

RSD 2017 – CONFERENCE PROGRAM

Monday morning, 4th December

7:30	Registration
8:50	Conference opening

ORAL PRESENTATIONS (9:00 – 10:15)	
Chairman: J. Vlček, University of West Bohemia, Czech Republic	

9:00	<i>Invited talk</i>
MI1	Quantum mechanically guided material design and experimentally guided quantum mechanical calculations
	<u>J.M. Schneider</u>
	<i>Materials Chemistry, RWTH Aachen University, Aachen, Germany</i>

9:30	Oxygen vacancy stabilized zirconia thin films: Synthesis and properties
MR1	<u>S. Konstantinidis</u> ¹ , M. Raza ¹ , D. Cornil ² , J. Cornil ² , S. Lucas ³ , J.F. Pierson ⁴ , P. Boulet ⁴ , H. Rinnert ⁴ , D. Horwat ⁴ , L. dos Santos Gómez ⁵ , V. Esposito ⁵ , S. Sanna ⁵ , R. Snyders ¹
	¹ Laboratory of Plasma-Surface Interaction Chemistry, University of Mons, Mons, Belgium
	² Service de Chimie des Matériaux Nouveaux, University of Mons, Mons, Belgium
	³ LARN, University of Namur, Namur, Belgium
	⁴ Institut Jean Lamour, CNRS, Université de Lorraine, Nancy, France
	⁵ Department of Energy Conversion and Storage, Technical University of Denmark, Roskilde, Denmark

9:45	Local epitaxial growth and self-assembled growth of vertically aligned columns in copper oxide thin films
MR2	<u>J.F. Pierson</u> ¹ , Y. Wang ¹ , J. Ghanbaja ¹ , S. Bruyère ¹ , F. Soldera ² , D. Horwat ¹ , F. Mücklich ²
	¹ Institut Jean Lamour (UMR CNRS 7198), Université de Lorraine, Nancy, France
	² Department for Materials Science, Functional Materials, Saarland University, Saarbrücken, Germany

10:00	Formation and morphological evolution of 3D atomic islands on weakly-interacting substrates
MR3	<u>V. Gervilla</u> ¹ , B. Lü ¹ , G. Almyras ¹ , J.E. Greene ^{2,3} , K. Sarakinos ¹
	¹ Nanoscale Engineering Division, Department of Physics, Chemistry and Biology, Linköping University, Linköping, Sweden
	² Thin Film Physics Division, Department of Physics, Chemistry and Biology, Linköping University, Linköping, Sweden
	³ Materials Science and Physics Departments, University of Illinois, Urbana, Illinois, USA

10:15 – 10:45 Coffee break	
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ORAL PRESENTATIONS (10:45 – 12:00)

Chairman: J.E. Greene, *University of Illinois, USA*

10:45 *Invited talk*

MI2 Control of micro- and nanostructure in transition metal nitrides and borides: Recent advances

I. Petrov^{1,2}, G. Greczynski², J. Rosen², J. Birch², L. Hultman², J.E. Greene^{1,2}

¹*Frederick Seitz Materials Research Laboratory and Materials Science Department, University of Illinois, Urbana, Illinois, USA*

²*Department of Physics (IFM), Linköping University, Linköping, Sweden*

11:15 **Age hardening in hard and tough Ta-Al-N coatings**

MR4 M. Mikula^{1,2}, D.G. Sangiovanni^{3,4}, D. Plašienka¹, T. Roch¹, M. Čaplovičová⁵, M. Truchlý¹, L. Satrapinsky¹, R. Bystrický⁶, D. Tonhauzerová¹, D. Vlčková¹, P. Kúš¹

¹*Department of Experimental Physics, Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava, Slovakia*

²*Institute of Materials and Machine Mechanics SAS, Bratislava, Slovakia*

³*ICAMS, Ruhr-Universität Bochum, Bochum, Germany*

⁴*Department of Physics, Chemistry, and Biology (IFM), Linköping University, Linköping, Sweden*

⁵*Slovak University of Technology in Bratislava, University Science Park Bratislava Centre, Bratislava, Slovakia*

⁶*Institute of Inorganic Chemistry, Slovak Academy of Sciences, Bratislava, Slovakia*

11:30 **Reactive sputtering of high entropy alloys with nitrogen – Tuning the unit cell**

MR5

R. Dedoncker, D. Depla

Department of Solid State Sciences, Ghent University, Ghent, Belgium

11:45 **Mechanical properties of ternary V-Mo-N and quaternary V-Mo-Al-N coatings**

MR6

B. Grančič¹, S. Uzon¹, M. Mikula^{1,2}, D.G. Sangiovanni^{3,4}, T. Roch¹, M. Truchlý¹, L. Satrapinsky¹, P. Kúš¹

¹*Department of Experimental Physics, Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava, Bratislava, Slovakia*

²*Institute of Materials and Machine Mechanics SAS, Bratislava, Slovakia*

³*Thin Film Physics Division, Department of Physics, Chemistry, and Biology (IFM), Linköping University, Linköping, Sweden*

⁴*ICAMS, Ruhr-Universität Bochum, Bochum, Germany*

12:00 – 13:00 Lunch

Monday afternoon, 4th December

ORAL PRESENTATIONS (13:00 – 14:15)

Chairman: I. Petrov, *University of Illinois, USA*

13:00 *Invited talk*

MI3 Durable smart and multifunctional optical coatings for energy saving and anticounterfeiting – New opportunities for pulsed reactive plasmas

L. Martinu, B. Baloukas, F. Blanchard, S. Loquai

Functional Coating and Surface Engineering Laboratory, Department of Engineering Physics, Polytechnique Montreal, Quebec, Canada

13:30

MR7

Controlled reactive HiPIMS – Effective technique for low-temperature (300 °C) synthesis of VO₂ films with semiconductor-to-metal transition

D. Kolenatý, J. Vlček, T. Kozák, J. Houška, R. Čerstvý

Department of Physics and NTIS - European Centre of Excellence, University of West Bohemia, Plzeň, Czech Republic

13:45

MR8

Tailoring optical and electrochemical properties of ITO films deposited by means of reactive magnetron sputtering

V. Stranak¹, P. Sezemsky¹, D. Burnat², J. Kratochvil¹, H. Wulff³, Z. Hubicka⁴, M. Cada⁴, R. Bogdanowicz⁵, M. Smietana²

¹*Institute of Physics, University of South Bohemia, Ceske Budejovice, Czech Republic*

²*Institute of Microelectronics and Optoelectronics, Warsaw University of Technology, Warsaw, Poland*

³*Institute of Physics, University of Greifswald, Greifswald, Germany*

⁴*Institute of Physics, Academy of Science of the Czech Republic, Prague, Czech Republic*

⁵*Faculty of Electronics, Telecom. and Informatics, Gdansk University of Technology, Gdansk, Poland*

14:00

MR9

Hard transparent Al-Si/O-N coatings

M. Fischer¹, M. Trant¹, D. Scopece¹, C. Pignedoli¹, D. Passerone¹, K. Thorwarth¹, J. Patscheider¹, H.J. Hug^{1,2}

¹*Empa, Laboratory for Nanoscale Materials Science, Dübendorf, Switzerland*

²*University of Basel, Department of Physics, Basel, Switzerland*

14:15 – 14:45 Coffee break

14:45 – 15:50 Transfer to the university

15:50 – 16:00 Welcome at the university

ORAL PRESENTATIONS (16:00 – 17:15)

Chairman: J. Musil, *University of West Bohemia, Czech Republic*

16:00 *Invited talk*

MI4 **Fundamental properties of TM nitrides: Materials design strategies for extreme properties**

J.E. Greene^{1,2,3}

¹*Depts. of Materials Science and Physics, University of Illinois, Urbana, Illinois, USA*

²*Physics Department, Linköping University, Linköping, Sweden*

³*Mat. Sci. Dept, National Taiwan University of Science & Technology, Taipei, Taiwan*

16:30 **MR10** **Pulsed reactive sputtering of chromium nitride from 12.5 to 87.5% of duty cycle, at 62.5 to 5000 Hz**

E. Haye, S. Lucas, J.-J. Pireaux

Research Centre for the Physics of Matter and Radiation (PMR), University of Namur, Namur, Belgium

16:45 **MR11** **Systematics in reactive ion beam sputter deposition of TiO₂**

C. Bundesmann, T. Lautenschläger, D. Spemann, H. Neumann

Leibniz Institute of Surface Modification, Leipzig, Germany

17:00 **MR12** **B-based coatings prepared by magnetron sputtering and cathodic arc co-deposition**

O. Zindulka, M. Jílek, V. Sochora, I. Fojtl

SHM, s.r.o., Šumperk, Czech Republic

17:15 – 17:45 Light refreshment

17:45 – 18:45 Visit of the facilities

19:00 Transfer to the hotel

Tuesday morning, 5th December

ORAL PRESENTATIONS (8:30 – 10:00)

Chairman: D. Depla, *Ghent University, Belgium*

8:30 *Invited talk*

TR1 **Model calculation and visualization of time-dependent reactive gas mass balance change in Ti-O₂ reactive sputtering**

E. Kusano

Advanced Materials Center, Kanazawa Institute of Technology, Hakusan, Japan

9:00 **Evolution of titanium atom and ion density in reactive HiPIMS – Impact on hysteresis curve shape**

TR1

M. Fekete¹, K. Bernátová¹, P. Klein^{1,2}, J. Hnilica^{1,2}, P. Vašina^{1,2}

¹*Department of Physical Electronics, Faculty of Science, Masaryk University, Brno, Czech Republic*

²*CEPLANT, R&D Centre for Low-Cost Plasma and Nanotechnology Surface Modifications, Faculty of Science, Masaryk University, Brno, Czech Republic*

9:15 **Transition mode sputtering of Al₂O₃ – Hysteresis and process stability of large Al targets**

TR2

M. Heintze, I. Luciu

TRUMPF Hüttinger GmbH + Co. KG, Freiburg, Germany

9:30 **Plasma and floating potentials in magnetron discharges**

TR3

M. Jaroš, J. Musil

Department of Physics and NTIS – European Centre of Excellence, University of West Bohemia, Plzeň, Czech Republic

9:45 **Long-term stability and disappearing anode effects during reactive DC and pulsed bipolar magnetron sputtering of Al₂O₃**

TR4

P. Mareš, S. Kadlec, A. Marek

HVM Plasma spol. s r.o., Praha, Czech Republic

10:00 – 10:30 Coffee break

ORAL PRESENTATIONS (10:30 – 12:00)

Chairman: L. Martinu, Polytechnique Montreal, Canada

10:30 **Invited talk**

TI2 Synchronised external magnetic fields applied in HiPIMS enhance plasma generation in the race track as well as plasma transport to the substrate

M. Bilek^{1,2,3}, R. Ganesan¹, B. Akhavan¹, H. Najafiashtiani¹, D.G McCulloch⁴, D.R. McKenzie¹

¹*School of Physics, University of Sydney, Sydney, Australia*

²*School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney, Sydney, Australia*

³*Australian Institute of Nanoscale Science and Technology, University of Sydney, Sydney, Australia*

⁴*Microscopy and Microanalysis Facility, RMIT University, Melbourne, Australia*

11:00 **Ion energy distributions in magnetron sputtering: Questions remain even after detailed measurements of the plasma potential**

TR5

A. Anders^{1,2}

¹*Lawrence Berkeley National Laboratory, Berkeley, USA*

²*Leibniz Institute of Surface Modification, Leipzig, Germany*

11:15 **Arcing in high power impulse magnetron sputtering: Review of physical background and arcing mitigation methods**

TR6

W. Gajewski, A.W. Oniszczyk, P. Róžański, P. Lesiuk, P. Ozimek

TRUMPF Huettinger, Zielonka, Poland

11:30 **Spokes occurrence in HiPIMS discharge at different magnetic field strengths**

TR7

J. Hnilica, M. Šlapanská, P. Klein, M. Fekete, P. Vašina

Department of Physical Electronics, Masaryk University, Brno, Czech Republic

11:45 **The application of a short positive voltage reversal in reactive HIPIMS: Enhanced deposition rate and improved coating properties**

TR8

I. Fernández-Martínez^{1,6}, V. Bellido-González², J.A. Santiago³, L. Mendizábal⁴, M. Monclús³, R. González-Arrabal⁵, J. Molina³, A. Wennberg^{1,6}

¹*Nano4Energy SL, Madrid, Spain*

²*Genco Ltd, Liverpool, United Kingdom*

³*Imdea Materiales, Madrid, Spain*

⁴*Fundación Tekniker, Eibar, Spain*

⁵*Instituto Fusión Nuclear, Escuela de Industriales de la UPM, Madrid, Spain*

⁶*hip-V AB, Stocksund, Sweden*

12:00 – 13:00 Lunch

Tuesday afternoon, 5th December

ORAL PRESENTATIONS (13:00 – 14:45)

Chairman: E. Kusano, *Kanazawa Institute of Technology, Japan*

13:00 *Invited talk*

TI3 Key features of reactive high power impulse magnetron sputtering

D. Lundin¹, N. Brenning^{1,2,3}, J.T. Gudmundsson^{1,2,4}, M.A. Raadu², T.J. Petty¹,
F. Cemin¹, T. Minea¹

¹*Laboratoire de Physique des Gaz et Plasmas – LPGP, Université Paris–Sud, Université Paris–Saclay, Orsay, France*

²*Department of Space and Plasma Physics, School of Electrical Engineering, KTH – Royal Institute of Technology, Stockholm, Sweden*

³*Plasma and Coatings Physics Division, IFM–Materials Physics, Linköping University, Linköping, Sweden*

⁴*Science Institute, University of Iceland, Reykjavik, Iceland*

13:30 **Modelling the dynamics of processes in reactive HiPIMS deposition of oxide films**

TR9

T. Kozák, J. Vlček

Department of Physics and NTIS – European Centre of Excellence, University of West Bohemia, Plzeň, Czech Republic

13:45 **Current dependency of the compound sputtering yield**

TR10 R. Schelfhout, K. Strijckmans, D. Depla

Research group DRAFT, Department of Solid State Sciences, Ghent University, Ghent, Belgium

14:00 **A novel method for the optimization of reactive sputtering processes**

TR11 M. Fahland, T. Vogt

Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology, Dresden, Germany

14:15 *Invited talk*

TI4 Reactive HiPIMS through the eyes of a ‘simple’ model

K. Strijckmans, R. Schelfhout, F. Moens, D. Depla

DRAFT – Department of Solid State Sciences, Ghent University, Ghent, Belgium

14:45 – 15:00 Coffee break

15:00 – 16:00 Posters

17:00 – 23:59 Pilsner Urquell Brewery – excursion and dinner

Wednesday morning, 6th December

ORAL PRESENTATIONS (8:30 – 10:00)

Chairman: J.M. Schneider, RWTH Aachen University, Germany

8:30 *Invited talk*

WI1 Reactive and non-reactive sputter deposition of MoO_x thin films

J.M. Pachlhofer¹, R. Franz¹, A. Tarazaga Martín-Luengo², E. Franzke³,
A. Bonanni², H. Köstenbauer³, J. Winkler³, C. Mitterer¹

¹Department of Physical Metallurgy and Materials Testing, Montanuniversität, Leoben, Austria

²Institute of Semiconductor and Solid State Physics, Johannes Kepler University, Linz, Austria

³Business Unit Coating, PLANSEE SE, Reutte, Austria

9:00

WR1 The role of oxygen in sputtered AZO and ZnO films used for ZnO nanorod-based device

P. Novák¹, J. Briscoe², T. Kozák³, M. Kolega¹, J. Savková¹

¹New Technologies – Research Centre, University of West Bohemia, Plzeň, Czech Republic

²Materials Research Institute, Queen Mary University of London, London, UK

³Department of Physics and NTIS – European Centre of Excellence, University of West Bohemia, Plzeň, Czech Republic

9:15

WR2

Control of process pressure and Ar/O₂ ratio in reactive-HiPIMS to deposit high-stability and high-mobility zinc oxynitride films for thin-film transistor devices

R. Ganesan^{1,2}, M. Trant¹, K. Thorwarth¹, H.J. Hug¹, M.M.M. Bilek²,
D.R. McKenzie²

¹EMPA Materials Science and Technology, Dübendorf, Switzerland

²The School of Physics, The University of Sydney, Sydney, Australia

9:30

WR3

Deposition of Nb doped TiO₂ thin films using a hybrid CVD/HiPIMS technique

D. Donaghy¹, J. Kulczyk-Malecka², P. Chalker³, P.J. Kelly², J.W. Bradley¹

¹Department of Electrical and Electronic Engineering, University of Liverpool, Liverpool, UK

²Surface Engineering Group, Manchester Metropolitan University, Manchester, UK

³Department of Mechanical, Materials and Aerospace Engineering, University of Liverpool, Liverpool, UK

9:45

WR4

Nb₂O_{5-x} vs. Nb targets for DC reactive magnetron sputter PVD of thin optical films

V. van Karsbergen, N. Weinberger, G. Strauss

Material Center Tyrol, Institute for Material Technology, University of Innsbruck, Innsbruck, Austria

10:00 – 10:30 Coffee break

ORAL PRESENTATIONS (10:30 – 12:00)

Chairman: C. Mitterer, Montanuniversität Leoben, Austria

10:30 **Invited talk**

WI2 Improvement of deposition rate of high power impulse magnetron sputtering system using hybrid and superimposition approaches

J.-W. Lee^{1,2,3}, Y.-W. Su¹, Ch.-Y. Lu¹, W. Diyatmika¹, B.-S. Lou⁴

¹Department of Materials Engineering, Ming Chi University of Technology, New Taipei, Taiwan

²Center for Thin Films Technologies and Applications, Ming Chi University of Technology, New Taipei, Taiwan

³College of Engineering, Chang Gung University, Taoyuan, Taiwan

⁴Chemistry Division, Center of General Education, Chang Gung University, Taoyuan, Taiwan

11:00 **HPPMS deposition from composite targets: Effect of two orders of magnitude target power density changes on the composition of sputtered Cr-Al-C thin films**

WR5

H. Rueß¹, M. to Baben^{1,2}, S. Mráz¹, L. Shang¹, P. Polcik³, S. Kolozsvari³, M. Hans¹, D. Primetzhofer⁴, J.M. Schneider^{1,4}

¹Materials Chemistry, RWTH Aachen University, Aachen, Germany

²GTT-Technologies, Herzogenrath, Germany

³Plansee Composite Materials GmbH, Lechbruck am See, Germany

⁴Department of Physics and Astronomy, Uppsala University, Uppsala, Sweden

11:15 **Study on giant negative piezoresistance effect in diamond like carbon films deposited by reactive magnetron sputtering of Ni target**

WR6

Š. Meškiniš, A. Vasiliauskas, S. Tamulevičius, R. Gudaitis

Kaunas University of Technology, Institute of Materials Science, Kaunas, Lithuania

11:30 **Inside gas aggregation cluster source: In-operando study of Ti/TiO_x nanoparticles production**

WR7

J. Kousal¹, A. Shelemin¹, A. Kolpaková², P. Kudrna², M. Tichý², H. Biederman¹

¹Department of Macromolecular Physics, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic

²Department of Surface and Plasma Science, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic

11:45 **Plasma metal and metal oxides nanoparticles coatings for new functional properties**

WR8

A. Usoltseva, C. Rigaux, C. Vandenabeele, S. Wallon, S. Matioudaki, S. Lucas

Namur University (LARN-PMR), Namur, Belgium

12:00 – 13:00 Lunch

Wednesday afternoon, 6th December

ORAL PRESENTATIONS (13:00 – 14:15)

Chairman: J.-W. Lee, *Ming Chi University of Technology, Taiwan*

13:00 *Invited talk*

WI3 Industrial challenges and applications of reactively sputtered hard coatings

J. Vyskočil, S. Kadlec, P. Mareš, T. Mates

HVM Plasma spol. s r. o., Praha, Czech Republic

13:30 **HiPIMS makes reactive sputtering the future technology for premium cutting tools**

WR9

T. Leyendecker¹, L. Zima², C. Schiffers¹

¹*CemeCon AG, Würselen, Germany*

²*CemeCon s.r.o., Ivančice, Czech Republic*

13:45 **Reactive sputter deposition of Al₂O₃ layers on large area substrates**

WR10 D. Gloess¹, T. Goschurny¹, H. Nizard^{1,2}, A. Drescher¹, M. Gittner¹, H. Bartzsch¹, P. Frach¹

¹*Fraunhofer-Institut für Organische Elektronik, Elektronenstrahl- und Plasmatechnik FEP, Dresden, Germany*

²*Technische Universität Dresden, Institut für Festkörperelektronik (IFE), Dresden, Germany*

14:00 **Plasma enhanced reactive sputter deposition processes in application**

WR11 E. Schüngel, J. Weichart, S. Gees, S. Schwyn-Thöny

Evatec AG, Trübbach, Switzerland

14:15 – 14:45 Coffee break

ORAL PRESENTATIONS (14:45 – 15:55)

Chairman: J. Vyskočil, HVM Plasma spol. s r. o., Praha, Czech Republic

14:45 *Invited talk*

WI4 Reactive HIPIMS and process control on industrial scale coating systems

H. Gerdes, J. Rieke, R. Bandorf, M. Vergöhl, G. Bräuer

Fraunhofer IST, Braunschweig, Germany

15:15 **Nanocomposite nc-TiC/a-C:H coatings: enhancement of coating properties by utilization of HiPIMS and Ni doping**

WR12

P. Souček, J. Daniel, J. Hnilica, K. Bernátová, L. Zábanský, V. Buršíková,
M. Stupavská, P. Vašina

Department of Physical Electronics, Faculty of Science, Masaryk University, Brno, Czech Republic

15:30 **Multilayered TiVN/TiSiN hard coatings – Mechanical properties and tribological performance**

WR13

Y.-J. Weng, Y.-Y. Chang

Department of Mechanical and Computer-Aided Engineering, National Formosa University, Yunlin, Taiwan

15:45 – 15:55 Conference closing