



Symposium on Functional Coatings and Surface Engineering - FCSE



Montreal, June 5-8, 2005

**Organized by the Upstate New York Chapter of the AVS – UNY-VAC
and the Regroupement québécois sur les matériaux de pointe – RQMP
and hosted by
École Polytechnique de Montréal and Université de Montréal**

Symposium organizers:

Meeting Chair: L. Martinu, **Co-Chair:** J.E. Klemberg-Sapieha

Local organizing committee:

A. Amassian, B. Baloukas, L. Caron, M.-M. DeDenus-Baillargeon,
P. Jedrzejowski, S. Larouche, E. St-Jacques

UNY-VAC officers: T. Rogelstad, J. McLean, L. Fendrock, J. Nedelka, R. Kraft

Preliminary program

**Meeting location: École Polytechnique
Campus of the Université de Montréal**

Sunday, June 5

Workshops on New Characterization Techniques

Time	PART I: Introductory Talks (Room B-505) Moderators: P. Jedrzejowski and A. Amassian, École Polytechnique, Montréal, QC, Canada
8:30 – 9:00	<i>Continental Breakfast</i>
9:00 – 9:40	<i>Introduction to Mechanical Properties of Surfaces and Thin Films</i> N. Jennett , National Physical Laboratory, Teddington, UK
9:40 – 9:50	<i>Break</i>
9:50 – 10:30	<i>Advanced Nanomechanical Characterization Techniques</i> S. Downs , Hysitron Inc., Minneapolis, MN, USA
10:30 – 10:50	<i>Break</i>
10:50 – 11:30	<i>Optical Characterization of Thin Films and Reverse Engineering by Spectroscopic Ellipsometry, A</i> J.N. Hilfiker , J.A. Woollam Co. Inc., Lincoln, NE, USA
11:30 – 11:40	<i>Break</i>
11:40 – 12:20	<i>Optical Characterization of Thin Films and Reverse Engineering by Spectroscopic Ellipsometry, B</i> J.N. Hilfiker , J. A. Woollam Co. Inc., Lincoln, NE, USA
12:20 – 13:30	<i>Lunch</i>
	PART II: Hands-on Workshop in the Laboratory
13:30 – 17:00	<i>Advanced Nanomechanical Characterization Techniques</i> S. Downs , Hysitron Inc., Minneapolis, MN, USA
13:30 – 17:00	<i>Optical Characterization of Thin Films and Reverse Engineering by Spectroscopic Ellipsometry, C</i> J.N. Hilfiker , J.A. Woollam Co. Inc., Lincoln, NE, USA

Monday, June 6

FCSE-2005 - Symposium Program

Time	Room C-631 Amphithéâtre Bell
8:30 – 8:50	Opening Ceremony
	Film Growth, Microstructure and Applications I Moderators: P. Desjardins , École Polytechnique, Montréal, QC, Canada; D. Aspnes , North Carolina State University, Raleigh, NC, USA
8:50 – 9:40	<u>Plenary lecture:</u> <i>Structural and Surface Morphological Evolution at the Atomic Scale during Growth of Transition-Metal Nitride Layers: Self-organized Nanostructures</i> J.E. Greene (AVS distinguished lecturer), C.-S. Shin, S. Kodambaka, K. Ohmori, and I. Petrov, University of Illinois, IL, USA
9:40 – 10:10	<u>Invited:</u> <i>Atomic Layer Deposition, Fundamentals and Applications in Functional Coatings</i> M. Ritala , University of Helsinki, Finland
10:10 – 10:40	<i>Break</i>
	Film Growth, Microstructure and Applications II Moderators: C. Bright , 3M, Tucson, AZ, USA; F. Gitzhofer , Université de Sherbrooke, QC, Canada
10:40 – 10:55	<i>Atomic Shadowing during Thin Film Deposition: Nanopipes and Nanostaircases in Transition Metal Nitride Layers</i> D. Gall , Rensselaer Inst., Troy, NY, USA
10:55 – 11:10	<i>Stabilizing and Enhancing a Catalyst System for the Growth of Carbon Nanotubes by using Amorphous Carbon Coating</i> S.M. Smith , B. Coll, Y. Wei and J. Quintero, Motorola, Tempe, AZ, USA
11:10 – 11:25	<i>Damage in Implanted Si Investigated by Nanocalorimetry</i> F. Schiettekatte , R. Karmouch, J.-F. Mercure, Y. Anahory and S. Roorda, Université de Montréal, QC, Canada
11:25 – 11:55	<u>Invited:</u> <i>Photoactive Coatings for Use in a Photolytic Artificial Lung Device</i> P.M. Martin ⁵ , T.A. Snyder ¹ , M.V. Kameneva ¹ , B. Monzyk ² , E.C. Burckle ² , A. Vollmer ³ , T.A. Thorsen ³ , R.J. Gilbert ³ , K.A. Dasse ⁴ , H.S. Borovetz ¹ , W.R. Wagner ¹ ; ¹ University of Pittsburgh, PA, ² Battelle Memorial Institute, Columbus, OH, ³ Massachusetts Institute of Technology, Cambridge, MA, ⁴ Pharos LLC, Waltham, MA, USA; ⁵ Pacific Northwest National Laboratory, Richland, WA, USA
12:00 – 14:00	Lunch, Poster Session and Vendors Exhibit (Galérie Rolland)
	Optical Thin Films Moderators: P.M. Martin , Pacific Northwest National Laboratory, Richland, WA, USA; R.W. Cochrane, Université de Montréal, QC, Canada
14:00 – 14:30	<u>Invited:</u> <i>Optical Coatings - Principles, Behavior and Applications</i> H.A. Macleod , Thin Film Center, Tucson, AZ, USA
14:30 – 15:00	<u>Invited:</u> <i>Current Issues and New Directions in Spectroscopic Ellipsometry</i> D. Aspnes , North Carolina State University, Raleigh, NC, USA
15:00 – 15:15	<i>Optically Variable Devices for Security Applications</i> B. Baloukas , S. Larouche and L. Martinu, École Polytechnique, Montréal, QC, Canada
15:30 – 15:45	<u>Invited:</u> <i>Properties and Issues with ITO on Plastic Substrates</i> C. Bright , 3M, Tucson, AZ, USA
15:45 – 18:00	Vendors Exhibit, Poster Session - continued (please see below) and Wine & Cheese Reception
19:30 – 21:00	Concert to celebrate the Year of Physics (M. Karlicek – Piano, M. Lussier – French Horn; music by L. van Beethoven, J.P. Rameau, R. Schumann, C. Saint-Saens, K. Szymanowski)

Monday, June 6

Poster Presentations

Poster #	Time: 12:00 – 18:00 (Galérie Rolland)
P1	<i>The Synthesis of Silicon Oxynitride Thin Films by Polymer-Source Chemical Vapour Deposition for Planar Optical Waveguides</i> R. Sowerby and M. Scarlete, Bishop's University, Lennoxville, QC, Canada
P2	<i>Non-destructive Testing of Surfaces and Coatings from Nanometer to Micrometer Thickness Range</i> H.-J. Scheibe, D. Schneider and T. Schuelke, Fraunhofer USA, East Lansing, MI, USA
P3	<i>The Microstructure of Electrodeposited Aluminum Films on Copper Substrate in Nonaqueous Solution</i> Y. Tan, Z. Shi and J.A. Szpunar, McGill University, Montreal, QC, Canada
P4	<i>Nanostructure Birth, Growth and "Death" in Shadowing-Dominated Extreme Glancing Angle Deposition of a-Si</i> A. Amassian ¹ , K. Kaminska ² , L. Martinu ¹ and K. Robbie ² , ¹ École Polytechnique, Montréal, QC, Canada; ² Queen's University, Kingston, ON, Canada
P5	<i>In Situ Doping of Silicon Carbide Thin Films Synthesized by Polymer-Source Chemical Vapor Deposition Using Borocarbosilane</i> E.H. Oulachgar, C. Aktik, L.M. Scarlete, Université de Sherbrooke, QC, Canada
P6	<i>The Impact of Deposition Parameters on the Optical and Compositional Properties of Er Doped SRSO Thin Films Deposited by ECR-PECVD</i> M. Flynn, J. Wojcik, S. Gujrathi, E. Irving and P. Mascher, McMaster University, Hamilton, ON, Canada
P7	<i>Microstructure of an Ultra-Thin Palladium Membrane and its Fabrication</i> Z. Shi ¹ , J.A. Szpunar ¹ , S. Wu ² and M. Roshd ² , ¹ McGill University, Montreal, QC, Canada; ² AH2T Inc., Montreal, QC, Canada
P8	<i>Novel Growth Process of Boron Doped Silicon Carbide Thin Films Prepared by Polymer Source Chemical Vapor Deposition (PS-CVD)</i> E.H. Oulachgar, C. Aktik and L.M. Scarlete, Université de Sherbrooke, QC, Canada
P9	<i>Effect of Pulsing on the Optical, Electrical and Mechanical Properties of Sputtered High Performance ITO Films</i> M. Dudek, O. Zabeida, J.E. Klemberg-Sapieha, and L. Martinu, École Polytechnique, Montréal, QC, Canada
P10	<i>Atomic Force Microscopy Study of Functionalized Silicon Chips and Screen-Printed Carbon Electrodes Used as DNA Sensors</i> A. Shabani, Concordia University, Montreal, QC, Canada
P11	<i>The Morphology and Corrosion Resistance of Tin Electrodeposits</i> S. Wen and J.A. Szpunar, McGill University, Montreal, QC, Canada
P12	<i>Fabrication of Fabry-Perot Filters Using Porous-dense Silicon Nitride Stacks with Optimized Interfaces</i> R. Vernhes, A. Amassian, J.E. Klemberg-Sapieha and L. Martinu, École Polytechnique, Montréal, QC, Canada
P13	<i>Adhesion Mechanism of PEG-based Hydrogel on Plasma Treated Polymer Surface</i> R. Snyders ¹ , O. Zabeida ¹ , L. Martinu ¹ , J.E. Klemberg-Sapieha ¹ , C. Roberge ² and M.P. Faure ² , ¹ École Polytechnique, Montréal, QC, Canada; ² Bioartificial Gel Technologies, Montreal, QC, Canada
P14	<i>Characterization Of Carbon-Based Coated Polytetrafluoroethylene Films</i> C. Côté ¹ , F. Boccafroschi ² , M. Foursa ³ , A. Hirose ³ , D. Mantovani ² , A. Sarkissian ¹ , V.N. Vasilets ⁴ , ¹ PLASMIONIQUE Inc, Montreal, QC, Canada; ² Université Laval, Montreal, QC, Canada; ³ University of Saskatchewan, SK, Canada; ⁴ Research Institute of Transplantology and Artificial Organs, Moscow, Russia
P15	<i>A Needle-like Method for the Synthesis of Optical Filters with Arbitrary Indices</i> S. Larouche and L. Martinu, École Polytechnique, Montréal, QC, Canada
P16	<i>Shape Deformation of Silica-embedded Gold Nanoparticles by High Energy Ion Beam</i> J.-M. Lamarre ¹ , Z. Yu ² , C. Harkati ² , S. Roorda ² and L. Martinu ¹ , ¹ École Polytechnique, Montréal, QC, Canada, ² Université de Montréal, QC, Canada
P17	<i>Detection of DNA Hybridization and Melting Temperatures (T_m) on Diazonium Modified Silicon Substrates Through Electrical Impedance Measurements</i> A.W.H. Mak and M.F. Lawrence, Concordia University, Montreal, QC, Canada
P18	<i>Influence of Fabrication Process on Microstructures in Substrate and Oxide-metal Interface of Zr-2.5Nb Tubes</i> C. Nam ¹ , J.A. Szpunar ¹ , R. Holt ² , ¹ McGill University, Montreal, QC, ² Queen's University, Kingston, ON, Canada
P19	<i>Optically Variable Devices for Security Applications</i> B. Baloukas and L. Martinu, École Polytechnique, Montréal, QC, Canada
P20	<i>Role of Ion-Mixing and Subplantation on Interface Broadening in Plasma-Assisted Deposition Environment</i> A. Amassian ¹ , M. Svec ² , P. Desjardins ¹ and L. Martinu ¹ , ¹ École Polytechnique, Montréal, QC, Canada, ² J. E. Purkyne University, Usti nad Labem, Czech Republic

Tuesday, June 7

FCSE-2005 - Symposium Program

Time	Presentations (Room C-631 Amphithéâtre Bell)
	Tribological Coatings and Mechanical Properties I Moderators: J.E.Klemberg-Sapieha, École Polytechnique, Montréal, QC, Canada; M. Ritala, University of Helsinki, Finland
9:00 – 9:30	<u>Invited:</u> <i>Materials Synthesis by Thermal Plasma Technology</i> F. Gitzhofer , Université de Sherbrooke, QC, Canada
9:30 – 10:00	<u>Invited:</u> <i>Reliable Measurement of Surface and Coatings Mechanical Properties</i> N. Jennett , National Physical Laboratory, Teddington, UK
10:00 – 10:15	<i>The Effect of Surface Texture on Corrosion Behavior of AISI304 Stainless Steel</i> M. Azzi and J.A. Szpunar, McGill University, Montreal, QC, Canada
10:15 – 10:35	<i>Coffee Break sponsored by Micro Photonics, Inc.</i>
	Tribological Coatings and Mechanical Properties II Moderators: J.E. Klemberg-Sapieha, École Polytechnique, Montréal, QC, Canada; N. Jennett, National Physical Laboratory, Teddington, UK
10:35 – 11:05	<u>Invited:</u> <i>Structure and Properties of Nanostructured Hard Coatings: From Multilayers to Nanocomposites</i> J. Patscheider , EMPA, Duebendorf, Switzerland
11:05 – 11:35	<u>Invited:</u> <i>Thick Sputtered Coatings for Gun Barrel Applications</i> D. Glocker , Isoflux Inc., NY, USA, C. P. Mulligan, S. L. Lee, M. Cipollo, M. Wotzak, and G.N. Vigilante, US Army Armament Research, Benet Laboratories, NY, USA
11:35 – 11:50	<i>Erosion-Resistant Coatings for Aerospace Applications</i> M. Bielawski , IAR-NRC, Ottawa, ON, Canada
11:50 – 12:05	<i>Deposition Technology, Tribological Properties and Applications of Superhard Amorphous (ta-C) Carbon Films</i> H-J. Scheibe , M. Leonhardt and T. Schuelke, Fraunhofer USA Inc., East Lansing, MI, USA
12:05 – 12:20	<i>Atmospheric Pressure Plasma Polymerization – a Breakthrough for Fast in Line Functional Coatings</i> D. Kaute , PlasmaTreat North America Inc., Mississauga, ON, Canada, and C. Buske, PlasmaTreat GmbH, Germany
12:20 – 14:00	Lunch, Announcement of the winning poster awards (Galérie Rolland)
	Nanostructured Films for Micro- and Optoelectronics Moderators: J. Patscheider, EMPA, Duebendorf, Switzerland; D. Glocker, Isoflux Inc., NY, USA
14:00 – 14:30	<u>Invited:</u> <i>Fabrication and Device Applications of Nanoengineered Thin Films</i> M. Brett , University of Alberta, Edmonton, Canada
14:30 – 15:00	<u>Invited:</u> <i>Combinatorial Preparation and Characterization of Thin-film Optical-Amplifier Oxides</i> B. Van Dover , Cornell University, NY, USA
15:00 – 15:30	<u>Invited:</u> <i>Silicides and Germanides for Microelectronic Integrated Circuits</i> P. Desjardins , École Polytechnique, Montréal, QC, Canada
15:30 – 15:45	<i>Gold Nanoparticle Deposition by OMCVD on Template SAMs and Proteins</i> S. Mittler , University of Western Ontario, London, ON, Canada
15:45 – 16:00	<i>Dynamic All-optical Tuning of Transverse Resonant Cavity Modes in Photonic Bandgap Fibers</i> G. Benoit , K. Kuriki, J-F Viens, J.D. Joannopoulos and Y. Fink, MIT, Cambridge, MA, USA
16:00 – 16:10	Closing remarks
16:10 – 18:00	Visit of the thin film research facilities on the Campus

Wednesday, June 8

Short courses

Time	
8:30 – 9:00	<i>Continental Breakfast</i>
9:00 -17:00	<i>Film nucleation and growth (Room B-600.6)</i> J.E. Greene, University of Illinois, IL, USA
9:00 – 17:00	<i>Optical filters (Room B-505)</i> H.A. Macleod, Thin Film Center, Tucson, AZ, USA
9:00 – 14:00	<i>Smart materials (Room B-506)</i> P.M. Martin, Pacific Northwest National Laboratory, Richland, WA, USA
12:00 - 13:00	Lunch and Discussions

Dates and deadlines

Registration deadline for all activities.....**May 20, 2005**

Fees (in US\$) - registration form is available at www.unyvacc.org

Registration fees include proceedings/documentation, lunches, reception and refreshments, concert ticket

Technical program	Students - \$60 (\$80 after deadline)
	Regular participants - \$120 (\$140 after deadline)
Short course	Students – \$100 one day course; \$60 half day course (+\$30 after deadline)
	Regular participants – \$350 one day course, \$200 half day course (+\$50 after deadline)
Workshop	Students - \$100 (+\$30 after deadline)
	Regular participants - \$300 (+\$50 after deadline)
	For possible analysis of your own samples - please contact the organizers
Exhibitors	\$300 per table (for details see www.unyvacc.org ; for special arrangements, please contact the organizers)
Concert	\$15 for accompanying persons; tickets included in the registration fee of regular participants

Contacts

General information	E-mail: lmartinu@polymtl.ca tel.: 514-340-4099
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Registration	E-mail: mclean@geneseo.edu tel.: 585-245-5897
Exhibitors	E-mail: Clnrmsrvs@aol.com tel.: 800-447-4754

Further information including registration, accommodation and travel: www.unyvacc.org