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APIC 2010
Asia Pacific Interfinish 2010
10th International Conference on Applied Surface Engineering
5th International Conference on Surface and Interface Science and Engineering
19 - 22 October 2010

Organised by:

In Partnership with:

Co-Sponsored by:

Please refer http://www.aseansurfin.org for new updates
Welcome Message

The Asia Pacific Interfinish2010, an international event which is organized jointly by the International Union for Surface Finishing (IUSF) and the Singapore Surface Engineering Association (SSEA) attracts participants from all over the world and returns to Singapore after 20 years. Joining us in the conference are the 10th International Conference on Applied Surface Engineering (ICASE of Japan) and the 5th International Conference of Surface and Interface Science and Engineering (SISE of China). The event covers the most relevant technologies of surface engineering and therefore is of significance to the entire industry. Surface engineering being interdisciplinary in research and production is essential for the functionality and innovation of products connected with a major increase in value. This is applicable to the transportation, energy, machinery, electronics and information technology, just to name a few.

The conference will provide academics and professionals an opportunity to exchange the latest information on surface engineering and allied technology networking. At the same time, we warmly welcome you to “YOUR SINGAPORE” – an experience of a lifetime!

CP Kam
President,
Singapore Surface Engineering Association

Dr. Gopal Krishnan
General Chair, APIC2010 Organizing Committee
Singapore Surface Engineering Association

APIC 2010 SECRETARIAT

The Singapore Surface Engineering Association
190 Middle Road
#19-05 Fortune Centre
Singapore 188979

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21 Heng Mui Keng Terrace
Singapore

Attn: Mr Yaadhav RAAJ
Tel : 65-91898275
Email : apic2010@a-iats.com
raj@a-iats.com
URL : www.a-iats.com

Venue

The APIC2010 Conferences, education course and Exhibition will be held at THE BIOPOLIS, 30 Biopolis Street, Matrix #B2-14, Singapore 138671
http://www.bsf.a-star.edu.sg/Home/ContactUs.aspx

Registration for conference and course start at 0830am

Event Highlights

<table>
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<tr>
<th>Event Highlights</th>
<th>Important Dates of Closure</th>
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<tr>
<td>19 October 2010 : Industry Workshop, / Educational Courses</td>
<td>Manuscript Submission 03 September 2010</td>
</tr>
<tr>
<td>20-22 October 2010 : Conference/Posters, Exhibition/Marketing talk</td>
<td>Sponsorship write-up 03 September 2010</td>
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<tr>
<td>22 October 2010 (pm) : Visit to Research labs and Industry</td>
<td>Registration of Conference, Course, Exhibition 21 September 2010</td>
</tr>
<tr>
<td>21 October 2010 : Banquet and Cultural Show</td>
<td>Exhibition write-up 03 September 2010</td>
</tr>
<tr>
<td>22 October 2010 (pm) : Golf Networking</td>
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</tr>
</tbody>
</table>

Important Dates of Closure

- Manuscript Submission: 03 September 2010
- Sponsorship write-up: 03 September 2010
- Registration of Conference, Course, Exhibition: 21 September 2010
- Exhibition write-up: 03 September 2010

Registration for conference and course start at 0830am
Conference - Background Significance

In recent years, there has been a paradigm shift in surface engineering from traditional electroplating to leading edge thin & ultra thin surface finishing processes assisted by advanced sources like plasma, laser, ion, electron, pulsed arc, spark and microwave energies. The scope and potential of interdisciplinary surface engineering have a wide range of applications which include critical components from almost all major industries such as automotive, green energy, aerospace, bio-medical, defence, precision engineering and electronic systems.

The ASIA INTERFINISH 2010 conference along with the 10th International conference on Applied Surface Engineering of Japan and the 5th International conference on Surface and Interface Science and Engineering of China will be held from October 19 to October 22 in Singapore. This event will be jointly organised by Singapore Surface Engineering Association in collaboration with A*STAR, NASF (International Branch), A-IATS(Sin), Singapore Polytechnic and IUSF.

The primary purpose of the joint Conference is to bring together the surface engineering professionals, the end users of surface engineering and associated technologies to nurture exchange of noteworthy global developments. This platform also discusses the current state of the art technologies, the comprehensive applications and update understanding of various application landscapes. The conference will also provide ample opportunity for the global delegates to network in a friendly and supportive environment as well as to immerse in the rich multicultural heritage of YOUR SINGAPORE.

Technology topics to be addressed but not limited to

The primary purpose of joint-international conference is to bring together in Singapore the surface and interface engineering professionals and the end users of surface engineering and associated technologies to nurture exchange of noteworthy global initiatives for applied research and product development.

Coating Processes
- Electroplating
- Electroless plating
- Immersion plating
- Galvanising
- Electroforming
- Composite Charging
- Sol-gel coating
- PVD / CVD
- Powder Coating

Surface Engineering Processes
- Shot Peening
- Surface Cleaning and preparation
- Plasma Surface processing
- Anodising
- Heat Treatment

Industry Applications
- Electronics
- Display Components
- Advances in LED
- Micro-Joining/PCB/MEMS
- Automotive
- Aerospace
- Precision Engineering
- BioMedical
- Decorative and Functional Finishing
- Photo-Voltaic & Solar Batteries

Characterization and Testing
- Analysis and Characterization
- Standardization and Testing
- Failure Analysis

Business and Management
- Roadmap of Surface Engineering
- Legislation: ROHS/ WEEE/ REACH
- Carbon footprint
- Environment

Emerging Technologies
- New Materials for surface coating
- Nanotechnology in Surface Finishing
- Waste Water and Air Pollution filtration
- Fuel Cells
- Surface Technologies for Optics
- Alternatives to ultra-thin Au thin films

Keynote Speaker
Energy-assisted coatings and their applications, Dr John S Colligon, Dalton Research Institute, Manchester Metropolitan University

UNITED KINGDOM

Nano-structured surfaces for bio-medical applications Prof. Sandro Carrara, EPFL - Swiss Federal Institute of Technology Lausanne

SWITZERLAND

Nano-structured multi-functional composite coatings and their applications, Dr X. T. Zeng, Singapore Institute of Manufacturing Technology

SINGAPORE

This is a partial list, please refer to our website for regular updates)

List of Speakers

Plating Technology

Asmaa Farouk Ahmed Saleh, Sol-gel derived inorganic-organic hybrid polymers filled with ZnO nanoparticles as antibacterial finish, AIST, Japan

Dr Bogdan Warochinski, The properties of multilayer CrCN/CrN coatings depend on their architecture, Koszalin University of Technology, Poland

Dr LEFEVRE Gregory, Prediction of the deposition of particles in turbulent flows: do surface charges rule the fouling process ?, Chimie ParisTech-CNRS, France

Dr. Volker Sitterling, Large area deposition and long-term stabilization of a reactive mid-frequency sputtering process of Al-doped zinc oxide films, , FRAUNHOFER IST,Germany

Dr Yujiro Kaneko, Multi-scale kinetic Monte Carlo simulation of electrodeposition and its application to industries, Kyoto University, Japan

Florian Feil, Multilayered, purely inorganic Coatings for the Corrosion Protection of Magnesium Alloys, , dechrma E.V

Hisham Abu Samarr, Development of a new generation of amorphous hard coatings based on the Si-B-C-N-O system for applications in extreme conditions, University of Siegen, Germany

Dr. Yutaka Kaneko, Large area deposition and long-term stabilization of a reactive mid-frequency sputtering process of Al-doped zinc oxide films, , FRAUNHOFER IST,Germany

Dr John S Colligon, Dalton Research Institute, Manchester Metropolitan University

HT Yum, IUSF Korea

Ichiro Koizumi, A Basic Study of Cu-Mo Alloy Plating Film Using Molybdophosphoric Acid as a Molybdenum Source, Kanto Gakuin University

Jiang Zhaohua, Growth process of ceramic coatings on Q235 carbon steel by plasma electrolytic oxidation, Harbin Institute Of Technology, Japan

Joe Abyo, Through Silicon Via Copper Plating Technologies Challenges & Solutions, Co4koon, USA

Kazuki Urakami, Influence of Metal Impurities on the Nickel Electrodeposition in Citric Acid Bath, Tokyo Metropolitan Industrial Technology Research Institute, Japan

Keigo Masujima, ZnMgO transparent conducting films deposited on glass by multi-cathode rf-magnetron sputtering

Ken Hattori, Phase discrimination of silicide islands by three-dimensional reciprocal lattice mapping, Nara Institute of Science and Technology, Japan

Lawrence K Y Li, The effects of carbon and nitrogen ion implantaion on the surface and tribological properties of Ti-Al-Si-N coatings, MIEEM City University of Hong Kong

M. Duraiselvam, Application of laser surface engineering in power generation and automobile industries, National Institute of Technology, India

Martin Gall, Trends and Innovations for Trivalent Chromates on Zinc Plating.Columbia Chemicals, USA

Michal Novák, Electroless nickel coating of aluminium alloys, Instituto de Technologie of Chemical Technology, Prague

Michiko Yoshitake, Interface characterization of a MOS structure by biased X-ray photoelectron spectroscopy, National Institute of Materials Science, Japan

Sergey Kruglikov, Role of macro- and microdistribution factors in the plating of electronic components,Mendeleyev University of Chemical Technology, Moscow, Russia

Steven Burling, The Environment and Precious Metal Plating, Metalor Technologies UK

Stewart J Hemsley and Priscilla Hong, Acid Gold Plating Developments, Metalor Technologies Singapore

Tony Evans, Cleanliness is next to Godliness : Selecting the correct Automatic Aqueous Cleaning Equipment for your application, PAL (HK)

Wilma Ayako Taira dos Santos, Evaluation of the corrosion resistance and cytotoxicity of electrodeposited gold on various types of intermediate layers, IPEN/CNEM-ISO PAULO - Brazil
List of Speakers
(This is a partial list, please refer to our website for regular updates)

**Nano Technology**
- Hongdong Li, Growth and properties of nanoscale magnetic semiconductor heterostructures, Tsinghua University, China
- Karolina Siskova, Functional tailored nanomaterials by soft chemistry, Institute of Macromolecular Chemistry, Czech Republic
- Yonghao Lu, Nanocomposite films for biomedical applications, University of Waterloo, Canada
- Dr. Sandro Carrara, Nanostructured materials for energy and environmental applications, University of São Paulo, Brazil
- Dr. Liu Rong, Challenges and Opportunities in Superhydrophobic coatings, Trinity College Dublin, Ireland
- Dr. Liu Rong, Challenges and Opportunities in Superhydrophobic coatings, Trinity College Dublin, Ireland
- Dr. Liu Rong, Challenges and Opportunities in Superhydrophobic coatings, Trinity College Dublin, Ireland
- Dr. Liu Rong, Challenges and Opportunities in Superhydrophobic coatings, Trinity College Dublin, Ireland

**Surface Engineering**
- Daisuke Kana, Local conduction in junctions composed of Pt and single-crystalline Nb-doped SrTiO3, Institute of Chemical Research Kyoto University, Japan
- Prof. Marie-Helene Tullier, The role of structural properties on damage behaviour of silicon and aluminum nitride coatings: contributions of XAFS and TEM techniques, Université de Haute Alsace
- Prof. Hans-Otto Mathias, Surface Engineering by Laser and Plasma. *Prospects and Applications in Selected Materials*, Università degli Studi di Firenze, Italy
- Dr. Artur Chrobak, A nondestructive method of elastic properties measurements for coatings on metallic substrate., University of Silesia, Poland
- Dr. Chen ChangJun, Recent Advances in Surface Modification for Metals by High-energy Micro-arc Alloying Processing, Wuhan University of Science and Technology, China
- Dr. AliReza Niknam, Modeling of argon plasma discharge produced by direct current electric field in a coaxial structure., Shahid Beheshti University
- Ippel Ohta, Surface Distribution Analysis of Minute Amounts of Fluorescent Substance, Nagoya University, Japan
- Kigook Song, Effects of Surface Porosity on Alignment of Nematic Liquid Crystals, Kyung Hee University
- Dr. Shigeo Sato, Effect of excitation states of nitrogen on the surface nitridation of steels, Institute of Material Research, Tohoku University
- Prof. Robert Schennach, Growth and Reactivity of Zn and ZnO on Pt(111)
- Dr. Yuukihiro Kusano, Ultrasound enhanced plasma surface modification at atmospheric pressure, Riso National Laboratory for Sustainable Energy, Technical University of Denmark
- Sergei Manzhos, Dynamics on ab initio potential energy surfaces for predictions of reactivity: a general method
- Fiorezza Fanelli, Surface processing of materials with fluorocarbon fed atmospheric pressure dielectric barrier discharges, University of Bari Aldo Moro
- Yao Zhong Ping, Structure and corrosion resistance of PEO ceramic coatings on AZ91D Mg alloy under different power modes.
- Azusa N. Hattori, Surface treatments toward obtaining clean GaN(0001) substrate surfaces, ISIR OSAKA UNIVERSITY
- Kiyotera Kobayashi, Photoduced leakage currents and paramagnetic defects in amorphous SiCN and Si3N4 dielectrics for ULSI applications, Tokai University, Japan
- Wang Xibao, Development of the In-situ Synthesizing Fabrication of Boride Coatings on Steel Using Plasma Transferred Arc (PTAW) Process, Tianjin University
- Dr. Takashi Koida, In2O3:H transparent conductive oxide films with high mobility and near-infrared transparency for optoelectronics applications, Japan
- Dr. Sagheer Omaiz, A Novel Biochemical Method for Decoupling Enzyme Transfer from Surface Proteolysis Reaction, The Australian institute for Bioengineering and Nanotechnology
- Chih-Yung Huang, Textured Zinc Oxide Synthesize by Low Pressure Chemical Vapor Deposition with Dual Flow Showether, Industrial Technology research Institute
- Mario Birckholz, Corrosion-resistant metal layers from a CMOS process for bioelectronic and medical implant applications
- Maryline Guilloux-Viry, Control of KTa1-xNbxC3 ferroelectric epitaxial thin films., l’Institut des Sciences Chimiques de Rennes Equipe Chimie du Solide et Mat’iaux
- Michiko Yoshitake, Interface characterization of a MOS structure by biased X-ray photoelectron spectroscopy, National Institute of Materials Science
- Ken Hattori, Phase Distribution of Silicate Glasses by Three-dimensional reciprocal lattice mapping, Nara Institute of Science and Technology
- Mr. Emanuels D. Jonsson, Copper Immobilization on Polyamide Substrates using Supercritical Fluid Carbon Dioxide and Thermal Treatment, University of Fukui
- Dr. Nikolay Todorov, Ellipsometric characterization of thin chalcogenide films for photonic application
- Dr. Sudarshana, Challenges and Opportunities in Supercritical Fluid Coatings, MatMod Inc, USA
- Dr. Liu Rong, Advance SIMS application in electronic and biomedical materials, Physics, NUS, Singapore
- Mr. Atem S. Ramsundersingh, “Change Management: aligning for innovation”, STB Technologies, Singapore
- G. Foyas and Yaadhav Raaj, Surface & subsurface analysis of nanostructured titanium surfaces by scanning probe microscopy, Japan Advanced Technology and Science

**Basic Registration Fees for Conference**

<table>
<thead>
<tr>
<th>Event</th>
<th>On or before 21 Sept 2010</th>
<th>After 21 Sept 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Conference on 20-22 October 2010*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 US$=1.45 S$</td>
<td>S$ 700</td>
<td>S$ 750</td>
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<tr>
<td>SSFS member</td>
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<tr>
<td>Non-member</td>
<td>S$ 750</td>
<td>S$ 850</td>
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<tr>
<td>Student (full time)</td>
<td>S$ 400</td>
<td>S$ 500</td>
</tr>
</tbody>
</table>

* The fee includes lunches, tea breaks, an abstract booklet, 1 set of symposium proceedings in CD-ROM, and industry visit

**Registration Fees for Industry Workshop**

<table>
<thead>
<tr>
<th>Event</th>
<th>On or before 21 Sept 2010</th>
<th>After 21 Sept 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry workshop before the *</td>
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<tr>
<td>1 US$=1.45 S$</td>
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<tr>
<td>SSFS member</td>
<td>S$ 250</td>
<td>S$ 350</td>
</tr>
<tr>
<td>Non-member</td>
<td>S$ 300</td>
<td>S$ 400</td>
</tr>
<tr>
<td>Student (full time)</td>
<td>S$ 250</td>
<td>S$ 350</td>
</tr>
</tbody>
</table>

**The fee includes courses notes, lunch, and tea break

* A 10% discount will be given to participants attending both the course and the symposium
* Discounts applicable only until 21st September 2010.
* Registration starts at 0830am on 19th and 20th Oct 2010

Please complete Registration Form downloadable from the website and send a crossed cheque or bank draft payable to “The Singapore Surface Engineering Association” for delivery to the Secretariat.
Exhibition
An exhibition will be specially held in conjunction with the symposium. The exhibition will be open from 11am on Wednesday 20 October to 12pm on Friday 22 October 2010. Tea breaks and lunches will be held at/near the same location. Participating exhibitors are also requested to write in with their company’s core competence, products and services with no more than 250 words along with their contacts for inclusion in proceedings and abstract booklet by 03 Sep 2010. Besides, a marketing platform is provided for exhibitors to present their work exclusively in a classroom atmosphere for a duration of 30minutes at a fee of SGD500.00. Those who are interested in specialized booth can write in to the secretariat. Exhibition forms are downloadable from the website.

The standard booth (S$3500) comprises: 3x3 square-meter
- Fascia board with company’s name
- Information desk, power points and two folding chairs in an enclosed stall.

Publications
All of the key-note, invited and contributed papers presented at the conference will be compiled in CD-ROM for distribution to paid participants. Abstract booklet will be provided in hardcopy along with the CD-ROM which will have all the manuscript. The organizers will publish the manuscripts after peer review in a hardcopy through a reputed publisher. A sample manuscript is available for reference in the website. Please contact Technical Secretariat apic2010@a-iats.com for purchase of hardcopy proceedings.

Passport, Visa Requirements and Travel Insurance
Visitors to Singapore must hold a valid passport. A Singapore visa for some countries’ passport holder is required when traveling to Singapore. You can find useful visa information from the Singapore Immigration & Check Authority. If you need any assistance to obtain your visa, please contact the Conference secretariat. You are recommended to obtain travel insurance coverage during the period of the symposium if you are traveling outside your own country.

Research Laboratory Visits
Arrangements have been made to visit Research Labs in Faculty of Science of National University of Singapore and A*STAR SIMTech.

Sponsorship
The organizing committee invites manufacturers, supply houses, dealers, associations, foundations and institutions to sponsor the ASIA Interfinish 2010. The list of sponsors will be displayed prominently in the inaugural function, souvenir, abstract booklet and proceedings. Please write in to the secretariat in advance. The sponsorship forms are downloadable from the website.

Networking Golf Event
There will be a networking golf event on 22 October 2010. Those who are interested are requested to contact the secretariat.

Target Audience
Technical officers, Engineers, Research Scientists, Managers, R&D personnel, company CEOs, S&T administrators, graduate students, academics and all those engaged in the surface engineering applications and industries.

Accommodation
Overseas participants are advised to email linda_ho@travelmedia.com.sg in advance for early booking.

About the Organizers and Associates

Singapore Surface Engineering Association (http://www.sesf.org)
The Singapore Metal Finishing Society was founded in November 1981 with the mission to promote the development of the local electroplating industry. It counts contract platers, academics, surface finishers, suppliers of chemicals, equipment, technology, analytical lab and test service providers and PCB manufacturers as its members. The Society is currently a member of the International Union of Surface Finishing (IUSF), Singapore Manufacturer’s Federation (SMa) and has a Memorandum of Understanding (MOU) with the Association of Electronics Industries in Singapore (AEIS).

A*STAR SIMTech (http://www.simtech.a-star.edu.sg)
The Singapore Institute of Manufacturing Technology (SIMTech) develops high value manufacturing technology and human capital to enhance the competitiveness of Singapore’s manufacturing industry. SIMTech has completed more than 900 projects with more than 500 companies, big and small, in the electronics, semiconductor, precision engineering, medical technology, aerospace, automotive, marine, logistics and other sectors.

Singapore Polytechnic (http://www.sp.edu.sg)
Singapore Polytechnic, Singapore’s first polytechnic, was set up in 1954 to train technologists and professionals to support the industrialisation and economic development of Singapore. To date, Singapore Polytechnic has produced more than 135,000 graduates, some of whom have gone on to become Parliamentarians, captains of industries, senior executives of multi-national corporations, and successful entrepreneurs and professionals in Singapore and overseas. Their mission is to educate their students and to train them to excel in work and in life. Their aspiration is to be a world-class institution.

A*STAR (http://www.a-star.edu.sg)
The Agency for Science, Technology and Research (A*STAR) is Singapore’s national agency for science and technology, supporting the development of industry clusters. Its mission is to foster world-class scientific research and talent for a vibrant knowledge-based Singapore. The Agency comprises the Biomedical Research Council, the Science and Engineering Research Council, A*STAR Graduate Academy, Policy and Personnel, and Corporate Planning and Administration Divisions, and a commercialization arm, Enterprise Technologies Pte Ltd. The two research councils fund and oversee 12 public research institutes engaged in cutting edge research in the physical sciences, engineering and biomedical sciences. The institutes build up intellectual capital and trains research talent to deepen Singapore’s scientific capabilities.

A-IATS(Singapore) Pte Ltd (http://www.a-iats.com)
Advanced, Integrated Analytical and Test Services: Innovative metrology, methodology and characterization are becoming critical for development of nano/micro circuit technology and clean technology cluster. A-IATS enables your SP variation management (Properties/Process/Product performance) by linking composition, structure, morphology, roughness, adhesion and hardness with defect reduction and yield enhancement. The division of TechDoc focuses on market research, Technology roadmapping, Scientific and technical documentation and international conference editing.

International Union for Surface Finishing (http://www.iufsf.org/charter.htm)
A world-wide union of societies and associations concerned with the science and technology of surface finishing.

AESF/NASF International Branch
The NASF is a 501 (c)(6) trade association whose mission is to promote the advancement of the North American surface finishing industry globally. NASF was created as a means to better serve the needs of the surface finishing industry by “reorganizing” and bringing together the members of the American Electroplaters and Surface Finishers Society (AESF), the Metal Finishing Suppliers Association (MPSA) and the National Association of Metal Finishers (NAMF).
Energy-assisted coatings and their applications

Surface coatings provide important flexibility to the design of a component as the designer can choose a material for its bulk properties and then provide a top layer that, not only, protects the surface against the working environment, but also can tailor the product to provide optimum working properties. Recent developments in the use of physical vapour deposition processes, which provide the engineering and aircraft industry with high performance finishing layers, will be reviewed. The latest methods, including pulsed magnetron sputtering and High Power Impulse Magnetron Sputtering (HIPIMS) combine deposition with some form of energy-assisted bombardment (usually by ions). This produces coatings with improved adhesion, provides some control in the nucleation and growth process to create denser coatings and can produce micro- and nano- structural features which could not be otherwise be formed in a controlled way. Such coatings can withstand high temperatures, harsh environments, provide low friction and can have low wear rates. Over the last decade some of the nano-composite coatings have been shown to be extremely hard with hardness values (HV) approaching that of diamond. However, more recently, it has been seen that durable and ductile coatings provide surfaces which survive erosion and wear better. The ratio of H to Young’s Modulus (E) for a material appears to be a useful guide to the durability of a material (many authors have suggested H multiplied by the square of H/E gives the best correlation). Accurate measurement of H and E for a coating-substrate combination can be time-consuming and it is suggested that a simpler indication of durability from the critical load in a scratch test could be a useful starting point when selecting new coating-substrate systems. MAX phase materials which are stable at temperatures in excess of 1000°C will be described. These are layered materials with chemical formula M2Ti X, where M is a transition Metal, A an element from the A group in the periodic table and X is either C or N. Ti23C and Ti3SiC2 are just two of the many MAX phase materials.

The review will conclude by discussing some of the remaining challenges which include (1) how to produce the MAX phase coating without overheating the substrate, (2) how to coat the inside of cavities and tubes (3) to be aware of and control impurity levels which can seriously influence nucleation and growth of nanostructured coatings.

Nano-structured multi-functional composite coatings and their applications

Surface engineering for nanocomposite coatings is offering a significant impact on product performance and quality because of their unique material properties and integrated multiple functionalities through nano-structuring and engineering. Such coatings containing nano-sized multi-phases in composition and multi- or nano-layers in structure render substantially improved mechanical, chemical, tribological and optical properties as well as additional functions such as anti-sticking, self-lubricating, easy-to-clean or self-cleaning, corrosion and oxidation resistance, heat insulating and environment- and bio-compatibility.

In this presentation, nano-phased hybrid multi-functional coating materials and deposition processes will be reviewed based on our research work in surface engineering using physical vapour deposition, sol-gel and electro-chemical process technologies. Case studies in coating design, material selection and deposition processes will be shared and discussed for applications in aerospace, precision engineering, automotive and construction industries, with emphasis on PVD composite coatings for high temperature wear and oxidation protection and sol gel based hybrid composite coatings for heat insulation and corrosion protection.

Nano-structured surfaces for bio-medical applications

In more recent years, nanotechnology plays an increased role in improving surface properties in bio-medical applications. Old problems like biocompatibility and specific recognition are now addressed by using new nano-structured materials. New Ethylene-glycol nano-layers self-assembled onto gold surfaces have been proposed to enhance specific surface recognition in surface plasmon resonance biosensors, as well as improve time stability and detection reliability in capacitance-based electrochemical biosensors. Film properties improve because the ethylene-glycol chains behave, at the nano-scale, as water stabilizers, as envisaged by molecular dynamics. The aim of this keynote talk is to review all the most recent research findings demonstrating that these new ethylene-glycol self-assembled monolayers are an absolute break-through for many biomedical applications, especially in molecular diagnostics. Highly-ordered ethylene-glycol monolayers are now proposed for applications in DNA and cancer markers nano-bio-sensing by means of fully-electronics readers. The improved detection reliability in terms of increased specificity, reliability, and time stability of the acquired electrical signals is definitely related to the films structure that the nanoscale onto both gold and silicon surfaces.

Industry Workshop on 19th October 2010

EC1: Plating Technology for the Semiconductor Devices ( wafers & leaded Components)
Dr A C Tan, SSEE, Singapore

EC2: Advanced Biomaterials and the challenges ahead
Prof Geetha Manipasavag, School of Mechanical and Building Sciences, VIT University, India
Outline: The course is designed to introduce students and researchers to the area of various kinds of biomaterials in use and their applications in selected subspecialties of medicine. Biomaterials is a central area of materials and biology, that covers mechanical design of implants, but it is also increasingly important as it underpins many of the applied technologies such as surface engineering and physical sciences. This course provides a comprehensive background of biomaterials as it covers surface properties, mechanical behaviour, wear and corrosion of ceramics, polymers and metals implanted in the body. One of the main aims of this course is to bring out the truly interdisciplinary nature of the field since it covers all kinds of materials employed in making implants, their design criteria and structure-property correlation. The objective is to bring students from both pure and applied sciences as well as those who are from engineering and medical streams Which will enable them to gain a good background and to undertake research at the cutting edge technologies. It will be in three modules viz., Basics of biomaterials, existing problems, role of surface engineering to develop implants with high life span and significant opportunities and the challenges to be faced in the development and characterization of better biomaterials.

EC3: Practical Surface Analysis for industrial coatings
Dr. Gopal Krishnan & Dr Liu Rong, Physics Department, NUS, Singapore
Outline: Analytical support has played and still plays an indispensable role in material & process research, process development, defect free manufacturing and reliability. Advanced analytical tools and specialized methodologies have been providing facility to leading edge research labs and regional manufacturers to link composition, structure, morphology, roughness, hardness and adherence with defect reduction, yield improvement and optimum performance enhancement. In this course, the principle and application of analytical tools such as XPS, AES, SIMS, AFM, TEM/EDX/EELS, FIB/SEM will be presented with specific references to Surface finishing/engineering and allied industries. Besides, other techniques such as SEM/EDX, Micro Raman, X-ray imaging, XRD, XRF, RBS, PIXE, FT-IR, GC-MS, AAS, ICP-OES, DSC, DT, TGA, TMA... are also briefly described with references to scientific research and industrial applications.

EC4: Precious Metal Plating for Electronic & Industrial Applications
Mr. Steven Burling, Metalor, United Kingdom
Outline: For platers/non platers requiring a general understanding of Precious Metal Plating, its benefits and its applications. All precious metals will be discussed (Gold, Silver, Palladium and its alloys, Rhodium, Platinum and Ruthenium). Applications for these metals will be discussed as well their cost implications and calculations. Formulation information and the roles of process constituents will be covered. Operating conditions and types of plating processing (high speed, rack/ vat and barrel plating will be presented and well as process control (analysis and plating test methods). Environmental and legislative issues will also be covered.

EC5: Surface Engineering for the Practitioner
Dr. Sudarshan, Material Modification inc, USA
Outline: Surface engineering pervades the entire gamut of engineering applications and is one of the primary methods for combating wear, corrosion, lubrication and other degradation phenomena. Life extension and maintenance are therefore key issues in all industry sectors. Involved in manufacturing. The primary objective of this workshop is to provide the overview of all the available processes and treatments that can be used commercially for various substrates and applications. We will discuss vapour deposition processes, electroplating, ion and laser beam processes and numerous other surface hardening processes. Attendees will be able to have an appreciation at the end of the course of the advantages and disadvantages of the various methods and a real world applications for the available coatings and methods along with some typical applications.