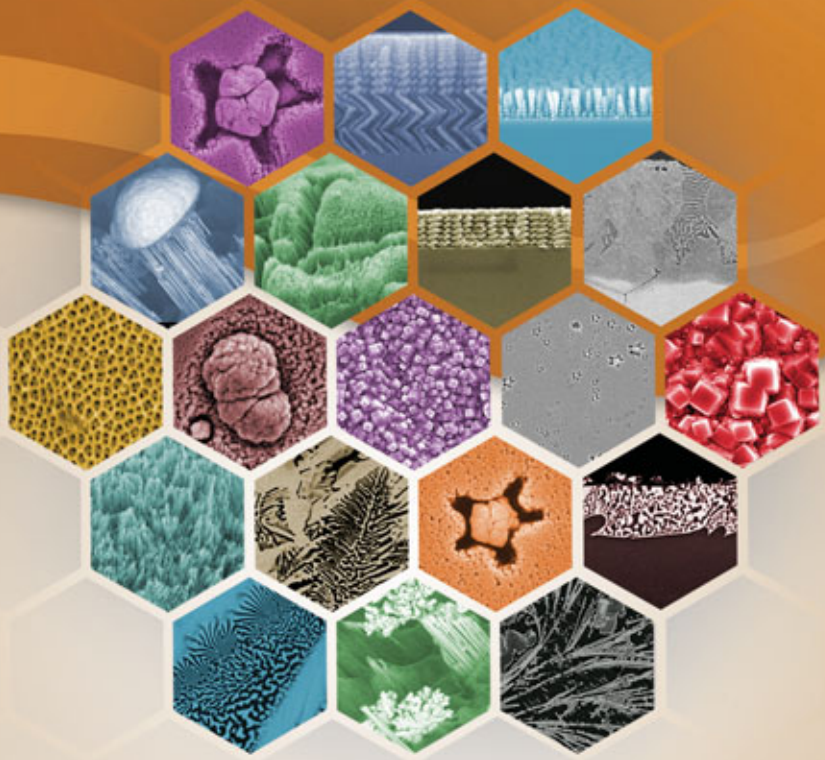
1. ULUSLARARASI YÜZEY İŞLEMLERİ SEMPOZYUMU

1st INTERNATIONAL SURFACE TREATMENT SYMPOSIUM



Symposium Programme / Sempozyum Programı

15-18 Haziran/June 2011
Istanbul Technical University
Taşkışla Campus, Istanbul

TMMOB Kimya Mühendisleri Odası
UCTEA Chamber of Chemical Engineers

TMMOB Metalurji Mühendisleri Odası
UCTEA Chamber of Metallurgical Engineers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15-18 Haziran 2011 İstanbul Teknik Üniversitesi
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UCTEA Chamber of Metallurgical Engineers

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UCTEA Chamber of Chemical Engineers

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TMMOB Kimya Mühendisleri Odası

Kimya Mühendisleri Odası (KMO) 1954 yılında 7303 sayılı yasa ve 66 ile 85 sayılı Kanun Hükmünde Kararnameler ile değişik 6235 sayılı Türk Mühendis ve Mimar Odaları Birliği (TMMOB) yasasının yürürlüğe girmesiyle kurulan ilk beş Odadan birisi olup kamu kurumu niteliğinde bir meslek örgütüdür. KMO'nun kurulmasıyla birlikte İstanbul Şubesi de çalışmalarına başlamıştır (19 Ocak 1954).

Merkezi Ankara'da bulunan KMO'nun 21.000'e yakın üyesi bulunmaktadır KMO'nun 6.000'i aşkın üyesi olan Ankara ve İstanbul Şubeleri dışında Bursa, Ege Bölge, Güney Bölge, Samsun, Trakya Bölge ve Kocaeli Şubeleri; ve Trabzon Bölge Temsilcilikleri ile 30 İl Temsilcilikleri vardır.

İlgili yasa uyarınca KMO; Kimya Mühendislerinin örgütlülüğünün geliştirilmesi, meslek ve ülke sorunlarının bütünlüğü içerisinde ülke çıkarlarının, Kimya Mühendislerinin özlük haklarının savunulması, mesleki birikimlerinin geliştirilmesi, Oda'nın işyerleri ile ilişkilerinin sağlanması amacı ile ayrıca işyeri temsilcilikleri de kurabilmektedir.

TMMOB'ye bağlı tüm Odalarda olduğu gibi KMO'da da Genel Kuvrul toplantıları ve seçimler iki yılda bir yapılır. Üyelerinin ve diğer meslek disiplinlerinin hizmet içi eğitimlerine yönelik etkinlikler düzenleyen KMO; teknik kongreler, kısa süreli okullar, kurslar, paneller ve sergiler gerçekleştirmektedir.

KMO'da üye katılımını sağlama ve bilgi üretme aracı olarak Yönetim Kuruluna bağlı yarkurullar oluşturulmaktadır. Yarkurullar Odanın üyeleri ile ilişkisini sağlayan ve konunun uzmanı üyelerin katılımıyla Oda görüşlerinin ortaya çıkarıldığı, çeşitli etkinliklerin üretildiği çalışma birimleridir.

Örgütlülüğün nitel ve nicel olarak geliştirilmesi, üyelerinin mesleki, ekonomik ve demokratik çıkarlarının toplumun çıkarlarıyla bütünleştirilerek savunulması KMO'nun görevleri arasındadır.

KMO; Kimya Mühendislerinin tek yasal mesleki kuruluşu olarak üyelerinin hak ve çıkarlarının temsilcisi, meslek alanında ulusal çıkarların uzman sesidir.

UCTEA Chamber of Chemical Engineers

The Chamber of Chemical Engineers (CCE) was one of the first five Chambers established in 1954 after the enactment of Law No. 6235 (7303) on the Union of Chambers of Turkish Engineers And Architects (UCTEA). It is a Turkish public sector entity. Immediately following CCE's establishment, its Istanbul Branch began its operation on January 19, 1954.

Headquartered in Ankara the CCE has approximately 21.000 members. Its Istanbul Branch has more than 6.000 members. CCE also has Branches in the Aegean Region, Ankara, Bursa, Samsun,Trakya Region, Kocaeli and the Southern Region, as well as representatives in Trabzon Region and 30 other cities.

In accordance with the pertinent law, the CCE's functions include; development of an organizational structure for chemical engineers, protection of chemical engineers rights and benefits within the context of national and professional interests; enhancement of professional resources; promotion of business relationships between its members and other related organizations; and establishment of business representative offices.

CCE's general assembly and elections are held every two years, similar to all Chambers under the UCTEA. CCE organizes vocational training for its members in various professional disciplines, including technical conferences, short-term courses, panels, exhibits and similar events.

CCE establishes various committees under the guidance of its Board of Directors, to facilitate membership participation in various events and to collect information on issues of concern. These committees are working units connecting the Chamber to its members, and incorporating its members' expertise in formulating the Chamber's policies and decisions.

These units also undertake the organization of various promotional events Among CCE's duties is enhancement of its organizational quality and size, and protection of their members' professional, economic and democratic welfare within the context of social development.

CCE is the only legal professional association of chemical engineers in Turkey, and continues to be a highly effective tool in promoting its members' personal and national interests.

TMMOB Metalurji Mühendisleri Odası

Türk Mühendis ve Mimar Odaları Birliği'ne bağlı olarak ilgili yasa hükümlerine uygun şekilde 1970 yılında kurulan Metalurji Mühendisleri Odası, kamu kurumu niteliğinde bir meslek kuruluşudur. Halen 4000 olan Metalurji Mühendisleri Odası üye sayısı, her yıl metalurji dalında mühendislik eğitimi veren yurtiçi ve yurtdışı üniversitelerinden mezun olanlarla artmaktadır.

Ülke ve Oda üyelerinin hak ve yararları gözetilerek, metal ve metal dışı malzemelerin üretimi, şekillendirilmesi, özelliklerinin geliştirilmesi, hasarlı ve hasarsız kontrolleri vb. alanlarda, ihtiyaç duyulan ve gerek görülen etkinliklerin organizasyonu ve çalışmaların yapılması, sektörümüzde yapılan çalışmaların, yeni teknolojilerin ve bilgi birikiminin çeşitli araçlarla meslektaşlarımıza ve sektör mensuplarına duyurulması, üyelerin durumlarının iyileştirilmesi, oda amaçlarının temelini oluşturmaktadır.

Bu amaçlar doğrultusunda Metalurji Mühendisleri Odası iki ayda bir "METALURJİ" dergisini ve Oda faaliyetlerinin, sektörel haberlerin güncel şekilde aktarıldığı "BÜLTEN"i yayınlamakta ve seminer, sempozyum, panel, forum, kongre, fuar gibi etkinlikler organize etmektedir.

İki yılda bir yapılan ve Odaya kayıtlı üyelerin katılımıyla gerçekleştirilen Genel Kurullarda oluşan Oda Yönetim Kurulu yukarıda bahsedilen çalışmaların yürütülmesinden sorumludur. Ayrıca, Oda Yönetim Kurulunca oluşturulan ve üniversite, araştırma kuruluşları ve sanayiden uzmanların yer aldığı çalışma gruplarınca belli konularda ayrıntılı çalışmalar yapılmaktadır.

UCTEA Chamber of Metallurgical Engineers

The Chamber of Metallurgical Engineers (CME) is a non-profit public organization founded in 1970 and is one of twenty-two Chambers, which constitute the Union of Chambers of Turkish Engineers and Architects. The CME membership is currently 4000 and increasing each year with new graduates from national and foreign universities.

The main functions of CME are to organize required and necessary activities and conduct studies in broad fields of production, shaping, improving properties, destructive and non-destructive testing of metallic and nonmetallic materials, and also introducing the new technologies and the knowledges for the use and benefits of the members of CME and the country.

Within this context CME publishes a bimonthly journal entitled "METALURJI" and a bulletin called "BULTEN" in which news related to metallurgy and materials science appear. CME also organizes seminars, symposiums, panels, forums, congresses and fairs.

The supreme governing body of CME is the General Assembly which consists of the Chamber members and is elected biannually. Board of Directors elected at the General Assembly is responsible from the execution of the functions mentioned above. Additionally, detailed studies on certain specific subjects are conducted by "work groups" that consist of specialists from universities, research institutions and the industry and established by the board of Directors.

1. ULUSLARARASI YÜZEY İŞLEMLERİ SEMPOZYUMU

Malzemelerin yüzey işlemleri, teknolojiyi yöneten ve öncülük yapan mühendislik konuları içerisinde büyük ölçüde Ar-Ge'ye dayalı ve disiplinler arası konulardan bir tanesidir. Ekonomik krizler, ortaya çıkan çevresel, sosyal ve etik sorunlar yüzey işlem proseslerini her zamankinden daha da önemli hale getirmektedir.
Türkiye'nin iki öncü mühendislik meslek odası sinerjik bir yaklaşımla dünyanın değişik yerlerindeki bilim adamlarının, mühendislerin ve üreticilerin katkısıyla "Yüzey İşlemler Teknolojilerini" değerlendirmek ve geliştirmek üzere işbirliğine girmiştir. Bu sempozyumun ana amacı; temel bilimsel ve mühendislik bilgileri üzerine inşaa edilmiş, uygulanabilir mühendislik çalışmaları vasıtasıyla toplumun ihtiyaçlarının karşılanmasıdır.
1. Uluslararası Yüzey İşlemler Sempozyumu TMMOB Metalurji Mühendisleri Odası ve TMMOB Kimya Mühendisleri Odası ortaklığı ile 15-18 Haziran 2011 tarihlerinde İstanbul Teknik Üniversitesi Taşkışla Kampüsü'nde düzenlenecektir.

1. Uluslararası Yüzey İşlemler Sempozyumunun hedefleri:

- Kavram ve yöntemlerdeki son gelişmelerin anlatılacağı, akademik ve endüstriyel katılımcıların bulunduğu bir forum ortamının yaratılması.
- Yeni ortaya çıkan kavram ve teknolojilerin tanıtılması, değerlendirilmesi ve karşılaştırılmalarının yapılması.
- Yüzey bilim ve teknolojisindeki yeni ürün ve teknolojilerin etkilerinin bulunması, tanımlanması ve tartışılması.
- Endüstriyel uygulamalar için umut verici fikirlerin değerlendirilmesi.
- Ortak sorun ve ilgi alanlarının ve tamamlayıcı bilgilerin paylaşılabileceği bir ortamın sağlanması.

Sempozyumun odak noktaları:

- Çevre dostu dönüşüm kaplamalar ve anodizasyon.
- Vakum kaplama teknikleri.
- Isıl püskürtme kaplama teknikleri.
- Elektrolitik, kimyasal ve sıcak daldırma kaplama teknikleri.
- Yüzey işlem teknolojilerinde kalite yönetimi, iş güvenliği ve çevresel sorunlar.

Sempozyuma yüzey işlemler alanında çalışan bilim adamları, araştırmacılar, üreticiler, tedarikçiler ve kullanıcılar davet edilmektedir. Sempozyum boyunca katılımcıların son yıllardaki teknoloji ve yenilikleri öğrenebilecekleri, sorun ve çözümlerini ifade edebilecekleri, paylaşacakları ve üzerinde tartışabilecekleri bir çok araç olacaktır (sunumlar, forumlar, kurslar ve sergiler).

1st INTERNATIONAL SURFACE TREATMENT SYMPOSIUM

The surface treatments of materials have become one of the leading research oriented, technology governing and interdisciplinary subjects for engineers. Converging crises in economics, emerging environmental, social and ethical issues make surface treatment processes more important than ever.
Two leading engineering chambers of Turkey are committed to a synergetic engagement to evaluate and promote Surface Treatments technologies with the contributions of engineers, scientist and manufacturers from all over the world. The main purpose of this symposium is to fulfill society requirements through applicable engineering practices structured with fundamental scientific and engineering knowledge.
The 1st International Surface Treatment Symposium will be jointly organized by UCTEA Chamber of Metallurgical Engineers and UCTEA Chamber of Chemical Engineers on 15 - 18 June 2011 at the Taşkışla Campus of Istanbul Technical University.

The goals of 1st International Surface Treatment Symposium are:

- to provide a forum with academia and industrial attendees for reporting the latest advances in concepts and methodologies,
- to introduce, evaluate and compare emerging concepts and technologies,
- to understand, identify and find the effect of new technologies and products in surface science and technology,
- to determine promising ideas for industrial applications,
- to provide an environment for sharing the complementary knowledge, problems, and interests.

The symposium will focus on:

- Environmentally friendly conversion coatings and anodization.
- Vacuum deposition techniques.
- Thermal spray coating techniques.
- Electrolytic, chemical and hot dip deposition techniques.
- Quality management, labor safety and environmental issues in surface treatment technologies.

The symposium welcomes scientists, researchers, manufacturers, vendors, and purchasers in the field of surface treatments to share their knowledge as well as their technologies and products with this community. There will be several tools (presentations, forums, courses and exhibition) throughout the symposium for attendees to express, share, learn and discuss recent technologies, innovations, complications and solutions.

KAPSAM // *Topics*

• Çevreye Duyarlı Dönüşüm Kaplamalar ve Anodizasyon İşlemleri

6 Değerlikli Kromla Yapılan Dönüşüm Kaplama İşlemlerinin Alternatifleri, Kromik Asit Anodizasyonuna Alternatifler, Sıcak Sülfürik ve Fosforik Asit Anodizasyonu, Mikro Ark Oksidasyonu

• Vakum Kaplama Teknikleri

Fiziksel Buhar Biriktirme , Kimyasal Buhar Biriktirme, Sert Kaplamalar, Dekoratif Kaplamalar, Otomotiv Endüstrisine Yönelik Kaplamalar, Elmas Benzeri Karbon Kaplamalar, Elmas Kaplamalar, Katı Yağlayıcılar, Nanokompozit Kaplamalar

• Isıl Püskürtme Teknikleri

Isıl Püskürtme, Plazma Püskürtme, HVOF, Patlamalı Tabanca, Isıl Yalıtım Kaplamaları, Aşınma ve Sürtünme Özelliklerini Geliştirmeye Yönelik Kaplamalar, Biyomalzemelere Yönelik Kaplamalar

• Elektrokimyasal, Kimyasal ve Sıcak Daldırma Kaplama İşlemleri

Elektrolitik Kaplamalar, Akımsız Kaplamalar, Sol-Jel Kaplamalar, Kompozit Kaplamalar, Ergimiş Tuz Elektrolizi, Fosfatlama, Hibrit Kaplama Yöntemleri, Nanobiyoteknolojide Kullanılan Kaplama Yöntem ve İşlemleri, Sıcak Daldırma Çinko, Aluminyum vb. Kaplamalar

• Yüzey İşlem Sektöründe Çevre ve İş Güvenliği

• Environment Sensitive Conversion Coatings and Anodization

Alternatives of 6 Valent Chromium Conversion Coatings and Chromic Acid Anodization, Hot Sulfuric Acid and Phosphoric Acid Anodization, Micro Arc Oxidation

• Vacum Coating Techniques

Physical Vapor Deposition, Chemical Vapor Deposition, Hard Coatings, Decorative Coatings, Coatings for Automotive Industry, Diamond Like Carbon Coatings, Diamond Coatings, Solid Lubricants, Nano Composite Coatings

• Thermal Spray Techniques

Thermal Spray, Plasma Spray, HVOF, Detonation Gun, Thermal Barrier Coatings, Coatings for Wear and Friction, Coatings for Biomaterials

• Electrochemical, Chemical and Hot Dip Coatings

Electrolytic Coatings, Electroless Coatings, Sol-Gel Coatings, Composite Coatings, Molten Salt Electrolysis, Phosphating, Hybrid Coating Techniques, CoatingTechniques and Treatments Used in Nano Biotechnology, Hot Dip Zinc, Aluminum etc. Coatings

• Environment and Labor Safety in Surface Treatment Sector

1st ISTS2011

1. ULUSLARARASI YÜZEY İŞLEMLERİ SEMPOZYUMU
1st INTERNATIONAL SURFACE TREATMENT SYMPOSIUM

ÖZEL DERS // *Tutorial*

Sempozyumda yer alacak özel ders başlık ve eğitimci isimleri aşağıdaki listede yer almaktadır.
Tutorials, topics and names of the tutors are listed below.

Özel Ders-1 / Tutorial-1: Prof. Dr. Ali Fuat ÇAKIR
Elektrolitik Metal Kaplamaların Prensipleri, Teknolojisi ve Kontrolü (Türkçe)
Electrolytic Metal Coatings: Principles, Technology and Control (in Turkish)
17 June / Haziran / 2011 Saat : 15.00 – 18.00

Özel Ders-2 / Tutorial-2 : Prof. Ivan PETROV
Sıçratma Yöntemi ile Biriktirmenin Temelleri : Mikro ve Nanoyapı Kontrolü (İngilizce)
Fundamentals of Sputter Deposition Techniques: Control of Micro-and Nanostructure (in English)
17 June / Haziran / 2011 Saat : 15.00 – 18.00

Özel Ders-3 / Tutorial-3 : Prof. Dr. Fatih ÜSTEL
Isıl Püskürtme Teknolojilerinin Tanıtımı ve Uygulamaları (Türkçe)
Introduction and Applications of Thermal Spray Technologies (in Turkish)
16 June / Haziran / 2011 Saat : 15.00 – 18.00

Özel Dersler 20 kişilik kontenjanla sınırlıdır ve eğitim ücreti 100 TL/kişi'dir. (Öğrenciler için 50 TL) Başvuru için koordinatörlükle iletişime geçiniz.
The tutorials are limited to 20 attendees and the fee per each tutorial is 100 TL per person (for students 50 TL). Contact symposium coordinator office.

ÖZEL OTURUM KONUŞMACILARI

Plenary Speakers

Ali Fuat ÇAKIR

After graduating from the Lycee de Galatasaray he received Masters and Dr. Eng. Sc. degrees from the İstanbul Technical University (ITU, 1962) and The Columbia University (1971) in New York, USA, respectively. He served also as preceptor at the later institution. He started again teaching at ITU in 1972.
He was co-founder of the Faculty of Metallurgy, founder and Chairman of the Electrometallurgy and Corrosion Chair. He served as Chair of the Metallurgy and Materials Engineering Department, Dean of the Faculty of Chemical and Metallurgical Engineering, University Senator and Interuniversity Board Member representing ITU. He retired in 2005.

His fields of interests are: corrosion and corrosion protection, surface treatment, electrolytic processes, physical vapor deposition, electro and hydrometallurgy, chemical characterisation and historical metallurgy.

In national and international journals or congresses he published or presented over 170 papers. He received Science Award of the Corrosion Association (Turkey, 1994), Kape Memorial Medal from the Institute of Metal Finishing (UK, 1998). He was elected to European Academy of Surface Technology (1989) and to Board of Administrators of European Federation of Corrosion (2010).

Sunulacak Bildiri Özeti // Abstract

Surface Treatment In Turkey

Surface and surface treatment. General view of the Turkish economy. The sectors where surface teatments are important. Turkish economy in 2023 and its sectors. Surface Treatments in Turkey. Structure of the sector and recommendations.

ÖZEL OTURUM KONUŞMACILARI

Plenary Speakers

Ali ERDEMİR

Dr. Ali Erdemir is a Distinguished Fellow of Argonne National Laboratory. He received his B.S. in Metallurgy from Istanbul Technical University in 1977; and his M.S. and Ph.D. degrees in Materials Science & Engineering from Georgia Tech in 1982 and 1986.

Dr. Erdemir's research interest includes surface engineering and tribology and super-hard and -low friction materials and coatings. In recognition of his innovative research, he has received several prestigious awards and honors, including four R&D-100 Awards, two Al Sonntag and an Edmond E. Bisson Awards from the Society of Tribologists and Lubrication Engineers, the Innovative Research Award of the Tribology Division of ASME. He is a Fellow of AVS, ASME, STLE, and ASM-International. He authored/co-authored more than 260 papers, 16 book/handbook chapters, edited two books, and holds 15 U.S. Patents.

Sunulacak Bildiri Özeti // Abstract

Advances in Surface Engineering for Demanding Tribological Applications: From Super-Hard & Low-Friction Coatings to Super-Fast Surface Treatments

In recent years, there has been considerable interest in the development and diverse utilization of novel surface treatments and coatings that can further enhance tribological performance, efficiency and reliability of moving mechanical assemblies in transportation and manufacturing systems.

Among others, the development of super-hard and low-friction coatings has attracted the most attention because of their unique abilities to provide much superior property and performance improvements under severe operating conditions.

Most of these novel coatings consist of unique chemical and structural architectures and can only be achieved by the use of advanced arc and magnetron sputtering processes equipped with very robust power sources like HiPIMS, pulsed DC and cathodic arc.

The primary focus of this talk will be on the chemical and structural design of new classes of nanocomposite coatings for advanced transportation applications where higher efficiency, lower emissions, and longer durability are urgently

needed. For the structural and chemical design of such coatings, we will introduce a crystal-chemical model that can be very useful in the selection of coating ingredients which appear to be essential for their superior friction, wear, and scuff properties under lubricated conditions. Recent results are presented to demonstrate the superior tribological properties for these designer coatings over a broad range of sliding conditions.

Tribological properties of engineering materials can also be improved by a variety of well-established surface treatments like nitriding, carburizing, and boriding which are used extensively by industry in all types of engineering components despite being very time and energy consuming.

A novel super-fast surface treatment method: ultra-fast boriding will also be introduced and the initial test results from a variety of borided materials will be presented. The talk will be concluded with a future outlook for both the super-hard coating and super-fast surface treatment technologies.

DAVETLİ KONUŞMACILAR

Invited Talks

Imre BAKONYI

Dr. Imre Bakonyi is currently working at Research Institute for Solid State Physics and Optics, Hungarian Academy of Sciences as Head of Materials Research Department since 1995 and also as scientific advisor since 2007. He received MSc and PhD degrees in physics from Eötvös University of Budapest.

Dr. Bakonyi is a member of Hungarian Academy of Science since 1991. His research interests include preparation, thermal stability, atomic and electronic structure, electrical transport and magnetic properties of amorphous, nanocrystalline, multilayered and other metastable metallic phases, and metal hydrides.

His current focus of research is giant magnetoresistance (GMR) in electrodeposited multilayers. In recognition of his research activities, he has received several Awards and Honours, including Annual Resarch Award (CRIP, 1976), Zoltán Gyulai Award (R. Eötvös Physical Society, 1989), Jánossy Award (CRIP, 1989), Annual Research Award (RISSPO, 1990) and Annual Publication Award (RISSPO, 2003, 2006). He authored/ co-authored more than 176 papers (142 in peer-reviewed international journals including 1 extended review in Progr. Mater. Sci., 34 in conference proceedings, 2 book chapters).

He has given several invited talks at international conferences, and holds 1 patent. He acted as co-editor of conference proceedings; member of organizing committee of several international conferences and organized 2 international workshops.

Sunulacak Bildiri Özeti // Abstract

Electrodeposition of Multilayered Film Coatings

Electrodeposition is an important technique for producing coatings on various metallic surfaces. In order to achieve an improvement over the properties of d.c.-plated deposits consisting of a pure metal or an alloy, various approaches have been applied. These include (i) pulse-plating or pulse-reverse plating leading to a deposit grain refinement with a unifrom surface coverage, (ii) d.c. or pulsed electrodeposition from a bath containing colloidal particles, resulting in a nanocomposite deposit and (iii) the use of two-pulse plating from a single bath containing at least two species of metallic ions which offers the possibility of the formation of a multilayered deposit.

An appropriate choice of the elemental combination in the layered deposit can provide an enhancement of the mechanical properties and corrosion protection or may also yield unusual behaviour not observed in homogeneous deposit layers. An example for the former can be the application of Pd/Ni multilayers instead of a Pd-Ni alloy layer whereby the individual layers withheld the advantageous properties of the two metals (still with a significant reduction of the amount of the precious metal Pd). For the second case, we might mention magnetic-non-magnetic multilayers (such as Co/Cu) which, due to the alternation of magnetic and non-magnetic layers at the nanoscale, can give rise to the giant magnetoresistance (GMR) effect.

In an attempt to improve the GMR effect in electrodeposited magnetic/non-magnetic multilayers, in the last two decades we made an extended study on the formation of multilayers by electrodeposition. Due to the prospective attractive features of nanoscale multilayered coatings in various fields, it might be useful to summarize the experience on the electrochemical formation of multilayered coatings which was obtained during these studies. The peculiar blend of these investigations was that, due to the extreme sensitivity of the GMR effect, numerous fine details of the layer formation processes could be revealed that may be relevant for the preparation of many other multilayered coatings by electrodeposition and can be useful not only for the case of magnetic/non-magnetic systems.

The aim of the present talk is to give an overview on our current understanding about multilayer formation by electrodeposition.

In particular, we intend to discuss the consequences of different galvanostatic and potentiostatic pulse combinations in multilayer formation and the role of the so-called exchange reaction arising due to the electrochemical differences of layer consituent elements in chemical intermixing at the interfaces, in layer thickness changes and in layer thickness fluctuations. It will be pointed out that although the exchange reaction in general has a deleterious effect on the layer structure in some aspects, a fairly good layered structure can still be formed even if a strong exchange reaction is allowed to take place.

On the other hand, although we have elaborated a method to eliminate the exchange reaction, even in such cases the asymmetry of the mutual nucleation of the individual layer constituents on each other, arising unavoidably, e.g, due to atomic size and surface energy differences, may result in an incomplete layer formation for very thin individual layer thicknesses. These structural features will be exemplified by using specific results on the magnetic and magnetoresistance behaviour as well as on the microstructure of the multilayers.

A detailed account of this research activity has been given in a recent review [1].

[1] I. Bakonyi and L. Péter: Electrodeposited multilayer films with giant magnetoresistance (GMR): progress and problems. Progr. Mater. Sci. 55, 107-245 (2010)

DAVETLİ KONUŞMACILAR

Invited Talks

P. Luigi CAVALLOTTI

Pietro Luigi Cavalotti is a full professor at Politechnico Milano, Department of Chemistry , Materials and Chemical Engineering since 1983. He graduated from Industrial Chemical Engineering at Politecnico Milano with honours in May 1963 and received associate professor degree in 1968.

Prof. Cavalotti, is the Vice Dean of the Engineering faculty of Milano Politechnico since 2001 and also coordinator of PhD courses in Materials Engineering since 2007. His main research activities include Metal structures and electrokinetics of electrochemical deposition, Autocatalytic chemical deposition ACD (electroless) of NiP and CoP, Alloy and composite electrodeposition, Magnetic thin and thick layers , Gold electrodeposition.

He is the president of POLIEFUN (a society supporting Surface Technology studies), European Academy Surface Technologies (EAST), Italian Metal Finishing Society (AIFM), International Union of Surface Finishing, and the Italian Representative in International Union of Surface Finishing and Coordinator and partner of Brite Euram programmes, and Italian Ministry researches.

In recognition of his contributions to surface finishing research and development he recieved several honors and awards including Montecatini Gold Medal for results of studies in Chemical Engineering (1963), O.De Nora prize for degree thesis on Cobalt Electrodeposition (1964), C.Ferrari prize for researches in Powder Metallurgy (1971), Silver Medal Plating and Surface Finishing (1989), International Prize "Palermo per l'Europa" for Science (1989), IBM Italy Acknowledgement for patents and collaboration(1998), Johnson Matthey Silver Medal IMF (2001), International Copper Medal AIM (2002) DGO Award for international cooperation (2005), Distinguished Service Award (Gold prize) Korean Institute Surf. Engineering (2007),Certificate of Excellence Int. Conf. Corrosion & Modern Tech. In Military Bucharest (2007), Hothersall Award and Medal of Institute Metal Finishing (2009). Prof. Cavalotti, authored and co-authored over 100 publications and gave plenary and invited talks at numerous international conferences.

Sunulacak Bildiri Özeti // Abstract

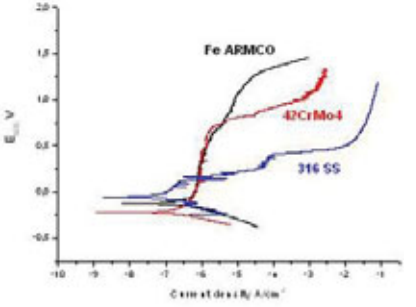
Nitroxidation and Galvanic Treatments of Steel: A Synergy Towards Possible Replacement of Stainless Steel

Many researchers are trying to substitute austenitic stainless steel for mechanical applications, for instance for oil or hydraulic valves, where high corrosion and wear resistance are fundamental. The problem of austenitic stainless steel regards its limited mechanical resistance and its increasing cost.

An interesting surface treatment for plain or hardened and tempered steels, to improve their wear and corrosion resistance, consists in a nitriding or nitrocarburizing treatment followed by thermal oxidation in an atmosphere containing water or nitrogen dioxide.

We will present some results obtained on steels (Armco Iron or 42 Cr Mo 4) nitrided in a furnace with ammonia at 520°C (1.5h) or 550°C (4h) and oxidized with H2O at 510-520°C (1h). Nitriding was made trying to obtain a white layer containing 'Fe4N and Fe2-3N of limited thickness. By oxidizing it was important to obtain magnetite as a final layer, without red hematite formation. The figure below was obtained by linear voltammetric runs, in a synthetic salt water solution (aerated NaCl 35g/l, room T, 1mV/s), starting from a cathodic potential. It shows that the nitrided and oxidized steels have an anodic behaviour which can be easily compared with austenitic stainless steel.

The corrosion and passivation current densities are quite comparable, while the breakdown potential is much higher (with less pitting action). The surface hardness obtained after the treatment ranges between 350 and 450 HV, much higher than the 140 HV value for austenitic stainless steel. Another interesting surface treatment was realized by plating a micro-cracked chromium layer 14 m thick on the nitrided steels. The Cr layer was then nitrided at 700°C, forming a 2 m thick Cr2N layer, and oxidized at 520°C with formation of an external Cr2O3+Cr2N layer. Hardness value becomes very high, as well as oxidation resistance of the surface.



Linear voltammetry curves obtained in a synthetic aerated salt water solution on ARMCO iron and Hardened and tempered steel, nitrided and oxidized, compared with stainless steel curve.

DAVETLİ KONUŞMACILAR

Invited Talks

Jean-Pierre CELIS

Dr. Jean Pierre Celis is working as full professor in Katholieke Universiteit Leuven (KULeuven), Department of Metallurgy and Materials Engineering (MTM since 1995. He received his MSc and Ph.D. degrees in Metallurgical Engineering from Katholieke University Leuven. He is the Head of Materials Engineering Chemical Division, KU.Leuven, Scientific co-ordinator of research group on Surface Engineering and Tribology, KU.Leuven and Board Member and Director R&D of spin-off company FALEX TRIBOLOGY N.V.

Prof. Celis is also the coordinator of applied research projects funded by Belgian and European industrial companies and institutions on surface modification of materials, friction and wear, tribocorrosion, and material selection and degradation. His main reseach activies includes, surface modification of materials and characterization of surface layers, electrochemical characterization of anodic and cathodic processes, tribology and tribocorrosion of advanced materials and surface modified materials, Adhesion in coated systems and in tribology. He is the referee for international scientific journals like J. Electrochem. Soc, Thin Solid Films, Wear, Surface and Coatings Technology, Tribology Letters and member of the editorial board of "Industrial Lubrication and Tribology" and "International Journal of Surface Science and Engineering". In recognition of his contributions to surface finishing research and development actitivies he has received many awards and honours including Brandsmaprijs (Nl, 1986), Fellow of The Institute of Metal Finishing (UK, 1990),Officier in de Orde van Leopold II (B, 25/1/94), Abner Brenner Award (Silver Medal) outstanding paper in Plating & Surface Finishing (USA, 2000), Doctor Honoris Causa, Dunarea de Jos University of Galati (Romania, 2010). Prof. Celis is the member Institute Metal Finishing (UK), Société Française du Vide (F), Société de Tribologie (F) and CEFRACOR– Commission Tribocorrosion (F), corresponding member for Belgium in the International Tribology Council, and Belgian representative in COST 532 (Wear of engineering materials), COST 533 (Biotribology), and COST 904 (Catalytic Intermetallics), Belgian representative in EUREKA-ENIWEP Umbrella, and Founder & chairman of Working Party (WP18) on Tribocorrosion, European Federation of Corrosion (EFC). He authored/co-authored over 450 publications and gave plenary and invited talks in many international conferences and meetings.

Sunulacak Bildiri Özeti // Abstract

Plasma Sprayed Wear Resistant Nanostructured Coatings

Nanostructured materials and coatings have been the subject of significant research and development efforts over the past decades due to their superior physical and mechanical characteristics over conventional crystalline materials. It has been observed that nanocrystalline coatings can exhibit an increased hardness, a high mechanical strength, an enhanced corrosion and oxidation resistance, and/or an improved friction and wear behavior.

Up to now, several techniques have been used for the development of such coatings. However, very little is actually already known about the deposition and growth of nanostructured coatings by thermal spraying techniques. In this presentation, first an overview is given on the backgrounds of nanostructured materials.

Then the state-of-the-art on nanostructured coatings deposited by Atmospheric Plasma Spraying (APS), High Velocity Oxygen Fuel Thermal Spraying (HVOF), Laser assisted Spraying, or Supersonic Plasma Spraying (SPS) deposition techniques, is presented. The effect of deposition parameters and chemical composition on microstructure, nanohardness, and tribological properties of these coatings is reviewed. These researches reveal clearly that a strong correlation exists between the deposition process parameters, the microstructure, and the sliding wear resistance of nanostructured coatings.

DAVETLİ KONUŞMACILAR

Invited Talks

Hüseyin ÇİMENOĞLU

Prof. Dr. Hüseyin Çimenoğlu is a Professor at Istanbul Technical University, Department of Metallurgical and Materials Engineering.

He received his BSc in Mechanical Engineering from Yıldız Technical University in 1981 and his M.Sc and Ph. D from Istanbul Technical University in 1984 and 1989. His research interests include welding, physical and mechanical metallurgy, biomaterials, surface treatment of metals and alloys, and tribology.

Dr. Çimenoğlu is in editorial board of Advances in Tribology and Open Mechanical Engineering journals. He acted as referee in many international journals, and research projects and led and took part in many industrial projects. Prof. Çimenoğlu authored / co-authored more than 75 publications, gave invited talks in international conferences.

Sunulacak Bildiri Özeti // Abstract

Surface Modification of Metallic Biomaterials

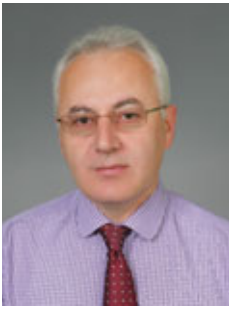
Load bearing orthopedic implants such as hip and knee prosthesis are desired to serve more than 15 years after implantation. Surface characteristics play crucial role on the longevity and the clinical success of implants.

On the other hand, early failures have been reported owing to the rapid surface degradation caused by combined effects of corrosion, wear, fatigue and tissue reactions.

In this presentation results of the researches conducted on metallic biomaterials at ITU Metallurgy and Materials Engineering Department with the aim of surface modification will be summarized. As the surface modification techniques diffusion, sol-gel and micro-arc oxidation processes will be focused.

DAVETLİ KONUŞMACILAR

Invited Talks



İhsan EFEOĞLU

Prof. Dr. Ihsan Efeoglu received his B.S. and MSc degrees from Gazi University, Ankara in 1979 and 1984, respectively. He was awarded with PhD degree from the Mechanical Engineering Department of Salford University, England in 1993. Since 1983 he is a faculty member of Erzurum Atatürk University, Department of Mechanical Engineering where he served also as Chairmen. He was Vice Dean of the Engineering Faculty and founding member of Ata Teknokent A.Ş. He established Surface Technologies Laboratories in 1997 where plasma- vacuum technologies are extensively used.

His research interests cover the fields of materials science and nanotechnology, surface technologies, tribology, defense technologies, and thin film characterization. Prof. Efeoglu was guest lecturer at the University of Salford, England, Technical University of Norway da Trodheim, and Lulea Technical University . He is a member of NATO Research & Technology Agency-SCI-186. He published 37 papers in refereed international journals, presented 46 papers at international conferences and 20 papers at national conferences.

Sunulacak Bildiri Özeti // Abstract

Studies on Coating Process of Solid Lubricants: Growth and Characterization of MoS_2(Ti/Nb) Coatings

A solid lubricant is “any material used as powder or a thin film on a surface to provide protection from damage during relative movement and to reduce friction and wear.” Some lamellar solids as a solid lubricants crystallize with a layered structure in which interatomic bonding between the layers is weaker that within them.

The lamellar structure with easy shear occuring between basal planes. The most comman dry solid lubricants are graphite, MoS_2, WS_2 and PTFE, among which, the most widely used lamellar compound solid lubricant is MoS_2 with hegzagonal crystal layer structure. MoS_2 continues to atract attention due to its low friction coefficient. MoS2 films have been used for space applications. In addition, MoS_2 solid lubrication films will have many non-space applications.

It has been observed that excellent lubricant property is shown when MoS_2 composite films grown by sputtering are used in dry air, inert gas or vacuum

environments. However, MoS_2 oxidizes easly in humid environments. Many studies have realed that the oxidation resistance and endurance of MoS_2 films in atmospheric conditions increase with addition of metals.

Composite structured hardened-solid lubricant films were deposited onto differant steels (M2, D2,52100, 440C, 4140, 304) by co-sputtering from MoS_2 and Ti/Nb targets using closed-field unbalanced magnetron sputtering process.

(CFUBMS). The microstructural, mechanical and tribological properties of MoS_2-Ti/Nb coatings were investigated. The composition and morphology of the films were investigated using X-ray diffraction and scanning electron microscopy, and their mechanical properties were characterised by Revetest-scratch tester and microhardness measurements. The tribological properties were established by pin-on-disc testing against hemispherical tungsten carbide pins.

In CFUBMS setting, sputtering process is controlled via using pulsed-dc and biased-dc applying to the substrates. Intense researches are conducted which focus on nano-composite structure, long wear life, and stable friction coefficient under atmospheric conditions. The results of the studies on Ti and Nb doped MoS_2 is a indicator of the fact that with applying pulsed-dc to the base matarial, the performances of the coatings films were raised with respect to their structural, mechanical and tribological properties.

DAVETLİ KONUŞMACILAR

Invited Talks

David GABE

Prof. David Gabe is currently working as Professor Emeritus at Loughborough University. He has received his BSc and PhD degrees from Sheffield and Cardiff Universities. After working with Steel Company of Wales (tinplate research) and as lecturer at Sheffield University, he joined Loughborough University in 1974.

He is the Former President of the Institute of Metal Finishing, UK and President of the IUSF and the founder member of EAST representing UK since 1989. His research activities include surface finishing processes especially electrodeposition and alloy process formulation and the use of agitation for high speed deposition processes.

In recognition of his contributions to surface finishing research and development actitivies, he has received the Gold Medal of the Institute of Metal Finishing and the Scientific Achievement Award of the American Electroplating Society. He authored/co-authored more than 300 hundred publications and gave plenary and invited talks at numerous international conferences.

Sunulacak Bildiri Özeti // Abstract

Agitation for Aqueous Surface Finishing Processes: From Air to Eductors

Air agitation has been the standard method of mixing or stirring electroplating solutions for over 150 years because it is cheap and simple. While other methods have been used – cathode reciprocation, rotational stirring, vibratory agitation, solution flow, jetting etc – they have tended to have niche applications.

It is useful, in fact, to discriminate between solution mixing and solution/cathode diffusion layer disruption, the latter being desirable for process operation and is therefore true agitation in the context of high speed electrodeposition.

Air suffers from three main disadvantages. It has a chemical oxidative action towards solution constituents, it is resistive when present as a cloud or foam of bubbles, and the general plating rate enhancement is modest. It also generates environmental pollution through its promotion of fume which carries solution chemicals into the atmosphere.

Eductors are jets based on the Venturi Principle, whereby 1 vol. is pumped and up to 4 vols. are drawn-in by the pressure drop, making it a highly efficient jetting

system. When fully submerged no air is entrained. Such eductors are marketed by several manufacturers and the design is based on that of ISO 4006 and 5167.

With the advent of eductors it is possible to overcome many of the disadvantages of air which were cited. Furthermore, it is applicable also to other metal finishing unit processes such as anodizing, cleaning, pickling and rinsing.

The lecture will address the characteristics of eductor agitation and their advantages and optimisation.

DAVETLİ KONUŞMACILAR

Invited Talks

Amine KHALIL

Amine Khalil is a Senior Fellow Scientist and the Manager of the Advanced Lithium Battery Technology group at Argonne National Laboratory, where he is responsible for directing the research and development of advanced materials and battery systems for HEV, PHEV, EV, satellite, military and medical applications. Dr. Amine currently serves as an Advisor to the U.S. National Research Consul on battery related technologies. He is the lead organizer and chair of the International Conference on Advanced Lithium Batteries for Automotive Applications.

Among his many awards, Dr. Amine is a 2003 recipient of Scientific America's Top 50 Worldwide scientist Award, a 2009 recipient of the US Federal Laboratory Award for Excellence in Technology Transfer, and is the three-time recipient of the R&D 100 Award. He was recently awarded the ECS battery Technology award and the International Battery Association award in 2010.

He holds or has filed over 120 patents, patent applications and inventions and has over 254 publications. From 1998-2008, Dr. Amine was the most cited scientist in the world in the field battery technology.

Sunulacak Bildiri Özeti // Abstract

Surface Modifications of Electrode Materials to Improve Life and Safety of Lithium Batteries for Automotive Applications

In its goal of developing more fuel efficient vehicles, the US Department of Energy in collaboration with the United State Battery Consortium (USABC) are focusing on high energy lithium-ion batteries to meet the energy storage requirements for PHEV and EV applications.

Under these auspices, Argonne National Laboratory is developing advanced high energy and high voltage cathode materials that has the potential meeting the energy requirement for PHEV 40 miles and EVs. To achieve the 15 year calendar life and improve the safety of lithium batteries, Argonne is exploring surface modification of both the cathode and anode to eliminate the surface reactivity between the charged electrodes and the electrolyte.

This is done by either nano-coating of the active particles with stable AlF_3, ZrO_2 and others using different processes such as co-precipitation or atomic layer deposition. Another approach is to form a stable coating at the electrode surface using functional electrolyte additives.

These additives polymerize or either reduce or oxidize at the surface of electrodes and form a very stable passivation film that suppress the reactivity at the interface between the electrode and the electrolyte.

DAVETLİ KONUŞMACILAR

Invited Talks

Sik-Chol KWON

Dr. Kwon is Principal Project Leader at Surface Engineering Department of Korea Institute of Materials Science (KIMS) and also Director of National Research Lab-Hex Cr Replacement. Dr. Kwon has obtained his BA degree in metallurgical engineering from Yonsei University, Seoul, Korea.

He received his MS and Ph.D. degrees from the Materials Science Engineering of the specialized graduate school of the Korea Advanced Institute of Science. After accomplishing his PhD he joined Korean Government-run research Institute of Korea Institute of Machinery and Materials(KIMM) as a laboratory head and established Surface Treatment Laboratory based on electrochemical process in the Institute. In 1983, he successfuly established "Surface Treatment Center" in Korea through a UNIDO/UNDP sponsored project.

He has planned and managed various research and development projects related to improve domestic industrial surface technology. The research areas involve both applied manufacturing technologies and fundamentals, covering hard chromium electroplating, hard anodizing of aluminum, electroforming of Cu foil for PCB and of Ni for mesh, and Pb-Sn-Cu alloy plating. In addition to the above wet process, he expanded his research arena to dry process such as CVD and PVD under the UNIDO/UNDP supported project.

He has experienced TiN, CrN, DLC coatings by PECVD, Reactive Sputtering and Ion Plating for decorative as well as engineering application. He contributed to Korean heat-treating industries by disseminating the plasma-aided process of Ion-Nitriding and Carburizing. Since 1983, he has served on several advisory committees for planning, coordinating and judging the national engineering projects of Ministry of Trade, Industry and Energy (MOTIE), and Ministry of Science and Technology (MOST). Dr. Kwon has extensive collaboration links with colleagues from universities, national research laboratories, domestic surface treatment industries, and even foreign researchers and engineers.

He has been author or co-author of 111 papers in scientific and technological conferences and 66 papers in journals in English, and filed 30 patents. He is now the vice-president of IUSF (International Union for Surface Finishing and serving as secretary of ISO/TC107/ SC3 since 2006.

Sunulacak Bildiri Özeti // Abstract

Plasma Surface Engineering in Korea

Surface engineering in Korea based on plasma technology has been industrially adapted in surface finishing industry as well as in heat-treating industry since late 1970's.

Dry plating termed as a new surface finishing process has become popular in surface finishing industry beginning from late 1980s as an alternative to traditional wet plating. Ion plating of TiN had pioneered a key industrial process, which had shown its gold color as a decorative coating as well an excellent wear resistant coating for tool and die.

The same approach has been made by domestic heat-treating industry which adapted a plasma-nitriding process as a substitute for a liquid nitriding process using hazard cyanide salts. With increasing health, safety and environmental (EHS) concerns in the industry, ion plating as well as plasma-based technology such as plasma nitriding has been widely used in surface hardening of steel in tool and mold industry as a replacement for hexavalent-based chromium plating as well as a substitute for a salt bath nitriding process.

The presentation will cover the historical progress of domestic surface technology related with an industrial development in surface finishing industry as well as in heat treating industry in Korea.

The statistics on surface engineering will give a new perspective on the development of advanced processes in view of mass productivity. In addition, spray coatings will be covered here as a part of domestic surface engineering industry as well. The new emerging issues to domestic surface engineer industry will be suggested to be solved for the extensive application of advanced process as well as its future development.

DAVETLİ KONUŞMACILAR

Invited Talks

Christian MITTERER

Dr. Christian Mitterer is currently working at Montanuniversität Leoben, Department of Physical Metallurgy and Materials Testing (MUL-MW) and also serving as Vice-Head of the Department. Besides being the Key Researcher of Materials Center Leoben, he is also leading the Christian Doppler Laboratory for Advanced Hard Coatings, MUL-MW, and also the NanoSurfaceEngineering Center, MUL. He received his M.Sc. and Ph.D. degrees in Materials Science & Engineering from Montan University Leoben-Austria. Prof. Mitterer's research interest includes surface engineering, hard coatings, tribology and thermal stability of hard coatings.

In recognition of his successful research activities he has received several prestigious awards and honours, including Eduard Wallnofer, Josef Krainer, Honorary Viking in Tribology, Erich Schmid, Hans Malzacher, Herbert Depisch awards and recently research award for Nanoscience and Nanotechnology of the Country of Styria for research in the field of nanostructured multifunctional coatings.

He authored/co-authored more than 170 papers in reviewed journals, 90 papers in proceedings and other journals, 1 book, edited 7 conference proceedings, and holds 5 patents and gave more than 60 invited lectures.

Sunulacak Bildiri Özeti // Abstract

Self-Adaptive Lubrication Mechanisms in Hard Coatings for Different Temperature Regimes

Transition metal nitride based hard coatings deposited by plasma-assisted vapor deposition are widely used to reduce friction and wear of tools and engineering components. Application temperatures may be extremely different ranging from low temperatures for automotive components to above 1000°C for dry-cutting tools. To avoid excessive frictional heat, coatings with self-lubricious properties have to be developed for the individual application conditions.

Self-lubrication can be achieved by the in-situ formation of easily shearable tribo-layers on the coating surface in a sliding contact, to accommodate the velocity difference. $TiC_{1-x}N_x$ hard coatings have been studied as a model system because

they present a time-dependent tribological behavior with an initial running-in period marked by an elevated friction coefficient, followed by a steady-state regime with low-friction and wear at room temperature in ambient air. Tribological tests performed at different relative humidity levels reveal that a minimum value between 15 and 25 % is needed to trigger the low-friction regime.

By in-situ observations of tribo-layer film growth it could be observed that third body material is formed during this running-in period by plowing of the coating and shearing of the removed material. The appearance and thickening of the transfer film marks the beginning of the steady-state low-friction regime. At this stage in the tribological test, Raman spectra indicate the presence of C–H bonds in the wear track, being responsible for interfacial sliding and thus friction reduction.

Since humidity-based lubrication mechanisms fail at elevated temperatures, the so-called Magnéli phase oxides have been studied as potential candidates for self-lubricious tribo-layers effective at high-temperatures. Among these Magnéli phase oxides, V_2O_5 formed in-situ by segregation and oxidation of V in elevated-temperature sliding contacts has been studied intensively for friction reduction due its low melting point of about 650°C, thus acting as low-melting oxide tribo-layer film on the V-depleted coating.

Melting of V_2O_5 is an endothermic reaction, and thus reduces the local temperature occurring in hot spots of the sliding contact. This high-temperature lubrication and heat reduction mechanism is demonstrated for V-alloyed $Ti_{1-x}Al_xN$ and $Cr_{1-x}Al_xN$ coatings.

DAVETLİ KONUŞMACILAR

Invited Talks

Macit ÖZENBAŞ

Dr. Macit Özenbaş is currently working as full-time Professor at Middle East Technical University (METU), Department of Metallurgical and Materials Engineering. He received his BSc, MSc and PhD from the same University. Dr. Özenbaş served as Vice Department Chair of METU, Metallurgical and Materials Engineering Department (1982-1985), Head of TUBITAK SEKOM (Ceramic and Composite Materials) (1992-1995) and coordinator of Micro and Nanotechnology Graduate Program (2005-2008). His research interests include nanostructured materials, magnetic nanoparticles and thin films, production of thin films with sol-gel techniques, ferrolelectric, piezoelectric and dielectric thin films, wear resistant boron containing coatings.

Prof. Özenbaş received the Outstanding Teaching award from METU in 1999. He has actively participated in organizing several national and international conferences, symposium and meetings. He authored and co-authored over 70 publications and gave several invited talks in national and international meetings, he is the associate editor of Journal of Nanoscience and Nanotechnology.

Sunulacak Bildiri Özeti // Abstract

Production of Sub-Micron Patterned Piezoelectric/Ferroelectric Thin Films for Sensor Applications

Ferroelectric ceramic thin films are non-metallic solid thin films that possess spontaneous polarization which can be reversed by an external electric field. Due to these unique properties, ferroelectric materials are used as capacitors, piezoelectric materials (transducers), pyroelectric detectors, electro-optic materials, thermistors and dielectrics. Several companies are already marketing ferroelectric memory devices on silicon. These memories offer numerous advantages over existing technology due to their radiation hardness, completely nonvolatile random access memory capabilities (no power is required to maintain memory), extremely high switching speeds compared to silicon based memories, and operating voltages easily within the range of conventional integrated circuit technology.

Recently, ferroelectric thin films are receiving an increasing interest in the field of microelectro-mechanical systems (MEMS) and nanoelectro-mechanical systems (NEMS). The ability to create sub-micron sized patterned ceramic thin

films is highly desirable in the fabrication of micro and nano-mechanical systems and sensing devices such as bio and chemical sensors. The growing interest in fabricating patterned homogeneous thin films on the mesoscale has resulted in a number of new methods. In this work, a simple and novel micropatterning method to pattern PZT (lead zirconate titanate – Pb(Zr,Ti)O3) ceramic thin films with nanoscale features on different substrates was developed economically.

Conventional technology used in the production of piezoelectric/ferroelectric patterned thin films requires the use of electron and/or ion beams to produce patterned structures using the films coated on suitable substrates. However, micropatterning technique is a quick and inexpensive procedure that permits the creation of patterned sub-micron and nanoscale features without the stringent requirements of a clean room.

Crack-free patterned films were easiest to achieve on platinum coated silicon wafers and stainless steel substrates by using a master on silicon. This master is then used to fabricate the elastomeric, polydimethylsiloxane (PDMS), mold which is placed down on the substrate and the recessed microchannels are used to wick the liquid PZT precursor solution to create the pattern.

Some patterns produced by using this technique are given in Figure 1. TEM images of PZT structures prepared for sensor applications are shown in Figure 2. In order to demonstrate the processibility of PZT patterns to be used in biological sensing applications, the underlying substrates were etched anisotropically and tips of the PZT patterns were liberated from the underlying silicon substrates by more than 10 mm. The unique geometry also provides an opportunity to study the confined one-dimensional grain growth of nanostructured materials within a matrix.

DAVETLİ KONUŞMACILAR

Invited Talks

Ivan PETROV

Ivan Petrov is a Professor of Materials Science at the University of Illinois and has appointments as Professor of Physics at Linköping University, Sweden and as Visiting Professor of Surface Engineering at Sheffield Hallam University. Ivan earned his Ph.D. in Physics from the Bulgarian Academy of Sciences and received a Doctor Honoris Causa Degree from Linköping University in 2009. His research interests include surface engineering, nanostructural and nanochemical analyses, thin film physics, and surface science.

Ivan conducted the first systematic study of the effects of ion/metal flux ratio and ion energy on microstructure evolution in hard coatings, employing a combination of analytical techniques.

He was a co-principal investigator in the Transmission Electron Aberration-corrected Microscope (TEAM) project which achieved 50 pm resolution. He has published 220 papers and presented 100 invited and plenary lectures. Ivan is an Editor of the Elsevier journal *Surface and Coatings Technology.*

Ivan is a Fellow of the AVS and received the 2009 Bunshah Award and Honorary Lecture from the Advanced Surface Engineering Division (ASED) "for seminal contributions describing the role of low-energy ion-irradiation and atomistic surface diffusion processes on microstructure and texture evolution during transition metal nitride layer growth". He also received the 2009 R&D100 award as a co-inventor of the TEAM electron microscopy stage and the 1996 DOE award for Sustained Outstanding Research.

Sunulacak Bildiri Özeti // Abstract

Recent Advances in Surface Engineering

Surface engineering encompasses the materials science and technology to modify and improve the surface properties of materials for protection in demanding contact conditions or aggressive environments as well as to engineer different surface functionality: electrical, optical, thermal, mechanical, chemical and biochemical.

Surface treatments can range from the nanometer to millimeter length scales and may involve hybrid technology for substrate modification and coatings deposition to manufacture graded layers to achieve multifunctional effect.

The lecture will review active areas of scientific and engineering interest which span from atomistic studies with in-situ dynamic probes and first-principle calculations, to modeling, in-situ diagnostics and scale-up of synthesis processes, to nanostructure and nanochemistry analysis, to advanced techniques for properties measurement and performance evaluation and monitoring. Recent advances will be exemplified with numerous specific examples.

DAVETLİ KONUŞMACILAR

Invited Talks

Yılmaz TAPTIK

Prof. Dr. Yılmaz Taptık was born in Ankara, in1954. He graduated from İstanbul Technical University Metallurgical and Materials Engineering Department in 1978. He received his masters and Ph.D. degrees from the same the same university.

In 1986, he worked on non destructive testing methods in Austria Leoben University and between 1986 and 1989 he conducted a research on quality tools and techniques in Berlin BAM. He became Full Professor in 1996.

Presently he is working as a full professor at the İstanbul Technical University. He has published or presented more than 100 papers/proceedings at various national and international journals or congresses. He has been advisor to more than 50 masters thesis and 6 PhD dissertations.

Prof. Dr. Yılmaz Taptık has been a department chair in between 2007-2010. He is now Student Dean at the İstanbul Technical University.

Sunulacak Bildiri Özeti // Abstract

TQM and Design of Experiments: A Safe Way of Continious Improvements for Surface and Coatings Techologies

Continuous improvement approach is the most important part of quality philosophy as well as TQM which began with the assurance of product and process quality and nowadays the idea of continuous improvement has become a part of our lives.

Demands on surface treatments' processes as far as functional coatings are concerned, have been increased due to changes engineering requirements on functionalities such as wear resistance, corrosion production, wear resistance, decorations etc. Since, materials structure and final properties are directly related with the quality of surface treatments, it forces us to see the surface treatments to be a main process rather than intermediate one.

To deliver desired surface characteristics and functional properties in other words to provide quality products continuously and to develop these characteristics and properties in time is the preliminary request of worldwide markets. In order to reach these goals, design of experiment approach is one of the important tools for researcher. For last two decades, with using DoE approach fast and affordable R&D projects have been managed. DoE tools have also been utilized to improve product and process properties in a safe and a productive way.

DAVETLİ KONUŞMACILAR

Invited Talks

Servet TİMUR

Servet TIMUR, was born in 1965 at Şanlıurfa, Turkey. He has completed his PhD in Bergakademie Freiberg Technical University. He has been working as a Full Professor since 2005 at The İstanbul Technical University of the Department of Metallurgy and Materials Engineering. Prof. Dr. Timur has 75 national and international publications and/or presentations. His areas of research are Electrometallurgy, Molten Salt Electrolysis, Application of Non-Ferrous Processes, Precious Metals Processes, Production of Nano-Materials and Recovery and Recycle of Metallurgical Wastes. He has been the Vice Dean of Faculty of Chemical and Metallurgical Engineering in ITU since 2006.

Sunulacak Bildiri Özeti // Abstract

Production of Transition Metal Borides by Molten Salt Electrolysis

The demand of advanced new materials in industrial applications and the seeking of more efficient processes with lower energy consumption have triggered the researches in the field of alternative material developments and new production techniques.

With recent advances in metallurgical and manufacturing sectors, borided machine parts are becoming increasingly more cost competitive and acceptable for certain applications in automotive field, armor materials, foundry or refractory applications, textile, cutting tool, and etc. due to their high hardness values and excellent wear and corrosion.

Transition metal borides, an important class of advanced structural ceramic materials, are candidate materials for various high temperature applications i.e. aluminum evaporation boat, cathode material for hall-heroult cell, in rockets nozzles, etc.

This is due to the fact that the borides like TiB_2 and ZrB_2 are characterized by high melting point (>3000°C), high hardness (FeB: ~19 GPa, TiB_2: ~35 GPa, ZrB_2: ~25 GPa), wear resistance, good oxidation resistance, excellent thermal and electrical properties.

Boriding , or boronizing, is a thermo-chemical surface hardening process that can be applied to a wide variety of ferrous, nonferrous, and cermet materials.

The process involves heating well-cleaned material in the range of 700 to 1000°C, preferably for 1 to 12h, in contact with a boronaceous solid powder (boronizing compound), paste, liquid, or gaseous medium. In general, the syntheses of transition -metal borides with classical boriding techniques has many drawbacks such as very long processing time, the generation of huge amounts of solid wastes and gaseous emissions which makes the boriding process economically and environmentally very costly and hinders its widespread application as well.

The technique developed by our laboratory has brought an alternative method to produce transition metal borides in a fast and green way by using molten salt electrolysis. In this talk, the effects of electrochemical boriding conditions (time, temperature, current density) on the thickness, morphology, chemistry of transition metal borides (FeB, TiB_2, ZrB_2,etc) are addressed with their characteristics.

DAVETLİ KONUŞMACILAR

Invited Talks

Robert VASSEN

Prof. Dr. Robert Vassen is working since 1989 at Forschungszentrum Jülich GmbH as Head of section of "Materials for modern power plants" Institute for Materials and Processes in Energy Systems, IEF-1 In 2009 he was also appointed as Professor at Ruhr University Bochum. He received his Dip. Eng and Dr. rer. nat degrees from RWTH Aachen University. His research interests include, powder technology, thermal spray technology, protective high-temperature coatings, especially thermal and environmental barrier coatings, processing of conventional and nanosized ceramics, lifetime modelling, solid oxide fuel cells, membranes, 1st wall coatings of fusion reactors, hydrogen storage materials.

He is member of Deutsche Physikalische Gesellschaft (DPG), German and American Ceramic Societies (DKG, ACERS), Gesellschaft für thermisches Spritzen (GTS), DKG technical committee "process engineering". Dr. Vaßen is Vice chair of the editorial committee of the J. of Thermal Spray Technology (JTST). He has organized several symposium and conferences. He is an active member of DIN standardization committee. He authored/co-authored more than 200 scientific and technical publications.

Sunulacak Bildiri Özeti // Abstract

Advanced Thermal Spray Processes for Coatings in Energy Systems

Thermal spray technology is frequently used for the manufacture of advanced coatings in different energy systems. A wide variety of different microstructures can be produced by the technology ranging from gastight to highly porous. Depending on the application, different thermal spray techniques are used as atmospheric or vacuum plasma spraying (APS/VPS), high velocity oxy fuel (HVOF) spraying or innovative processes as suspensions plasma spraying (SPS) or even PVD type deposition in the LPPS-PVD process.

In the presentation the potential of these coating techniques for applications in energy systems will be outlined. These will include especially advanced thermal barrier coatings (TBCs) for gas turbines. The performance of conventional, segmented, suspension plasma sprayed and also LPPS-PVD type coatings will be described. In addition, functional coatings for solid oxide fuel cells (SOFCs) like isolative and barrier coatings will be shown. Finally the deposition of membranes for CO2 capture by thermal spray techniques will be presented.

DAVETLİ KONUŞMACILAR

Invited Talks

Aleksey YEROKHIN

Dr Aleksey Yerokhin is a Senior Research Fellow at the Research Centre in Surface Engineering, Department of Materials Science and Engineering at the University of Sheffield, U.K. He both received his MSc and PhD from Department of Metals Science, Tula Polytechnical Institute, Russia in 1986 and 1995. After working as reseach assistant , senior process engineer at state plant Arsenal, he received Assoc. Professorship from Tula State University in 1997.

He is working at Sheffields University since 2003. His research interests includes, Physical and chemical fundamentals of plasma electrolysis, Process development for Plasma Electrolytic Oxidation (PEO) of Al, Ti, Mg, Zr and Nb; non-oxidising, diffusion and duplex treatments of metals, advanced surface characterisation and performance evaluation of surface engineered materials.

He is the member of several professional and academic societies including Editorial Board of Surface and Coatings Technology, Organising Committee of Int. Workshop 'Synthesis & Commercialisation of Advanced Nanostructured Materials & Coatings, Moscow, Russia, International Society of Electrochemistry. Dr Yerokhin, authored, co-authored more than 100 publications and holds 4 patents. He has given several invited talks in international conferences.

Sunulacak Bildiri Özeti // Abstract

Surface Engineering of Light Alloys Using Advanced Plasma Electrolytic Methods

Surface engineering of lightweight metallic materials, such as Al, Ti, Mg and Zr alloys, greatly benefits from development of new plasma-assisted electrolytic treatments, in particular Plasma Electrolytic Oxidation (PEO). This technology offers simple yet effective solutions to fundamental problems associated with poor tribological performance of such materials, together with substantial enhancements in their anticorrosion properties and functional performance.

PEO relates to the group of electrochemical surface oxidation techniques and is featured by applied high anodic potentials that result in occurrence of plasma discharge at the metal-electrolyte interface. Plasma-surface interactions accompanied metal oxidation affect kinetics of the main electrochemical process, morphology and composition of the oxide film being formed.

They also introduce significant nonlinearities that cause major problems in process understanding, optimisation and control.

Superior wear and corrosion resistance of PEO coatings is attributed to their specific structure in which a thick and dense surface layer can be formed comprising clusters of hard (nano)crystalline high-temperature oxide phases distributed in an amorphous/low temperature crystalline oxide matrix. Limiting factors of the coating protective performance are associated with the matrix defects and imperfections, such as crack networks, crater-like features with central pinhole defects and cites of increased porosity that are often a legacy of discharge thermal and hydrodynamic impact on the surface.

The functional performance of PEO coatings is greatly affected by electrolyte composition. Various compounds can be synthesised to provide surfaces with high biological and catalytic activity, thermal, dielectric and optical properties. To refine coating morphology and control chemical and phase composition, the application of pulsed current waveforms with relatively high frequency (102-103 Hz) is currently been considered.

Original methods of frequency response analysis are used for optimisation and control of such processes. PEO technology can be used in various surface engineering strategies to produce advanced nano-composite coatings with diverse architectures.

ENDÜSTRİDEN KATKILAR

The Contributions from The Industry Invited

Alüminyum Alaşımlarının Asit Matlaştırması
Acid Etching of Aluminum Alloys

Dr. Mesut Akkaya, Dr. Atila Yaman
Politeknik, Turkey

Elektroforetik Laklama Uygulamaları
Electrophoretic Lacquering Applications

Dr. Halim Polat
Galtek Ltd.Şti., Turkey

Sert Kaplama Uygulamaları için Yeni Bir Yüzey Parlatma İşlemi
Drag Polishing: A New Polishing Method for Hard Coatings

Kemal Tokmanoğlu
Tin_Kap Ltd., Turkey

Dekoratif Üç Değerlikli Krom Uygulamaları ve Uygun Ardıl İşlemler
Decorative Tri-Chrome Applications And Suitable Post-Treatments

Danica Elbick, Andreas Königshofen, Rolf Pofalla
Enthone GmbH, Germany

Fosfatlama Teknolojilerinin Yerini Alabilecek Cr(III) İşlemleri
Cr(III) as Substitute for Phosphating Technologies

Torsten Koerner, Peter Volk, Emrah İnçal
SurTec International, Germany, Dede Kimya, Turkey

Sulu Süreçler İçin Kontrollü Enerjetik Durulama İşlemleri
The Case for Managed Energetic Rinsing in Surface Finishing Operations Involving Aqueous Processes

Peter Hope
LVH Coatings Ltd., England

Korozyona Dayanıklı Kaplamalar İçin Sürdürülebilirliği Yüksek Kaplama Çözeltileri
Sustainable Plating Solutions for Corrosion Resistant Coatings

Dingwerth Björn, Christelle Virion
Atotech Deutschland GmbH, Germany

Beyaz Değerli Metal Katmanlar: Değerli Metal Kaplamalar Değişiyor
White Precious Metal Layers: Precious Metal Electroplating is Changing

Erich Arnet
Umicore Galvanotechnik GmbH, Germany

Akımsız Nikel Kaplama; Reaksiyon Mekanizmasının İncelenmesini, Teknik Ekipmanlari ve Çeşitli Sistemlerin Mümkün Uygulamalarını İçeren Genel Bakış
Electroless Nickel Plating; A General Overview, Includes Special Considerations of the Chemistry, Technical Equipments and Possible Applications of Such Systems

Thomas Gaethke
Eser Kimya San. Tic. Ltd. Şti., Turkey

Çinko ve Sıcak Daldırma Galvanizlemenin Tanımı, Tarihçesi, Ülkemizde Sıcak Daldırma Galvanizleme Sektörü, Ekonomik ve Çevresel Faydalar
Definition and History of Zinc and Hot Dip Galvanizing. Hot Dip galvanizing Sector in Turkey, Economic and Environmental Benefits

Bünyamin Halaç
Marmara Siegener Galvaniz A.Ş, Turkey

Zirkonyum Oksit: Metal Fosfatlama Yerine Kullanılabilecek Basit ve Dayanıklı bir Alternatif
Zirconium Oxide: A Simple and Robust Substitute to Phosphating Metal Pretreatment

William Fristad, Eric Ardourel, Mustafa Güler
Henkel AG & Co KGaA, Germany

SERGİ KATILIMCILARI

List of Exhibitors

Sempozyum ile birlikte eş zamanlı gerçekleştirilecek olan sergide katılımcı firmalar ürün ve hizmetlerini tanıtacaklardır. Sempozyum sergisi tüm katılımcıların ziyaretine açık olacaktır.

The participant companies will present their products and services in the exhibition, happening concurrently with the symposium. The symposium exhibition can be visited by all participants.

- Atılım Kimya San. ve Tic. A.Ş.
- Atotech İstanbul Yüzey İşlemleri Teknolojisi Ltd. Şti.
- Boreas Kimya San. ve Tic. Ltd. Şti.
- CSM Instruments
- Dede Kimya San. Tic. A.Ş. / SurTec International GmbH
- Era Metalurji San. ve Tic. Ltd. Şti.
- Eser Kimya San. Tic. Ltd. Şti.
- Fetaş Metalurji ve Yüzey İşlem Ürünleri San. Tic. Ltd. Şti.
- Galkim Yüzey İşlem Teknolojileri San. ve Tic. A.Ş.
- Gamtaş Galvanoplast ve Makina San. Tic. A.Ş.
- Hitit Metalurji Endüstri Cihazları San. ve Tic. Ltd. Şti.
- İşletme Ltd Şti.
- Karma Makina End. Bakım Ürün. Tic. Ltd. Şti. - Dr. Ing. Max Schlötter GmbH & Co. KG
- Marmara Metal Mamülleri Tic. A.Ş. / Eramet Group
- Marmara Siegener Galvaniz San. Tic. A.Ş.
- Mega Danışmanlık Temsilcilik Dış Tic. Ltd. Şti.
- Politeknik Metal San. ve Tic. A.Ş.
- Prokap Makine Bakım Onr. Otom. Metal ve Kaplama Müh. San. Tic. Ltd. Şti.
- Senkron Yüzey Teknolojileri San. ve Dış Tic. Ltd. Şti.
- Vilmeks İç ve Dış Tic. A.Ş. / Vale Inco Limited
- VTD Vakuumtechnik Dresden GmbH

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- NIPOSIT™ PM980 Akımsız Nikel

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Yarı-Parlak Nikel

Parlak Nikel

Mikro-Porik Nikel

- NICKEL GLEAM™ SB200 Yarı-Parlak Nikel
- NICKEL GLEAM™ BR220 Parlak Nikel
- NICKEL GLEAM™ MCP262 Mikro-Porik Nikel

Üç-Değerlikli Krom

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- CHROME GLEAM™ 3C Jet Antrasit Cr+3

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DEDEKİMYA

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