastic properties of (V, Al)N thin films.</p>	14:55- 15:10	15:10-15:15	15:15- 15:20
<p>Mathis Klette. <i>University of Kiel, IEAP, Germany.</i></p> <p>Measurement of momentum transfer in ion beam sputtering.</p>	15:20- 15:35	15:35-15:40	15:40-15:45
<p>Julian Held , Volker Schulz-von der Gathen and Achim von Keudell. <i>Experimental Physics II, Ruhr University Bochum Universitätsstr, Germany.</i></p> <p>Ionization of Sputtered Particles in HiPIMS Discharges.</p>	15:45-16:00	16:00-16:05	16:05-16:10
16:05-16:15	Coffee Break and Exhibition		

Wednesday 16 June 2021

Third afternoon block

Chairman: Dr. C. Constable, Ionbond UK

	Presentation time	LIVE Q&A	Introduction of the next talk
<p><u>Sven Ulrich.</u> <i>Karlsruhe Institut für Technologie (KIT), Germany.</i> Multifunctional carbon-based nanocomposite HiPIMS coatings.</p>	16:15-16:30	16:30-16:35	16:35-16:40
<p><u>Rebeca F. B. O. Correia</u>^{1,2,3}, <u>Anna Bender</u>³, <u>Holger Gerdes</u>³, <u>Vladimir J. Trava-Airoldi</u>¹ and <u>Ralf Bandorf</u>³ ¹<i>National Institute for Space Research – INPE,</i> ²<i>Federal University of São Paulo – UNIFESP,</i> ³<i>Fraunhofer Institute for Surface Engineering and Thin Films (IST), Braunschweig, Germany</i> Antibacterial Activity of DLC films with zinc, copper and silver.</p>	16:40- 16:55	16:55-17:00	17:00-17:05
<p><u>Petr Zeman</u> <u>Jiri Capek.</u> <i>European Centre of Excellence, University of West Bohemia, Czech Republic.</i> Effect of positive pulse voltage in bipolar reactive HiPIMS on crystal structure, microstructure and mechanical properties of CrN films.</p>	17:05-17:20	17:20-17:25	

17:25 END OF FIRST DAY

Thursday 17 June 2021

First morning block

Chairman: Prof. R. Bandorf, Fraunhofer IST, Germany

	Presentation time	LIVE Q&A	Introduction of the next talk
<u>Philipp Immich.</u> <i>IHI Hauzer Techno Coating B.V. The Netherlands.</i> More than 30 year of Evolution of Cr-Al-N - from conventional sputtering to HIPIMS for industrial applications.	8:45-9:00	9:00-9:05	9:05- 9:10
<u>Ch. Schiffers.</u> <i>CemeCon AG, Würselen, Germany.</i> 12 µm PVD in HiPIMS	9:10-9:25	9:25-9:30	9:30-9:35
<u>G van der Kolk.</u> <i>Ionbond Netherlands b.v., Venlo, The Netherlands.</i> Pulsed Arc plasma of ta-C and doped ta-C	9:35-9:50	9:50-9:55	9:55-10:05
09:55-10:05 Coffee Break and Exhibition			

Second morning block

Chairman: R. Bandorf, Fraunhofer IST, Germany

10:05- 11:05

QUO VADIS SURFACE ENGINEERING

Prof. Christoph Hermann, Director, Fraunhofer IST, Germany

Prof. Sam Turner, CTO, High Value Manufacturing Catapult, UK

Prof. Phil Withers, Chief Scientist and Regius Professor of Materials, Henry Royce Institute

Dr. Dave Doerwald, CEO, IHI Hauzer Techno Coating B.V.

Dr. Ton Hurkmans, CTO, IHI Ionbond Group

Prof. Ping Xiao, Chair of Surface Engineering Division, IOM³

Prof. Wayne Cranton, Dean of Research, Sheffield Hallam University

Dr. Christopher Constable, Managing Director, Ionbond UK Ltd.

Dave Elliot, CEO, Surface Engineering Association

11:05-11:15 Coffee Break and Exhibition

Thursday 17 June 2021

Third morning block

Chairman: Prof. R. Bandorf, Fraunhofer IST, Germany

	Presentation time	LIVE Q&A	Introduction of the next talk
<p>D. Vavassori^{a,*}, D. Dellasega^a, F. Mirani^a, C. Conti^b and M. Passoni^a ^a Politecnico di Milano, Milano, Italy ^b ISPC-CNR, Milano, Italy</p> <p>Role of energetic ions in the growth of fcc and ω crystalline phases in Ti films deposited by HiPIMS.</p>	11:15- 11:30	11:30-11:35	11:35- 11:40
<p>Holger Kersten. University of Kiel, IEAP, Germany.</p> <p>Energy flux measurements at magnetron sputtering.</p>	11:40- 11:55	11:55-12:00	12:00-12:05
<p>Krishnanand Shukla¹, Yashodhan P. Purandare¹, Imran Khan², A. P. Ehasarian¹, P. Eh Hovsepian¹ ¹National HIPIMS Technology Centre UK, Materials and Engineering Research Institute, Sheffield Hallam University, Sheffield, S1 1WB, UK. ²Zimmer-Biomet UK Limited, Dorcan Industrial Estate, Murdock Road, Swindon SN3 5HY, UK.</p> <p>Impact Fatigue and Fracture Toughness Analysis of CoCrMo Alloy Nitrided using HIPIMS Plasma.</p>	12:05-12:20	12:20-12:25	12:25--

12:25-13:35 Lunch Break

Thursday 17 June 2021

First afternoon block

Chairman: Prof. G. Bräuer, Fraunhofer IST, Germany

	Presentation time	LIVE Q&A	Introduction of the next talk
<p>R. Bandorf, M. Grein, H. Gerdes, R. Correia, U. Heckmann, G. Bräuer. <i>Surface Engineering and Thin Films (IST), Braunschweig, Germany.</i></p> <p>Me-DLC based strain sensitive materials.</p>	13:35- 13:50	13:50-13:55	13:55- 14:00
<p>P. Różański^{1,2}, W. Gajewski¹, A.W. Oniszczyk¹, M. Puźniak^{1,2}, R. Mroczyński², S. Bąba^{1,4}, P. Domanowski³ ¹ TRUMPF Huettinger Sp. z o.o., Zielonka, Poland ² Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland ³ University of Technology and Life Sciences, Faculty of Mechanical Engineering, Bydgoszcz, Poland ⁴ Warsaw University of Technology, Institute of Control and Industrial Electronics, Warsaw, Poland.</p> <p>Diamond-like carbon coatings by HIPIMS</p>	14:00- 14:15	14:15-14:20	14:20-14:25
<p>Ivailo Dolchinkov. <i>IHI Ionbond AG, Dulliken, Switzerland.</i></p> <p>Pulsed Arc non-equilibrium process effects on the properties of doped and pure ta-C coatings.</p>	14:25-14:40	14:40-14:45	14:45-14:55

14:45-14:55 Coffee Break and Exhibition

Thursday 17 June 2021

Second afternoon block

Chairman: Prof. G. Bräuer, Fraunhofer IST, Germany

	Presentation time	LIVE Q&A	Introduction of the next talk
<p>Joelle ZGHEIB, Ahmed RHALLABI, Pierre-Yves JOUAN. <i>Institut des Matériaux de Jean Rouxel Nantes (IMN)</i> <i>University of Nantes, France.</i> Modeling of High power impulse magnetron sputtering of Ar/Cr mixture using global kinetic model.</p>	14:55- 15:10	15:10-15:15	15:15- 15:20
<p>R. Buschhaus¹, A. von Keudell.¹ ¹<i>Experimentalphysik II, Ruhr- Universität Bochum, Bochum, Germany .</i> Ion-induced secondary electron emission coefficient of metal surfaces analysed in an ion beam experiment.</p>	15:20- 15:35	15:35-15:40	15:40-15:45
<p>A. Bertè, P. Civardi. <i>Lafer SpA, Piacenza (IT)</i> PVD coatings for Aluminium die casting applications: an experimental realistic approach.</p>	15:45-16:00	16:00-16:05	16:05-16:10

16:05-16:15 Coffee Break and Exhibition

Thursday 17 June 2021

Third afternoon block

Chairman: Prof. G. Bräuer, Fraunhofer IST, Germany

	Presentation time	LIVE Q&A	Introduction of the next talk
<p>Peter Klein^{(*)1}, Jaroslav Hnilica¹, Matej Fekete¹, Marta Šlapanská¹, Petr Vašina¹ <i>Department of Physical Electronics, Masaryk University, Brno, Czech Republic.</i> Investigation of spokes in reactive Ar/N₂ atmosphere.</p>	16:15-16:30	16:30-16:35	16:35-16:40
<p>Mathews George, Wolfgang Breilmann, Julian Held and Achim von Keudell <i>Experimentalphysik II, Ruhr-University Bochum, Germany</i> Control of Spokes in Magnetron Discharges.</p>	16:40- 16:55	16:55-17:00	17:00-17:05
<p>W.M. Huber^a, Z. Jeckell^a, I.F. Haehnlein^b, D.E. Barlaz^a, T.J. Houlahan, Jr.^b, B.E. Jurczyk^b, <u>D.N. Ruzic</u>.^{a*} <i>^a University of Illinois at Urbana-Champaign, ^b Starfire Industries, Urbana, IL, USA</i> Time-Resolved Electron Energy Distributions and Plasma Potentials During HiPIMS Processes</p>	17:05-17:20	17:20-17:25	

18:05 Exhibition

Friday 18 June 2021

First morning block

Chairman: D. Doerwald, Hauzer TechnoCoating, The Netherlands

	Presentation time	LIVE Q&A	Introduction of the next talk
<p><u>Y.P. Purandare</u>, G.L. Robinson, A.P. Ehasarian and P. Eh. Hovsepian National HIPIMS Technology Centre, MERI, Sheffield Hallam University, UK HIPIMS deposited nanoscale CrN/NbN multilayer coating for tribocorrosion resistance.</p>	8:45- 9:00	9:00-9:05	9:05- 9:10
<p><u>Jo Sharp</u>^{1*}, Itzel Castillo Müller¹, Paranjayee Mandal⁵, Ali Abbas², Magnus Nord^{4,6}, Alastair Doye⁴, Arutiun Ehasarian³, Papken Hovsepian³, Ian MacLaren⁴, W Mark Rainforth¹ ¹ Department of Materials Science and Metallurgy, University of Sheffield, UK, ² Loughborough University, Loughborough, UK, ³ Materials and Engineering Research Institute, Sheffield Hallam University, Sheffield, UK, ⁴ University of Glasgow, Glasgow UK, ⁵ University of Strathclyde, Glasgow, UK, ⁶ Universiteit Antwerpen, Antwerpen Belgium. Characterisation of a High-Power Impulse Magnetron Sputtered C/Mo/W Wear Resistant Coating by Transmission Electron Microscopy.</p>	9:10- 9:25	9:25-9:30	9:30-9:35
<p>Clementine Warres¹, J.C. Meyer^{1,2}, T. Lutz¹, J. P. Liebig³, W. Engelhart³ ¹NMI Natural and Medical Sciences Institute, ² Institute of Applied Physics, University of Tuebingen, ³Walter AG Tuebingen Complex 3D Nano Structures in HIPIMS Ti1-xAlxN-Coatings, an Electron Microscopic Study</p>	9:35-9:50	9:50-9:55	9:55-10:05
09:55-10:05 Coffee Break and Exhibition			

Friday 18 June 2021

Second morning block

Chairman: D. Doerwald, Hauzer TechnoCoating, The Netherlands

	Presentation time	LIVE Q&A	Introduction of the next talk
<p>Jaroslav Vlcek. <i>European Centre of Excellence, University of West Bohemia, Czech Republic.</i></p> <p>Controlled reactive HiPIMS: Effective technique for low-temperature deposition of tunable oxynitrides and thermochromic oxides</p>	10:05- 10:20	10:20-10:25	10:25- 10:30
<p>M. Zubkins*, A. Sarakovskis, E. Strods, L. Bikse, B. Polyakov, J. Purans <i>Institute of Solid State Physics, University of Latvia, Kengaraga 8, Riga, Latvia, LV-1063</i></p> <p>Amorphous and crystalline ReOx thin films deposited by reactive HiPIMS</p>	10:30- 10:45	10:45-10:50	10:50-10:55
<p>Chayan Ranjan Das*, Duggineni Gurappa, Amitava Ghosh. <i>Indian Institute of Technology Madras, India</i></p> <p>High-speed slot-milling of 304 stainless steel by end mill cutters coated with HiPIMS deposited AlTiN.</p>	10:55-11:10	11:10-11:15	11:15-11:25

11:15-11:25 Coffee Break and Exhibition

Friday 18 June 2021

Third morning block

Chairman: D. Doerwald, Hauzer TechnoCoating, The Netherlands

	Presentation time	LIVE Q&A	Introduction of the next talk
<p>Moritz Heintze <i>TRUMPF Hüttinger GmbH + Co. KG, Freiburg, Germany.</i></p> <p>Industrialization of Plasma Technology: Requirements for the Power Supplies When Moving to the 100 kW Range.</p>	11:25- 11:40	11:40-11:45	11:45- 11:50
<p>A.D. Pajdarová¹, T. Kozák¹, P. Mareš² and J. Čapek¹. ¹<i>European Centre of Excellence, University of West Bohemia, Czech Republic.</i> ²<i>HVM PLASMA, Praha , Czech Republic</i></p> <p>Presence of a reverse discharge during long positive voltage pulses in a bipolar HiPIMS discharge</p>	11:50- 12:05	12:05-12:10	12:10-12:15
<p>Marcus A. Law, Mark D. Bowden and James W. Bradley <i>Department of Electrical Engineering and Electronics, University of Liverpool, Brownlow Hill, Liverpool L69 3GJ, United Kingdom</i></p> <p>Electron property measurements in a Bipolar HiPIMS discharge by laser Thomson scattering.</p>	12:15-12:30	12:30-12:35	12:35----
12:35-13:35 Lunch Break			

Friday 18 June 2021

First afternoon block

Chairman: Prof. A.P. Ehasarian, Sheffield Hallam University, UK

	Presentation time	LIVE Q&A	Introduction of the next talk
Z. Jeckell^a, DE Barlaz^a, W. Huber^a, T. Houlahan^b, I. Haehnlein^b, B. Jurczyk^b, D. Ruzic^{a*}	13:35- 13:50	13:50-13:55	13:55- 14:00

^a University of Illinois at Urbana-Champaign, ^b Starfire Industries, Urbana, IL, USA.

Time Resolved Ion Energy Distribution Functions during a HiPIMS Discharge

F. Walk¹, R. Valizadeh², E. Seiler³, G. Stenning⁴, J.W. Bradley¹	14:00- 14:15	14:15-14:20	14:20-14:25
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¹ Department of Electrical Engineering and Electronics, University of Liverpool, UK, ² STFC Daresbury, Warrington, UK, ³ Institute of Electrical Engineering, Slovak Academy of Sciences, Bratislava, Slovakia, ⁴ ISIS Facility, STFC Rutherford Appleton Laboratory, Didcot, UK

Bipolar HiPIMS: Correlating plasma parameters to thin film properties

F. B. Lockwood Estrin, M. Law, J. W. Bradley.	14:25-14:40	14:40-14:45	14:45-14:55
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Department of Electrical Engineering and Electronics-University of Liverpool, Liverpool, UK.

The plasma potential structure in a bipolar pulsed HiPIMS plasma.

14:45-14:55 Coffee Break and Exhibition

Friday 18 June 2021

Second afternoon block

Chairman: Prof. A.P. Ehiasarian, Sheffield Hallam University, UK

	Presentation time	LIVE Q&A	Introduction of the next talk
<p>¹Stephanos KONSTANTINIDIS, ¹Amy O'REILLY, ¹Kamakshi PATEL, ¹Adrien CHAUVIN, ¹Julien DE WINTER, ¹David CORNIL, ¹Jérôme CORNIL, ²Adriano PANEPINTO, ³Jozef VESELÝ, ⁴Halima ALEM-MARCHAND, ¹Anastasiya SERGIEVSKAYA ¹ University of Mons - Mons (Belgium); ² Materia Nova - Mons (Belgium) ; ³ Charles University - Prague (Czech Republic) ; ⁴ Institut Jean Lamour - Nancy (France).</p> <p>Sputtering onto liquids for nanoparticle synthesis.</p>	14:55- 15:10	15:10-15:15	15:15- 15:20
<p>Anas Ghailane^{a,c*}, Hicham Larhlimi^a, Youssef Tamraoui^a, Mohammed Makha^a, Heinz Busch^{a,b}, Christian B. Fischer^{a,c}, and Jones Alami^{a*} ^aMaterials Science, Energy and Nano-engineering department, Mohammed VI Polytechnic University (UM6P), Bengueurir, Morocco ^bNTTF Coatings GmbH, Maarweg 30, 53619 Rheinbreitbach, Germany ^cDepartment of Physics, University Koblenz-Landau, 56070 Koblenz, Germany</p> <p>The effect of magnetic field configuration on structural and mechanical properties of TiN coatings deposited by HiPIMS and dcMS.</p>	15:20- 15:35	15:35-15:40	15:40-15:45
<p>P-Y Jouan University of Nantes, UMR CNRS 6502, Institut des Matériaux Jean Rouxel, 2 rue de la Houssinière – 44322 Nantes, France</p> <p>HiPIMS : A Side of the Story</p>	15:45-16:00	16:00-16:05	16:05-16:10

Dave TA Matthews¹, Rajesh Ganesan², Ivan Fernández-Martínez³, David. R. McKenzie² and Marcela MM Bilek²

16:10-16:25

16:25-16:30

1 The University of Twente, The Netherlands

2 The University of Sydney, NSW 2006, Australia

3 Nano4Energy S.L.N.E. 28006 Madrid, Spain

4 School of Biomedical Engineering, University of Sydney, Sydney, NSW 2006, Australia

Bipolar HiPIMS Thruster: Effective propulsion of metal ions for increased flux and enhanced coating characteristics

16:30-16:45

Student Prize Announcement and Closing Remarks

Prof. Arutiun P. Ehiasarian, Conference Chairman,

Prof. Ralf Bandorf. Fraunhofer IST, Germany

Prof. Andrew Alderson, Director of Industry and Innovation Research Institute, Sheffield Hallam University

16:45

End of Conference