

E-MRS SHORT COURSE

Strasbourg, France
May 29-30, 2005

MATerials SURface Processing (MATSUP) Deposition and Characterization of Surface Coatings and Thin Films

TECHNOLOGICAL FOCUS AND COURSE OBJECTIVES

Surface coating and thin film technology is pervasive in a large variety of applications, including micro-electronics, optics, micro-mechanics, etc. Multicomponent, nanoscale and functionally graded coatings or films are of major interest in various applications where the surface protection of materials against wear, corrosion, friction is a key issue, in particular for mechanical assemblies operating in hostile environment (vacuum, extreme temperature, corrosive atmosphere). In each field of applications, major scientific and technological advances depend on the ability to control the deposition and microstructure (at the atomic level) of coatings and thin films with thickness ranging from micrometers to tens of angströms. New deposition technologies using high-energy beams or particles (laser, ion, plasma processing) are required for the preparation and production of surface coatings and thin films at the industrial scale. A particular challenge for industry is to establish technological facilities for the production of coated parts with specific shapes and large sizes and to develop alternative technologies replacing surface treatment techniques polluting the environment. The development of techniques and achievement of a good understanding of the basic physical, chemical and materials related processes for the deposition and characterization of coatings, films and surface modifications are crucial points for successful applications and implementation of new advanced environmentally benign technologies. A vast number of deposition techniques are available and in use today. Each technique has specific limitations involving compromises with respect to process specifications, substrate materials limitations, expected properties of coatings or thin films, and cost. Over the few past years, ion and laser beam materials processing technologies for surface modifications as well as plasma-based chemical and physical vapor deposition techniques experienced a very rapid growth. These techniques appropriate to solve a given surface engineering problem are highly differentiated. As a result, it becomes difficult to maintain a clear overlook and understanding in this very interdisciplinary field of research and application.

This E-MRS short course will provide a broad overview on modern surface coating and thin film deposition techniques. The major purpose will be to develop and update the knowledge of young and senior scientists on various problems of physics and chemistry involved in the production, characterization and application of surface coatings and thin films which can be variously hard and

wear resistant for cutting tools, corrosion and abrasion resistant for turbine blades, self lubricant for ball bearings, etc. The current status of the science and technology related to coatings, films and surface modifications produced by directed energy techniques would be assessed through a series of lectures. For each lecture presented at a tutorial level, a balance would be found between fundamental aspects and experimental results illustrating various models, mechanisms or theories. New trends and new results would be evoked to have an overlook about future developments and applications.

PROGRAM AND DAILY SCHEDULE

Sunday, May 29, 2005

14h15-14h30 : Opening remarks

14h30-16h00 : L1

Magnetron discharges for thin film plasma processing

J. Musil, University of West Bohemia, Plzen, Czech Republic

16h00-16h30 : Break

16h30-18h00 : L2

Hard coatings based on metal nitride, metal carbide and nanocomposite materials : PVD process and properties

M.T. Vieira, University of Coimbra, Portugal

Monday, May 30, 2005

08h30-10h00 : L3

Cathodic arc evaporation and its applications to thin film synthesis

M.-P. Delplancke-Ogletree, Université Libre de Bruxelles, Belgium

10h00-11h30 : L4

Laser processing for surface modification by remelting and alloying of metallic systems

B. Major, Institute of Metallurgy and Materials Science, Cracow, Poland

11h30-13h00 : Lunch

13h00-14h30 : L5

Surface modifications of materials by plasma immersion ion implantation

J.-P. Celis, Catholic University, Leuven, Belgium

14h30-16h00 : L6

Formation and characterization of the structure of coatings and thin films

G. Radnoczi, Research Institute for Technical Physics and Materials Science, Budapest, Hungary

16h00-16h30 : Break

16h30-18h00 : L7

Determination and generation mechanisms of residual stresses in thin films produced by physical vapor deposition techniques

Y. Pauleau, National Polytechnic Institute of Grenoble, France

SHORT COURSE ORGANIZER

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LOCATION

Room Boston (1st Floor)
Palais de la Musique et des Congrès – Place de Bordeaux – Wacken - Strasbourg - France

COURSE MATERIAL

The participants will receive a set of lecture notes, which will be distributed upon arrival to the short course room.

The lecture notes will not be for sale outside the course.

CERTIFICATE

E-MRS will prepare a certificate to certify the attendance to the course, and indicating the topics, duration of the course, etc.

HOTEL RESERVATION

A certain number of rooms have been booked for E-MRS conference participants in hotels of various categories. The hotel reservation form can be found in the E-MRS web site :

http://www-emrs.c-strasbourg.fr/2005_SPRING/HotelRegistrationForm.pdf

COURSE FEES

Sunday afternoon, May 29 and Monday, May 30 **240.00 Euros/person**

The course fees per participant cover tuition, lecture notes, lunch on Monday and refreshments for 2 breaks on Sunday and Monday afternoon.

E-MRS SHORT COURSE

REGISTRATION FORM (before May 10, 2005)

NAME: _____

First Name: _____

INSTITUTION: _____

Department: _____

Street / PO Box: _____

Zip/City: _____

Phone: _____

Fax: _____

E-mail: _____

I will attend the E-MRS Short Course "MATSUP" held on Sunday afternoon May 29
& Monday May 30 2005

Course fees: 240,00 EUR

- Please charge my credit card:
 carte bleue carte visa Eurocard/Mastercard

Card number : _____

Expiration date _____

Card holder's signature :

- I enclose a cheque (to the order of E-MRS)
 I enclose a copy of a bank transfer
Account references: ASS. EMRS CONFERENCES BANQUE POPULAIRE D'ALSACE
IBAN : FR76 1760 7000 0111 1913 8543 911
BIC : BPRS-FR2A

- I enclose a purchase order form to invoice my institution/company

Please forward your registration form to E-MRS HQ

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