



# 3rd International Conference on HIPIMS Programme of Events

# Programme of Events

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# Programme of Events

Tuesday, 19 June 2012

**8:00-8:30**

REGISTRATION AT CUTLERS' HALL

**8:30-8:40**

WELCOME ADDRESS:

Prof. Mike Smith, Board member Joint SHU-Fraunhofer IST HIPIMS Research Centre

Prof. Alan J Smith, Director Materials and Engineering Research Institute, SHU

Prof. Wolfgang Diehl, Deputy Director Fraunhofer IST

Prof. Arutiun Ehasarian, Conference Chairman

## Morning Session.

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

**8:40-9:00**

SPUTTERING - RECENT DEVELOPMENTS AND PERSPECTIVES

**G. Bräuer, R. Bandorf, T. Jung, B. Szyszka, M. Vergöhl**

Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

**9:00-9:20**

CORRELATION BETWEEN PULSE PARAMETERS AND COATING GROWTH DURING S3P™ DEPOSITION OF TiAlN

**S.Krassnitzer, D.Kurapov, J. Hagmann, M.Arndt, H.Rudigier**

OC Oerlikon Balzers AG, Balzers, Liechtenstein

**9:20-9:40**

NOVEL DEPOSITION OF MULTI-COMPOSITIONAL ALUMINUM TITANIUM NITRIDE (AlTiN) COATINGS BY HIGH POWER IMPULSE SPUTTERING (HIPIMS<sup>+</sup>) TECHNOLOGY

**A. Campiche<sup>1</sup>, F. Papa<sup>1</sup>, T. Sasaki<sup>2</sup>, T. Ishikawa<sup>2</sup>, H. Hourai<sup>2</sup>, T. Krug<sup>1</sup>,**

<sup>1</sup> Hauzer Techno Coating, Venlo, Netherlands

<sup>2</sup> Hitachi Tool Engineering Ltd., Matsue-shi, Shimane-ken, Japan

**9:40-10:00**

TiN COATINGS FOR MACHINING: CAN HIPIMS STAND THE TEST?

**P. Cosemans, I. Truijen, T. Jacobs**

Sirris, Smart Coating Application Lab, Diepenbeek, Belgium

**10:00-10:20**

INTRODUCTION OF ICIS A NOVEL TECHNOLOGY FOR IONISED SPUTTERING OF MAGNETIC MATERIALS

**A.P. Ehasarian**

HIPIMS Technology Centre, Sheffield Hallam University, Sheffield, UK

**10:20-10:40**

COFFEE BREAK AND EXHIBITION

# Programme of Events

Tuesday, 19 June 2012.

## Second Morning Session.

**Moderator:** Arutiun P. Ehasarian, Sheffield Hallam University, UK

### **10:40-11:00**

HISTORY OF VACUUM DEPOSITION USING ENERGETIC IONS

**D. M. Mattox**

Management Plus, Inc., Albuquerque, USA

### **11:00-11:20**

LOCALIZATION OF IONIZATION IN HIGH POWER IMPULSE  
MAGNETRON SPUTTERING

**A. Anders, P. Ni, and A. Rauch**

Lawrence Berkeley National Laboratory, Berkeley, California

### **11:20-11:40**

HIPIMS DISCHARGE DYNAMICS: EVOLUTION AND ORIGIN  
OF PLASMA INSTABILITIES

**A. Hecimovic, T. de los Arcos, V. Schulz-von der Gathen, M. Böke, J. Winter.**

Institut for Experimental Physics II, Research Department Plasma, Ruhr-Universität Bochum, Germany

### **11:40-12:00**

ION ENERGY DISTRIBUTION MEASUREMENTS IN pDC AND HIPIMS  
DISCHARGES

**D. Gahan, P. Scullin, B. Dolinaj, D. O' Sullivan and M. B. Hopkins**

Impedans Ltd., Dublin, Ireland.

### **12:00-12:20**

TEMPORALLY RESOLVED ION DISTRIBUTIONS IN HIPIMS SYSTEM  
WITH Ti TARGET

**M. Cada<sup>1</sup>, P. Adamek<sup>1</sup>, J. Olejnicek<sup>1</sup>, Z. Hubicka<sup>1</sup>, J. Adamek<sup>2</sup>, J. Stockel<sup>2</sup>**

<sup>1</sup> Academy of Sciences of the Czech Republic, Institute of Physics, Czech Republic

<sup>2</sup> Academy of Sciences of the Czech Republic, Institute of Plasma Physics, Czech Republic

### **12:20-14:00**

LUNCH BREAK and Conference Photograph

# Programme of Events

Tuesday, 19 June 2012.

## First Afternoon Session.

**Moderator:** Thomas Krug, Hauzer Techno Coating, The Netherlands

### **14:00-14:20**

DEVELOPMENT OF HARD DLC COATINGS USING HIPIMS TECHNOLOGY

**R. Bandorf, M. Ebert, M. Petersen, H. Gerdes, G. Bräuer**

Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

### **14:20-14:40**

STUDY OF THE COATING PROPERTIES OF NICKEL DEPOSITED BY INDUCTIVELY COUPLED IMPULSE SPUTTERING (ICIS)

**D.A.L. Loch, A.P. Ehasarian**

HIPIMS Technology Centre, Sheffield Hallam University, Sheffield, UK

### **14:40-15:00**

ANALYSIS OF IONIZATION RATIO OF Nb<sup>+</sup>/Nb AND Ar<sup>+</sup>/Ar ON HIPIMS DISCHARGE

**G. Terenziani<sup>1</sup>, A.P. Ehasarian<sup>2</sup>, S. Calatroni<sup>1</sup>**

<sup>1</sup> Technology Department-Vacuum Surface and Coatings, Surface Chemistry and Coatings group (TE-VSC/VCC), CERN, Switzerland

<sup>2</sup> HIPIMS Technology Centre, Sheffield Hallam University, Sheffield, UK

### **15:00-15:20**

THE INFLUENCE OF INERT GASES ON THE C/N<sub>2</sub>/INERT GAS HIPIMS DISCHARGE AND THIN FILM GROWTH

**S. Schmidt<sup>1</sup>, G. Greczynski<sup>1</sup>, Zs. Czigány<sup>2</sup>, L. Hultman<sup>1</sup>**

<sup>1</sup> Thin Film Physics Div., Department of Physics (IFM), Linköping University, Sweden

<sup>2</sup> Institute of Technical Physics and Materials Science, Research Centre for Natural Sciences of the Hungarian Academy of Sciences, Budapest, Hungary

### **15:20-15:40**

TEXTURED CrN THIN COATINGS OPENING UP NEW FIELDS OF APPLICATION

**E.M. Slomski, H. Scheerer, T. Troßmann, M. Oechsner**

Technische Universität Darmstadt, Germany

### **15:40-16:00**

COFFEE BREAK AND EXHIBITION



# Programme of Events

Tuesday, 19 June 2012.

## Second Afternoon Session.

**Moderator:** Gery van der Kolk, IonBond, The Netherlands

### 16:00-16:20

STUDY OF ZrN SYNTHESISED WITH HIPIMS/UBM AND CATHODIC ARC TECHNIQUES

**Y. P. Purandare<sup>1</sup>, A. P. Ehasarian<sup>1</sup>, G. Kamath<sup>1</sup>, A. Santana<sup>2</sup> and P. Eh Hovsepian<sup>1</sup>**

<sup>1</sup> Nanotechnology Centre for PVD Research, Materials and Engineering Research Institute, Sheffield Hallam University, UK

<sup>2</sup> IonBond AG, Olten, Switzerland, CH-4600.

### 16:20-16:40

ROLE OF SYNCHRONIZED PULSED SUBSTRATE BIAS DURING  $Ti_{1-x}Al_xN$  FILM GROWTH BY HYBRID HIPIMS/DCMS CO-SPUTTERING

**G. Greczynski<sup>1</sup>, J. Lu<sup>1</sup>, J. Jensen<sup>1</sup>, I. Petrov<sup>1,2</sup>, J.E. Greene<sup>1,2</sup>**

**W. Kölker<sup>3</sup>, O. Lemmer<sup>3</sup> and L. Hultman<sup>1</sup>**

<sup>1</sup> Department of Physics, Chemistry, and Biology (IFM), Linköping University, Sweden

<sup>2</sup> Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, Illinois, USA and Materials Science Department, University of Illinois, Urbana, Illinois, USA

<sup>3</sup> CemeCon AG, Würselen, Germany

### 16:40-17:00

STRUCTURE AND PROPERTIES OF TANTALUM NITRIDE COATINGS DEPOSITED BY MODULATED PULSED POWER MAGNETRON SPUTTERING (MPP)

**L. Mendizabal<sup>1</sup>, U. Ruiz de Gopegui<sup>1</sup>, R. Bayón<sup>2</sup>, J. Barriga<sup>1</sup>**

<sup>1</sup> IK4 – Tekniker, Surface Physics and Technology Unit, Eibar, Spain

<sup>2</sup> IK4 – Tekniker, Tribology Unit, Eibar, Spain

### 17:00-17:20

DEPOSITION ALUMINIUM NITRIDE FILMS BY HIPIMS: CORRELATION BETWEEN TIME-RESOLVED PLASMA INVESTIGATIONS AND PHYSICAL PROPERTIES

**A. Soussou, K. Ait Aissa, J. Camus, Q. Simon, L. LeBrizoual,**

**P-Y. Jouan, Y. Scudellen and M.A. Djouadi**

Université de Nantes, UMR CNRS 6502, Institut des Matériaux Jean Rouxel, France

### 17:30-19:00

PLASMA DIAGNOSTICS DEMONSTRATIONS - HIDDEN ANALYTICAL AND IMPEDANS

### 19:30

CONFERENCE DINNER: CUTLERS' HALL, SHEFFIELD

# Programme of Events

Wednesday, 20 June 2012.

## First Morning Session.

**Moderator:** Jaroslav Vlcek, University of West Bohemia, Czech Republic

### 8:30-9:00

STRESS GENERATION IN LOW-MOBILITY METAL FILMS GROWN BY HIGH POWER IMPULSE MAGNETRON SPUTTERING

**D. Magnfält<sup>1</sup>, G. Abadias<sup>2</sup>, U. Helmersson<sup>1</sup>, K. Sarakinos<sup>1</sup>**

<sup>1</sup> Plasma & Coatings Physics Division, IFM, Material Physics, Linköping University, Sweden

<sup>2</sup> Institut P', Département Physique et Mécanique des Matériaux, CNRS-Université de Poitiers, France

### 9:00-9:20

INVESTIGATIONS OF VERY SHORT PULSE SEQUENCES IN HIPIMS MODE USING A REACTIVE PROCESS OF ALUMINIUM

**H. Gerdes, R. Bandorf, I. Dosch, G. Bräuer**

Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

### 9:20-9:40

ZrSiN COATINGS DEPOSITED BY HIPIMS FOR HARD COATING CORROSION PROTECTION ON ALUMINIUM

**A. Patelli<sup>1</sup>, M. Colasuonno<sup>1</sup>, D. Giordani<sup>1,2</sup>, G. Mattei<sup>2</sup>, V. Rigato<sup>3</sup>**

<sup>1</sup> Veneto Nanotech S.C.p.A., Padova, Italia

<sup>2</sup> Università di Padova, Dipartimento di Fisica, Padova, Italia

<sup>3</sup> Laboratori Nazionali di Legnaro – INFN, Legnaro, Padova, Italia

### 9:40-10:00

OPTICAL EMISSION SPECTROSCOPY OF AIP-, HIPIMS- AND UBMS DEPOSITION OF TiAlN

**R. Cremer<sup>1</sup>, T. Takahashi<sup>1</sup>, S. Hirota<sup>2</sup>, K. Yamamoto<sup>3</sup>**

<sup>1</sup> KCS Europe GmbH, Monschau, Germany

<sup>2</sup> Kobe Steel Ltd., Takasago, Japan

<sup>3</sup> Kobe Steel Ltd., Kobe, Japan

### 10:00-10:20

ON ECWR-ASSISTED HIPIMS DISCHARGE: TIME RESOLVED DIAGNOSTICS DURING DEPOSITION OF THIN FILMS

**V. Stranak<sup>1,2</sup>, A-P. Herrendorf<sup>1</sup>, Z. Hubicka<sup>3</sup>, M. Cada<sup>3</sup>, S. Drache<sup>1</sup>, R. Hippler<sup>1</sup>**

<sup>1</sup> University of Greifswald, Institute of Physics, Greifswald, Germany

<sup>2</sup> University of South Bohemia, Faculty of Science, Ceske Budejovice, Czech Republic

<sup>3</sup> Academy of Sciences of the Czech Rep., Institute of Physics, Prague, Czech Republic

### 10:20-10:40

COFFEE BREAK AND EXHIBITION

# Programme of Events

Wednesday, 20 June 2012.

## Second Morning Session.

**Moderator:** Andre Anders, Lawrence Berkeley National Laboratory, USA

### 10:40-11:00

HIGH-RATE REACTIVE DEPOSITION OF MULTIFUNCTIONAL Ta-O-N FILMS USING HIGH POWER IMPULSE MAGNETRON SPUTTERING

**J. Rezek<sup>1</sup>, J. Vlcek<sup>2</sup>, J. Houska<sup>2</sup> and R. Cerstvy<sup>2</sup>**

<sup>1</sup> European Centre of Excellence, NTIS - New Technologies for Information Society, University of West Bohemia, Plzen, Czech Republic

<sup>2</sup> Department of Physics, University of West Bohemia, Plzen, Czech Republic

### 11:00-11:20

PROCESS-PROPERTY RELATIONS IN PHOTOCATALYTIC Ta-O-N FILMS DEPOSITED BY HIGH-IONIZATION MAGNETRON SPUTTERING

**J. Alami<sup>1</sup>, K. Sarakinos<sup>2</sup>**

<sup>1</sup> INI Coatings Ltd. Maarweg 32, 53619, Rheinbreitbach, Germany

<sup>2</sup> Plasma & Coatings Physics Division, IFM-Materials Physics, Linköping University, Sweden

### 11:20-11:40

ENHANCED PHOTOCATALYTIC ACTIVITIES UNDER VISIBLE LIGHT OF C-DOPED TiO<sub>2</sub> THIN FILMS DEPOSITED BY HIPIMS-PLD

**V. Tiron, I. Mihaila, L. Sirghi, G. Popa**

Alexandru Ioan Cuza University, Faculty of Physics, Iasi, Romania

### 11:40-12:00

PULSED HIPIMS DEPOSITION OF IRON OXIDE THIN FILMS

**Z. Hubička, V. Straňák, Š. Kment, M. Čada**

Institute of Physics ASCR, Prague, Czech Republic

### 12:00-12:20

GYROKINETIC AXISYMMETRIC MODELING OF A HPPMS PLANAR MAGNETRON DISCHARGE - A VALID APPROACH?

**S. Gallian<sup>1</sup>, D. Eremin<sup>1</sup>, T. Mussenbrock<sup>1</sup>, R.P. Brinkmann<sup>1</sup>, W. N. G. Hitchon<sup>2</sup>**

<sup>1</sup> Lehrstuhl für Theoretische Elektrotechnik, Ruhr-Universität Bochum,

<sup>2</sup> Department of Electrical and Computer Engineering, University of Wisconsin-Madison, USA

### 12:20-12:40

MATERIAL FLUX OPTIMIZATION IN HIPIMS THROUGH THE CONTROL OF THE MAGNETIC FIELD

**J. Capek<sup>1,2</sup>, M. Hala<sup>1</sup>, O. Zabeida<sup>1</sup>, J.E. Klemberg-Sapieha<sup>1</sup>, and L. Martinu<sup>1</sup>**

<sup>1</sup> Department of Engineering Physics, École Polytechnique de Montréal, Canada

### 12:40-13:00

ARC MANAGEMENT OPERATION UNDER CHANGING PROCESS CONDITIONS - NEW FEATURES, NEW POSSIBILITIES

**Paweł Ozimek, Marcin Żelechowski, Andrzej Klimczak, Piotr Rózański**

Huettinger Electronic, Zielonka, Poland

### 13:00-14:00

LUNCH BREAK



# Programme of Events

Wednesday, 20 June 2012.

## First Afternoon Session.

**Moderator:** Wolfgang Diehl, Fraunhofer IST, Germany

### **14:00-14:20**

ADVANCEMENT OF HARDWARE AND PROCESS TECHNOLOGY FOR HIPIMS COATINGS FOR CUTTING TOOLS

**O. Lemmer, W. Kölker, S. Bolz, C. Schiffers**

CemeCon AG, Germany

### **14:20-14:40**

CHARACTERISTICS OF A ONE-INCH HIPIMS PLASMA SOURCE

**H. Ogiso<sup>1</sup>, K. Yukimura<sup>1</sup>, S. Nakano<sup>1</sup>, R. Mikawa<sup>2</sup>, K. Takaki<sup>2</sup>, S. Khumpuang<sup>1</sup>**

<sup>1</sup> National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan

<sup>2</sup> Faculty of Engineering, Iwate University, Morioka, Iwate, Japan.

### **14:40-15:00**

GAS TEMPERATURE AND HEAT FLUX TO THE SUBSTRATE IN ICP-ASSISTED MAGNETRON SPUTTER-DEPOSITION OF ALUMINIUM-DOPED ZnO FILMS

**Y. Matsuda<sup>1</sup>, A. Hirashima<sup>2</sup>, K. Mine<sup>2</sup>, T. Hashimoto<sup>1</sup>, D. Matsuoka<sup>1</sup>, M. Shinohara<sup>1</sup>, and Tatsuo Okada<sup>3</sup>**

<sup>1</sup> Graduate School of Engineering, Nagasaki University, Nagasaki, Japan.

<sup>2</sup> Graduate School of Sci. & Technology, Nagasaki University, Nagasaki, Japan.

<sup>3</sup> Graduate School of Information Science and Electrical Engineering, Kyushu University, Fukuoka, Japan

### **15:00-15:20**

HIPIMS ARC-FREE REACTIVE SPUTTERING OF NON-CONDUCTIVE FILMS USING THE ENDURA 200 MM CLUSTER TOOL

**R. Chistyakov, B. Abraham**

Zond Inc/Zpulsar LLC, Mansfield, MA, USA

### **15:20-15:40**

ON THE ENERGY DEPOSITION IN MAGNETRON DISCHARGES  
- FROM DCMS TO IPVVD AND HIPIMS

**J. Bretagne<sup>1</sup>, L. Caillault<sup>1</sup>, C. Costin<sup>2</sup>, I. Guesmi<sup>1</sup> and T. Minea<sup>1</sup>**

<sup>1</sup> Laboratoire de Physique des Gaz et Plasmas, Unité Mixte de Recherche 8578, CNRS - Université Paris-Sud XI, 91405 ORSAY Cedex France

<sup>2</sup> Faculty of Physics, "Al. I. Cuza" University, 700506 Iasi, Romania

### **15:40-16:00**

COFFEE BREAK AND EXHIBITION

# Programme of Events

Wednesday, 20 June 2012.

## Second Afternoon Session.

**Moderator:** Papken Hovsepian, Sheffield Hallam University, UK

### **16:00-16:20**

OPTIMIZED WIRE TREATMENT WITH HIPIMS DUE TO EFFECTIVE ANODE-TO-CATHODE CONFIGURATION

**O. Vozniy, D. Duday, A. Lejars and T. Wirtz**

Département de Science et Analyse des Matériaux, Centre de Recherche Public  
– Gabriel Lippmann – 41, rue du Brill – 4422 Belvaux, Luxembourg

### **16:20-16:40**

3D THICKNESS AND PROPERTY DISTRIBUTION OF TiC FILMS DEPOSITED BY DC MAGNETRON SPUTTERING AND HIPIMS

**M. Balzer, M. Fenker**

FEM – Research Institute for Precious Metals And Metals Chemistry, Germany

### **16:40-17:00**

STRUCTURE AND OPTICAL AND ELECTRICAL PROPERTIES OF AMORPHOUS ZINC-IRIDIUM OXIDE THIN FILMS

**A.Azens, R.Kalendarev, K.Vilnis, M.Zubkins, A.Ecis, J.Purans**

Institute of Solid State Physics, University of Latvia, Riga, Latvia

### **17:00-17:20**

A SIMPLE MATHEMATICAL MODEL OF A GLOW DISCHARGE

**A.E. Ross, D.R. McKenzie, M.M.M. Bilek**

School of Physics A28, The University of Sydney, Sydney, Australia

### **17:20-17:40**

HIPIMS POWER SUPPLY UTILIZATION FOR OXIDE COATING DEPOSITION ON ROLL POLYMERIC SUBSTRATES

**J. Kazuss, V. Kozlov, E. Machevskis, M. Misels-Piesins**

SIDRABE Inc, 17 Krustpils Str., Riga, LV1073, Latvia

# Programme of Events

Poster Presentations.

Exhibition Hall - 19 and 20 June 2012.

## COMPARISON OF DC AND HIPIMS SPUTTERED MOLYBDENUM FILMS

**V. Sittinger, J. Mahrholz, C.C. Fölster, B. Szyszka, G. Bräuer**

Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

## MECHANICAL AND TRIBOLOGICAL PROPERTIES OF TiN/WN MULTILAYER COATINGS DEPOSITED BY HIGH POWER IMPULSE MAGNETRON SPUTTERING

**Zi-Heng Qiu<sup>1</sup>, Ping-Hung Chen<sup>2</sup>, Chia-Hao Wu<sup>1,2</sup>, Wan-Yu Wu<sup>1,2</sup>, Chi-Lung Chang<sup>1,2</sup>, Da-Yung Wang<sup>1,2</sup>**

<sup>1</sup> Department of Materials Science and Engineering, MingDao University, Taiwan, R.O.C.

<sup>2</sup> Surface Engineering Research Center, MingDao University, Taiwan, R.O.C.

## CLEANING OF SUBSTRATES PRIOR TO VACUUM COATING

**H. Hofstetter.**

BorerChemie AG, Zuchwil, Switzerland

## CHROMIUM AND CHROMIUM NITRIDE THIN FILMS DEPOSITED BY HIPIMS USING SHORT IMPULSIONS

**A. Ferrec<sup>1</sup>, A. Tricoteaux<sup>2</sup>, C. Nivot<sup>2</sup>, F. Schuster<sup>3</sup>, M. Ganciu<sup>4</sup>, L. Le Brizoual<sup>1</sup>,**

**P-Y. Jouan<sup>1</sup>, M. A. Djouadi<sup>1</sup>**

<sup>1</sup> Université de Nantes, UMR CNRS 6502, Institut des Matériaux Jean Rouxel, France

<sup>2</sup> Université Lille Nord de France, Laboratoire des Matériaux Céramiques et Procédés Associés, France

<sup>3</sup> Laboratoire Commun MATPERF CEA-Mecachrome, Vibraye, France

<sup>4</sup> National Institute for Laser, Plasma and Radiation Physics, Bucharest, Romania

**17:40**

CLOSE of CONFERENCE

