2019 The 4th International Conference on Advanced Functional Materials (ICAFM 2019)

Salt Lake City, United States

August 2-5, 2019

University Guest House & Conference Center

Address: 110 S. Ft. Douglas Blvd. Salt Lake City, UT 84113-5036
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Welcome Address

We are pleased to welcome you to 2019 The 4th International Conference on Advanced Functional Materials (ICAFM 2019), which will take place in Salt Lake City, United States during August 2-5, 2019

After several rounds of review procedure, the program committee accepted those papers to be published in conference proceedings. We wish to express our sincere appreciation to all the individulas who have contributed to ICAFM 2019 conferences in various ways. Special thanks are extended to our colleagues in the program and technical committee for their thorough review of all the submissions, which is vital to the success of the conference, and also to the members in the organizing committee and the volunteers who had delicated their time and efforts in planning, promoting, organizing and helping the conference.

This conference program is highlighted by two keynote speakers: Prof. Hongfa (Henry) Hu, University of Windsor, Canada and Prof. Gong Hao, National University of Singapore, Singapore; Two plenary speaker: Prof. Ju Chou, Florida Gulf Coast University, USA and Prof. Qingsong Yu University of Missouri, USA

One best presentation will be selected from each session, evaluated from:originality, applicability, technical Merit, qualities of PPT, English. The best one will be announced at the end of each Session, and awarded the certificate over the end of session.

Let me, on behalf of the conference committee, cordially invite you to this outstanding conference. We look forward to receiving your paper in either research or development of acquired knowledge in order to disseminate to the wider audience. Join us at this event to see other excellent researchers share their work.

Salt Lake City is the capital and most populous municipality of the U.S. state of Utah and the best city to go to Yellowstone National Park. It is great place for conference. Hope you could enjoy the conference and have an unforgettable experience in Salt Lake City.

Conference Organizing Committee
Salt Lake City, United States

Organizing Committee

Advisory Chairs
David Ginley, Materials and Chemistry Science and Technology NREL, USA
Zheng-Hong Lu, University of Toronto, Canada

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Hao Gong, National University of Singapore, Singapore
Hongfa (Henry) Hu, University of Windsor, Canada

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Local Information

Conference Venue

UNIVERSITY GUEST HOUSE & CONFERENCE CENTER
1999 | 2019

University Guest House & Conference Center
Address: 110 S. Ft. Douglas Blvd. Salt Lake City, UT 84113-5036
https://www.universityguesthouse.com/
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Conference Meeting Room at a Glance



Welcome to the University Guest House and Conference Center at the University of Utah. Located in Historic Fort Douglas on the University of Utah campus, the Guest House and Conference Center includes 180 sleeping rooms and approximately 30,000 sq.ft. of unique meeting space.Our 180-room hotel features spectacular views of the Salt Lake Valley, Chapel Glen and the surrounding campus. Its proximity to both a TRAX train station and a campus shuttle stop allows you to explore both campus and Salt Lake City easily. Add affordable, comfortable rooms with fantastic amenities and you'll understand why visitors love the Guest House

Time

UTC/GMT -7

Weather

The Weather Situation of Salt Lake City in August

Average daily minimum temperature	Average daily highest temperature
21°C	35°C

Bank and Foreign Exchange

The Currency is USD here. You can exchange foreign currency at the airport, or exchange at the bank, Money exchanger.

Emergency Call: 911

Instructions for Oral & Poster Presentations

Oral Presentations

- **Timing:** a maximum of 15 minutes total, including speaking time and discussion. Please make sure your presentation is well timed. Please keep in mind that the program is full and that the speaker after you would like their allocated time available to them.
- You can use CD or USB flash drive (memory stick), make sure you scanned viruses in your own computer. Each speaker is required to meet her / his session chair in the corresponding session rooms 10 minutes before the session starts and copy the slide file (PPT or PDF) to the computer.
- It is suggested that you email a copy of your presentation to your personal in box as a backup. If for some reason the files can't be accessed from your flash drive, you will be able to download them to the computer from your email.
- Please note that each session room will be equipped with a LCD projector, screen, point device, microphone, and a laptop with general presentation software such as Microsoft Power Point and Adobe Reader. Please make sure that your files are compatible and readable with our operation system by using commonly used fronts and symbols. If you plan to use your own computer, please try the connection and make sure it works before your presentation.
- Movies: If your Power Point files contain movies please make sure that they are well formatted and connected to the main files.

Poster Presentations

- Maximum poster size is 60cm*80cm
- Posters are required to be condensed and attractive. The characters should be large enough so that they are visible from 1 meter apart.
- Please note that during your poster session, the author should stay by your poster paper to explain and discuss your paper with visiting delegates.

Dress code

- Please wearing formal clothes or national characteristics of clothing

Keynote Speakers

Speech Title: Pressurized Casting of Mg-Zn Alloys for Biodegradable Applications: Enhanced Mechanical Properties and Refined Microstructure

Prof. Hongfa (Henry) Hu
University of Windsor, Canada

Dr. Hongfa (Henry) Hu is a tenured full Professor at Department of Mechanical, Automotive & Materials Engineering, University of Windsor. He was a senior research engineer at Ryobi Die Casting (USA), and a Chief Metallurgist at Meridian Technologies, and a Research Scientist at Institute of Magnesium Technology.

He received degrees from University of Toronto (Ph.D., 1996), University of Windsor (M.A.Sc., 1991), and Shanghai University of Technology (B.A.Sc., 1985). He was a NSERC Industrial Research Fellow (1995-1997). His publications (over 150 papers) are in the area of magnesium alloys, composites, metal casting, computer modelling, and physical metallurgy. He was a Key Reader of the Board of Review of Metallurgical and Materials Transactions, a Committee Member of the Grant Evaluation Group for Natural Sciences and Engineering Research Council of Canada, National Science Foundation (USA) and Canadian Metallurgical Quarterly. He has served as a member or chairman of various committees for CIM-METSOC, AFS, and USCAR.

The applicant's current research is on materials processing and evaluation of light alloys and composites. His recent fundamental research is focussed on transport phenomena and mechanisms of solidification, phase transformation and dissolution kinetics. His applied research has included development of magnesium automotive applications, cost-effective casting processes for novel composites, and control systems for casting processes. His work on light alloys and composites has attracted the attention of several automotive companies.

Abstract: Mg-Zn alloys have been demonstrated to be a good candidate for biodegradable applications. In the present work, Zinc (Zn) addition varying from 1.0 up to 10.0 wt. % was introduced into liquid magnesium. The alloyed liquid was squeeze cast under an applied pressure of 90 MPa. The results of mechanical testing on the squeeze cast Mg-Zn alloys shows that Zn is an effective additive for enhancing their mechanical properties, specifically, tensile and yield strengths at room temperature, but reducing the elongation. While the Zn addition rises from 1.0 to 10.0 wt.%, the ultimate tensile and yield strengths increases to 181.0 MPa and 105.0 MPa from 140.7 MPa and 39.3 MPa, while the elongation-to-failure (ef) decreases to 3.7% from 6.2%, respectively. The reveal of the as-cast grain structure by an optical microscope (OM) indicates that the high Zn content reduces grain sizes considerably. The microstructures analyzed by a scanning electron microscope (SEM) with the energy dispersive spectroscopy (EDS) show that the secondary MgZn phase forms once Zn is introduced in sufficient amount. The grain refinement and the massive presence of the secondary MgZn phase at the boundaries of the refined grains should be responsible to the enhancement of the strengths and the reduction in the elongation. The developed pressurized casting without employing secondary manufacturing processes such as

extrusion or heat treatment exhibits its advantages to enhance the mechanical properties of the Mg alloys with high Zn content over conventional fabrication processes, since high Zn-containing Mg alloys have a long freezing range and tend to form microshrinkage porosity.

Speech Title: Transparent P-type Wide Gap Semiconductors

Prof. Hao Gong
National University of Singapore, Singapore

Dr. Hao GONG is a Full Professor of Materials Science and Engineering at National University of Singapore. He is also the coordinator of the transmission electron microscopy laboratory at Department of Materials Science and Engineering. His research interests include transparent oxide conductors and semiconductors (n-type and p-type), energy storage materials and devices (mainly supercapacitors), energy harvest materials and devices (mainly solar cells), gas sensors, functional thin film and nano-materials, materials characterization (mainly on transmission electron microscopy and electron diffraction).
Dr. Gong received his B.S. degree in Physics at Yunnan University in 1982. He passed his M.S. courses in Yunnan University, carried out his M.S. thesis research work at Glasgow University, UK, and received M.S. degree of Electron and Ion Physics at Yunnan University in 1987. He then did his PhD at Materials Laboratory at Delft University of Technology, the Netherlands, and obtained PhD degree there in 1992. He joined National University of Singapore in 1992, and is currently full professor at Department of Materials Science and Engineering. He has published about 200 refereed papers in major international journals and a few US patents. He has delivered several invited talks at international conferences. He has been chairman or committee member of several international conferences, and editor of special issues of some journal.

Abstract: Wide gap semiconductors can be transparent to visible light under certain conditions. They have a wide range of applications for such as display panels, solar cells, invisible electronics, etc. For visible light, the band gap should be great than 3 eV. Wide gap materials are basically insulators. With innovative ideas and great efforts, a few materials have been turned to be n-type conducting or semiconducting, and used as electrodes in display panels, solar cells and light emitting and detecting devices. However, they are not used for p-n junctions, as it is very difficult to achieve p-type counterparts. This presentation will be on the achievement of n-type as well as p-type transparent semiconductors. Their use as active device materials will be presented. Results will be discussed.

Plenary Speakers

Speech Title: Visualizing uptake of gold nanoparticles in live breast cancer cells and Zebra Fish

Prof. Ju Chou
Florida Gulf Coast University, USA

Dr. Ju Chou is currently an Associate Professor in the Department of Chemistry and Physics at Florida Gulf Coast University. Dr. Chou received her Ph.D. in chemistry from Chinese Academy of Science, Changchun, China in 1995. After that, Dr. Chou has worked as a postdoctoral fellow in RIKEN Research Institute in Japan for a year during 1996-1997. She came to the United States as a visiting research scholar working at University of California-Irvine and later at University of California-Santa Barbara, respectively. Dr. Chou's research areas include bio-electrochemistry of proteins such as cytochrome c, myoglobin and hemoglobin, bioaccumulation of trace elements in tissues, synthesis and characterization of nanomaterials such as gold nanoparticles and their biomedical applications. Dr. Chou's recent research interests also include green synthesis of gold nanoparticles and environmental analysis of toxic metals in water, soil and human hair. She has also been collaborating with biology professors on the application of gold nanoparticles in biological systems such as cancer cells and zebrafish embryos. This research focuses on the design of model nanoparticles for potential application in in vitro and in vivo assays of studying toxicity, biocompatibility and transport of gold nanoparticles.

Abstract: Gold nanoparticles possess distinctive physicochemical properties and can be used as unconventional therapeutic approaches for targeting of cancer cells. However, the mechanism of the interaction between gold nanoparticles and cancer cells is still not clear. The purpose of this study was to grow gold nanoparticles with controlable particle sizes and use them to study their transport and diffusion in live breast cancer cells MCF-7 and zebra fish. We treated MCF-7 with 8 nm gold nanoparticles for 72 hours and visualized gold nanoparticles in the live cancer cells for different transport times. A dark field optical microscope (DFOM) was used to examine their transport and accumulation in the cancer cells as shown in Figure 1. Two concentrations of gold nanoparticles were tested in MCF7 cancer cells to determine the transport rate of the gold nanoparticles in the cancer cells. The results show that gold nanoparticles were able to enter not only cell membranes, but also nucleus of cancer cells. The transport or accumulation rate of gold nanoparticles in cancer cells was dependent on the time and the concentration of gold nanoparticles.

Speech Title: Plasma Surface Modification for Interfacial Bonding Enhancement in Dental Restorations

Prof. Qingsong Yu
University of Missouri, USA

Dr. Qingsong Yu is a Full Professor in the Department of Mechanical and Aerospace Engineering at University of Missouri in the United States. Dr. Yu's research has been focusing on non-thermal gas plasma technology and its applications in materials processing, surface modification, thin film deposition, and recently in plasma medicine and plasma dentistry.

Dr. Yu received his B.S. in Chemical Engineering from Tianjin University of China, and his M.S. and Ph.D. in Chemical Engineering from University of Missouri (1995, 1998). Since then, Dr. Yu has worked in microelectronics industry at Silicon Valley in California. In 2002, he joined the faculty in the Department of Chemical Engineering at University of Missouri and now he is a Professor in the Department of Mechanical and Aerospace Engineering at University of Missouri. Dr. Yu has published over 100 refereed research papers in major international journals and holds a few US patents.

Abstract: Acrylic resins have received widespread clinical acceptance in dentistry, such as dental restoration and treatment of caries. Interface bonding is the most crucial factor for the success of these dental procedures. This talk will introduce our recent research results on plasma treatment effects on improving adhesive/dentin interface bonding.

Extracted unerupted human third molars were used after crown removal to expose the dentin surface. A non-thermal atmospheric plasma brush was used to modify/prepare dentin surfaces prior to traditional dental composite restoration procedures. Dental adhesives including total etch and self-etch adhesives and dental composite were applied to the dentin surfaces as directed by manufacturers' instructions. Micro-tensile bonding strength test results showed that, as compared with the untreated controls, the bonding strength with plasma treatment increased over 30% for total etch adhesive and over 22% for self-etch adhesive. SEM examination did show that, with plasma treated dentin, thicker hybrid layer and longer resin tags were formed at the interface to enhance the interfacial bonding. The improved interfacial bonding through plasma treatment will greatly improve the successful rate and longevity of dental restoration. The results obtained in this study, therefore, show the great promise of atmospheric plasma technology in dental clinical applications.

This study was supported in part by US National Institute of Health with grant numbers of 5R44DE019041 and 1R01DE021431. Meng Chen and Qingsong Yu have an equity interest in Nanova, Inc.

Agenda of ICAFM 2019

Whole Day < Friday, August 2nd, 2019> | Officer's Club East Room		
Registration & Materials Collection		10:00-16:00
Morning < Saturday, August 3rd, 2019> | Officer's Club South Room		
Welcome Address and Opening Remarks **Prof. Hao Gong, National University of Singapore, Singapore**		9:00-9:05
Chairman: Prof. Ju Chou		
Keynote Speech I	**Prof. Hongfa (Henry) Hu** **University of Windsor, Canada**	9:05-9:55
Keynote Speech II	**Prof. Hao Gong** **National University of Singapore, Singapore**	9:55-10:45
Coffee Break & Group Photo		10:45-11:15
Chairman: Prof. Hongfa (Henry) Hu		
Plenary Speech I	**Prof. Ju Chou** **Florida Gulf Coast University, USA**	11:15-11:45
Plenary Speech II	**Prof. Qingsong Yu** **University of Missouri, USA**	11:45-12:15
Lunch		12:15-14:00
Afternoon < Saturday, August 3rd, 2019> | Officer's Club South Room		
Session A **Advanced Functional Materials**	**Presentation ID: F005-A, F007-A, F020, F024-A**	14:00-15:00
Break		15:00-15:05
Session A **Advanced Functional Materials**	**Presentation ID: F012-A, F010, F011, F025**	15:05-16:05
Coffee Break		16:05-16:25
Afternoon < Saturday, August 3rd, 2019> | Officer's Club North Room		
Poster Session	**Presentation ID: F006, F021-A, F022, F041-A, F045-A, F044, F028, F054, F055, F048, F009, F039**	16:25-16:55
Dinner		17:00-18:30
Whole Day < Sunday, August 4th, 2019>		
Optional One Day Visit		9:00-17:00

Quick Glance of Presentations

Session A- Advanced Functional Materials Venue: Officer's Club South Room Time:14:00-16:05	
F005-A	Capture and Conversion of Carbon Dioxide by Solar Heat Localization
F007-A	Noble-Metal-Free Cobalt Sulfide Dots Modified Sulfur Doped Carbon Nitride Microtube for Efficient Photocatalytic Hydrogen Evolution
F020	Synthesis of Porous Zno Films on Quartz Substrates by Thermal Oxidation and Oxidant Atmosphere Effect
F024-A	Titanium Dioxide Nanocomposites as Environmentally Photocatalysts for the Degradation of Different Organic Pollutants in Water
F012-A	Synthesis and Characterization of Gold Nanoparticles on AluminaMembrane for Biomarkers Detection by SERS
F011	Development of a Composite Material Based on Polymers Polydimethylsiloxane and Polytetrafluoroethylene Use in Human Prosthetic Coatings
F010	Extraction of Sulfur from Commercial Gasoline Using 1-Butyl-3-Methylimidazolium Tetrafluoroborate [Bmim] [Bf4] As The Extraction Solvent.
F025	Preparation of Functional Calcite from Oyster Shell by Double Replacement Reaction

Poster Session Venue: Officer's Club North Room Time:16:25-16:55		
1	F006	Infrared and Raman spectra of Nanoporous SiO2 Matrix Filled with BaTiO3 Nanoparticles
2	F021-A	Effect of Porosity on Mechanical Properties of Ti-Based Biomaterials
3	F022	Enhanced Electromagnetic Wave Shielding Effectiveness of Carbon-based Nonwoven Fabrics by H2 Plasma Treatment
4	F041-A	Synthesis of variety shapes of sandwich-like polyaniline and applicationon anti-corrosion protection of steel
5	F045-A	Deposition and UV Blocking Property of Sio2-Tio2 Alternating Stack Multilayer Film
6	F044	Effect of the Filling Pattern on the Compression Strength of 3d Printed Objects Using Acrylonitrile Butadiene Styrene (Abs)
7	F028	A Bibliographic Historical Analysis on Geopolymer as a Substitute for Portland Cement
8	F054	Experimental Research of the Temperature Potential of Ventilation Emissions in Apartment Buildings.
9	F055	Study of the Attenuation Force Generated by a Magnetorheological Fluid in Industrial Robot Grippers Shock Absorbers
10	F048	The Influence of the Ground Thermal Energy and Borehole Heat Exchangers Depth On the Efficiency of Heat Pump (GHSP) Systems in Moscow Geo-Climatic Conditions
11	F009	Preparation and Numerical Simulation of Heat Transfer Performance for Methyl Palmitate /Expanded Graphite Phase Change Composite
12	F039	Duplex Stainless Steel Subjected to Normalized Thermal Treatment

Oral Presentation

Session A-1—Advanced Functional Materials
Session Chair: Prof. Henry Hu
Venue: Officer's Club South Room | Time: 14:00-16:05

Note:
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*To show the respect to other authors, especially to encourage the student authors, we strongly suggest you attend the whole session, the scheduled time for presentations might be changed due to unexpected situations, please come as early as you could.
*Session Photo will be taken at the end of the session.

F005-A

14:00-14:20

Capture and conversion of carbon dioxide by solar heat localization

Mr. Varun Kashyap and Hadi Ghasemi
University of Houston, USA

As the world slowly transitions from conventional fossil fuels to renewable forms of energy, environmentally friendly CO2 capture is urgently needed. Currently, liquid amine and ionic liquid-based systems are utilized for this purpose. However, these forms of capture mostly lead to the formation of stable carbamate salts with high enthalpy of formation, and it is therefore difficult to recover the initial liquid for cyclic operation. Furthermore, amine-based technologies pose concerns including toxic emissions and volatility, while ionic liquid-based systems suffer from complexity of liquid handling and high operational cost. Herein, we report a solid-state sustainable CO2 collector (SCC), which is activated by solar heat localization. This stable cyclic SCC is based on ionic liquids and graphene aerogel, which undergoes solid–liquid phase change to efficiently capture and convert CO2. The SCC captures 0.2 moles of CO2 for every mole of ionic liquid and converts the absorbed CO2 into useful byproducts, including water and calcium carbonate in each cycle. A system prototype of the SCC is developed and demonstrated. The SCC provides a new and promising paradigm to efficiently capture and convert CO2 using abundant solar energy to address global emissions and consequent environmental challenges.

F007-A

14:20-14:40

Noble-Metal-Free Cobalt Sulfide Dots Modified Sulfur Doped Carbon Nitride Microtube for Efficient Photocatalytic Hydrogen Evolution

Dr. Quanhao Shen, Lingfei Wei, Naixu Li and Jiancheng Zhou
Southeast University, China

Hydrogen as a clean and renewable energy for replacing the traditional fossil fuel has been received great attention in recent years. Solar-energy-driven hydrogen evolution mediated by semiconductor material is a promising way to realize energy harvest and storage without any pollution. The key factor for photocatalytic hydrogen evolution is to design efficient and stable photocatalytic materials to avoid recombination of photogenerated carriers, enhance the visible light absorption and accelerate the interfacial reaction. In this work, a novel CoSx dots loaded sulfur doped C3N4 microtube was synthesized via facile and eco-friendly chemical precipitation process. The photocatalysts were systematically studied by FTIR,

XRD, SEM, TEM, BET and XPS techniques. The results exhibited that CoSx dots with diameter of 3-5 nm deposited on the surface of sulfur doped C3N4 microtube in high dispersion and uniformity, which is ascribed to numerous nucleation sites supplied by high surface area of sulfur doped C3N4 and rapid nucleation procedure in synthesis process. The CoSx dots loading lower the hydrogen evolution overpotential and promote the photogenerated carrier separation induced by interfacial charge transfer compared with pure sulfur doped C3N4 microtube. The optimal 2.4% CoSx/sulfur doped C3N4 photocatalyst showed an excellent photocatalytic hydrogen evolution rate of 573.06 μmol·g-1 h-1, which even exceeded that of 0.75 wt% Pt/sulfur doped C3N4. This demonstrated that the CoSx dots work as a potential candidate to achieve noble-metal-free photocatalytic hydrogen evolution. This work provides a new insight to structure control and non-noble metal cocatalyst loading of carbon nitride-based composite nanomaterial for improving H2 production performance.

Synthesis of porous ZnO films on quartz substrates by thermal oxidation and oxidant atmosphere effect

Ms. Y.M. Hernández-Rodríguez, S Tehuacanero-Cuapa, R. Peña-Sierra and G. Romero Paredes
CINVESTAV, México

F020

14:40-15:00

The synthesis and characterization of porous ZnO films using a two stage process by thermal oxidation using a bilayer precursor film (ZnO/Zn) consisting of a Zn film covered with a ZnO nanofilm formed on quartz substrates is reported. The Zn films of 50 nm were grown by DC sputtering method at 300K. In the first stage bilayer precursor films (BPF) of ZnO/Zn were produced by growing a ZnO nanofilm on Zn films by thermal oxidation at 350 ℃ by 30 min in N2 atmosphere containing 5 ppm of O2, and in the second stage the BPFs were oxidized at 800 ℃ for one hour either in dry N2, dry or wet air with 42% of humidity. The produced porous ZnO films were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and UV-Vis spectroscopy measurements. The results revealed the role of the oxygen content and the relevance of the humidity content in the processing atmosphere. When the BPF was oxidized in N2 with low oxygen content nanoporous ZnO films of wurtzite phase with its c-axis perpendicular to the plane of the substrate were produced. When rich oxygen content oxidation atmospheres were used, either in dry or wet air, nanoporous ZnO films with three main crystallite orientations (100), (002) and (101), were produced. The optical transmittance characteristics at the band edge region were strongly influenced by the humidity content but induce the formation of reproducible nanoporous ZnO films with sizes of ≈ 10 nm.

Titanium dioxide nanocomposites as environmentally photocatalysts for the degradation of different organic pollutants in water

F024-A

15:00-15:20

Dr. Halema Alkandari, Shekhah Alkandari, Ahmed Mohamed and Aboubakr Abdullah
College of Health Sciences, Kuwait

Commercial nanoparticles P25 TiO2 was loaded with reduced graphene oxide, and carbon nitride using hydrothermal treatment method. All as-prepared photocatalysts were characterized using bulk and surface techniques such as IR, Raman, and XPS. Also, their band gap energies were also measured. It was reveled that addition of carbonaceous materials reduced the band gap energy of TiO2 nanocomposites, so its photocatalytic performance using visible light was significantly enhanced. For example, all the as-prepared photocatalyst showed excellent degradation of organic

compounds such as phenol, para nitrophenol and dyes such as methylene blue upon their irradiation of sun-simulated light in presence of both O3 and H2O2. Complete degradation of methylene blue, and more than 90% degradation of phenol were obtained in 30 minutes only.

F012-A

15:20-15:40

Synthesis and Characterization of Gold Nanoparticles on AluminaMembrane for Biomarkers Detection by SERS

Prof. Oscar E. Cigarroa-Mayorga, Angel Guillen-Cervantes, Bibiana Chávez-Mungu á, Salvador Gallardo-Hern ández and Patricia Talam ás-Rohana
UPIITA-Instituto Polit écnico Nacional, M éxico.

In this work, the synthesis of SERS substrates based on Gold-nanoparticles on alumina were achieved. In order to obtain the substrates, a porous Aluminum anodized oxide (AAO) surface was synthesized and a layer of Gold (Au) was deposited with two thicknesses: 15 and 100 nm. To raise the Au-nanoparticles array, the samples were thermally treated in a Nitrogen atmosphere for 15 min at 450 ℃. Afterward, four solutions of rhodamine (29.22 $x10^{-1}$ mM, 30.2 $x10^{-4}$ mM, 22.4 $x10^{-7}$ mM and 15.3 $x10^{-10}$ mM) were measured on the surface of substrates with an excitation of 660 nm. The SERS effect was proved in the synthesized substrates by identifying the rhodamine Raman shift through dilutions. Raman mapping demonstrates the homogeneity of the SERS effect in the samples.

F011

15:40-16:00

Development of a composite material based on polymers Polydimethylsiloxane and Polytetrafluoroethylene use in human prosthetic coatings

Ms. Ritha Chicaiza, Caterine Donoso and Francisco Quiroz
Universidad de las Fuerzas Armadas ESPE, Ecuador

The purpose of this study is the development of a composite material composed of a main layer of polydimethylsiloxane (PDMS) and a reinforcement of polytetrafluoroethylene (PTFE), to be used later in human prosthesis coatings. A mass ratio of the main layer consisting of PDMS:Tetraethyl orthosilicate (TEOS):Di-n-butyl tin dilaurate (DBTL) in the range of 33:1:0.5; 25:1:0.5; 10:1:0.5, and the mass ratio of the composite material (PTFE:PDMS) with a range was evaluated of 1:9; 1:1; 2:3. Obtaining the following results: Tensile strength of 0.085 MPa based on the ratio of 33:1:0.5 - 1:9 and 0.59 MPa with respect to the ratio of 10:1:0.5 - 2:3, evidencing an increase in tensile strength by decreasing the weight of PDMS and increasing the weight of PTFE. On the other hand, the composite material obtained is hydrophobic, insoluble in ethanol and water, has a cross-linking percentage of 98.74 % and 99.66 % respectively, also has a minimum permeance of 5.24x10-7 (g Pa-1 s-1 m-2). With which it is concluded that the treatment whose properties resemble the human skin is the combination 10:1:0.5 - 1:1 that allowed to obtain an average tensile strength of 0.66 MPa, average modulus of elasticity of 6.56 MPa, similar to the dermis of a 43 year old person.

F010

Extraction of Sulfur from Commercial Gasoline Using 1-Butyl-3-Methylimidazolium Tetrafluoroborate [Bmim] [Bf4] As The Extraction Solvent.

Cristian Valenzuela, Caterine Donoso and **Prof. Liliana Guzm án-Beckmann**
Escuela Polit écnica Nacional, Ecuador

This study aims to demonstrate the importance of using the 1-butyl-3-methylimidazolium tetrafluoroborate [BMIM] [BF4] ionic liquid (IL) as a green solvent in the extractive desulfurization of commercial gasoline, as a

16:00-16:20 complementary technology to conventional hydrodesulfurization (HDS), which has limitations in the removal of sulfur aromatic compounds. The extractive desulfurization of gasoline was evaluated by means of a factorial design to determine the best extraction conditions, considering temperature (25 and 35 ℃), feed/solvent mass ratio (3/1 and 1/1) and number of extraction stages (1 and 3 stages). The results show a maximum sulfur removal efficiency of 40%. In addition, the selectivity of [BMIM] [BF4] in the removal of aromatic sulfur compounds from gasoline, its extraction mechanism and the effects of desulfurization using IL regenerated by means of washing cycles with water and/or diethyl ether was investigated.

Coffee Break

16:05-16:25

Poster Session
Session Chair:
Venue: Officer's Club North Room | Time: 16:25-16:55

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F006

Infrared and Raman spectra of nanoporous SiO2 matrix filled with BaTiO3 nanoparticles

Prof. Jose Angel Roldan Lopez, Luis Manuel Angelats Silva, Nikita A. Emelianov and Leonid N. Korotkov
Universidad Privada Antenor Orrego, Peru

Nanocomposite in the form of a porous matrix SiO2 with average pore size of 320 nm filled with barium titanate nanoparticles in paraelectric cubic phase was obtained. Shift of the stretching vibration of Si–O–Si to higher frequencies caused by increased strengthening of the network in the matrices has been observed. Also demonstrated that decrease in the intensity of the absorption relating to Si–O(H) stretching vibration relative to Si-O(−Si) stretching vibration. Raman scattering spectra demonstrate the presence of both a cubic and a tetragonal ferroelectric crystalline phase in the filler nanoparticles. Thus, the mechanical deformation of nanoparticles in the pores of the matrix can lead to a change in the crystalline phase of the filler.

F021-A

Effect of porosity on mechanical properties of Ti-based biomaterials

Prof. Yeon-wook Kim and Tae-hyun Nam
Keimyung University, South Korea

Porous Ti-based shame memory alloys has been considered as one of the promising biomaterials in surgical implants which have been used in medical fields. The porous materials have many applications, ranging from spinal fixation to acetabular hip prostheses, dental implants, and permanent osteosynthesis plates. A new method to prepare the highly porous shape memory alloys is proposed in this study. TiNi shape memory alloy fibers were prepared by a melt overflow process. The martensitic transformation starting temperature of B2→B19' in the rapidly solidified fibers was 19 °C. Cylindrical billets of Ti-Ni alloy with 75% porosity were produced by a vacuum sintering technology using as-cast alloy fibers. Porous Ti-Ni alloys has been considered as one of the promising biomaterials in surgical implants which have been used in medical fields. The porous materials have many applications, ranging from spinal fixation to acetabular hip prostheses, dental implants, and permanent osteosynthesis plates. The porous bulk specimens, which have three-dimensional network structure, interconnected pores and high porosity, were produced using the solid-state sintering of the Ti-Ni alloy fibers and the effect of the high porosity on the mechanical performances was investigated using compressive tests. The mechanical properties and shape memory properties of the highly porous Ti-Ni alloy is investigated using a compressive test. The plateau of

the stress-strain curve was observed at about 7 MPa and resulted in 8% elongation associated with stress-induced B2→B19' transformation. It was also found that a recovered strain was 5.9% on heating after the compressive deformation. This recovery of the length is ascribed to the shape memory effect which occurs during the martensitic transformation. Because of the high porosity of this specimen, the elastic modulus of about 0.95 GPa could be obtained. It was reported that a porous TiNi bulk with 39.5% porosity exhibited the elastic modulus of 12~16 GPa. When compared with those from other studies, the elastic modulus values, which were obtained in this study, were much lower due to the high porosity.

Enhanced Electromagnetic Wave Shielding Effectiveness of Carbon-based Nonwoven Fabrics by H2 Plasma Treatment

Sung-Hoon Kim and **Ms. Hyun-Ji Kim**
Silla University, Republic of Korea

F022

Electromagnetic wave shielding effectiveness of the nonwoven fabrics was measured in the wide operating frequency range, namely 0.4GHz to 20GHz. The shielding effectiveness of the woven fabric was below 45dB in the range of 0.04GHz to 15GHz and then it increased to above 45dB in the range of 15GHz to 20GHz. To enhance the electromagnetic wave shielding effectiveness of the nonwoven fabrics, 3 minutes H2 plasma treatment of the nonwoven fabrics was carried out under the microwave plasma-enhanced chemical vapor deposition system. By H2 plasma treatment, the shielding effectiveness of the nonwoven fabrics was greatly enhanced in the whole operating frequency range. The surface electron conductivity of the nonwoven fabrics was also enhanced from 2.11 103 S/m to 3.02 103S/m by H2 plasma treatment. The surface and cross sectional morphologies of the nonwoven fabrics with or without H2 plasma treatment were investigated and compared with each other. Crystal structure variation of the nonwoven fabrics by H2 plasma treatment was also investigated. Based on these results, the cause for the enhancement of the shielding effectiveness of the nonwoven fabrics by H2 plasma treatment was suggested and discussed.

Synthesis of variety shapes of sandwich-like polyaniline and applicationon anti-corrosion protection of steel

Mr. Yuan-Teng Kang, Chuh-Yung Chen and Cheng-Chien Wang
National Cheng Kung University, Taiwan

F041-A

The novel paintings for anti-corrosion protection were prepared by epoxy resin with the variety sandwich-like polyaniline. The different types of sandwich-like polyanilines were manufactured via the conducting polyaniline nano-layer coated on the plate-shape, flower-shape, and branch-shape of the oligo-aniline template, respectively. The variety shapes of oligo-aniline template could be obtained by using controlling the polymerization conditions. Characteristic and the morphology of the variety sandwich-likes polyaniline were identified by using FTIR, UV-vis and SEM, respectively. The thickness of conducting polyaniline nano-layer coated on the oligo-aniline template was in the range of 40 nm to 60 nm from SEM micrographs observation. The conductivity of the variety sandwich-like polyaniline for the plate-shape, flower-shape, and branch-shape was 2.75 S/cm, 1.27 S/cm, 3.21 S/cm, respectively, after Four-point probe measurement. Furthermore, the anti-corrosion performance for 100 μm of the novel paintings coating on carbon steel was measured by using Tafel test. The anti-corrosion efficiency for 1 wt.% of the plate-shape, flower-shape, and branch-shape sandwich-like polyaniline within epoxy resin were 83.80%, 65.82%, 62.70%, respectively. The result shows the high

performance of anti-corrosion painting was successfully preparation in this research.

Deposition and UV blocking property of SiO2-TiO2 alternating stack multilayer film

Mr. Sungwoo Kim, Woochan Jin, Galvez Rita and Chan Park
Seoul National University, Korea

F045-A

The organic light-emitting diode (OLED) for advanced display technology has attracted attention due to many advantages such as high luminance, high visibility and good contrast ratio. OLEDs are widely used in IT applications such as smart phones, tablets and watches. Even with its commercial success, the short lifetime of OLED remains an issue which needs to be improved. The degradation caused by UV is one of the problems which have to be solved in order to improve the lifetime of OLED. In this study, alternating stack multilayer films which consist of SiO2 and TiO2 with good UV-shielding property were deposited on cell-phone cover glass by reactive RF magnetron sputtering, and the optical properties of the deposited films were investigated. The architectures of the multilayer films which has specific optical properties (transmittance in UV and visible light) were simulated using a commercial software. The transmittance of the films was measured using an UV/VIS spectrophotometer. Focused Ion Beam (FIB) and X-ray reflectivity (XRR) measurements were used to evaluate the thickness of each layer and the total thickness of the films. Surface morphology and roughness of the films were examined by atomic force microscopy (AFM). Optical properties which were obtained from the multilayer films and those calculated by the software were compared. The optical properties of multilayer films grown using deposition parameters which were adjusted from the difference between the measured and calculated optical properties, will be presented and discussed.

Effect of the Filling Pattern on the Compression Strength of 3d Printed Objects Using Acrylonitrile Butadiene Styrene (Abs)

Jhoselyn Reyes Morocho, Andrés Criollo Sánchez and **Prof. Marco Singaña,** Caterine Donoso
Universidad de las Fuerzas Armadas ESPE, Ecuador

F044

The present study exhibits the behavior of ABS polymer (acrylonitrile butadiene styrene) subjected to mechanical compression tests considering two filling patterns, rectangular and hexagonal; these patterns have been selected due to the geometric arrangement of their internal structure improves the mechanical properties of 3D printed parts, in addition to the increase in tensile strength. The specimens were developed by molten deposition modeling (FDM) under the ASTM D695 standard in 2015, so five samples of each pattern were made; they have an 80% filler material. This is due to the demanding mechanical requirement in engineering applications. The results obtained show that the rectangular fill pattern at 0 ° and 90 ° registered the highest compressive strength obtaining as a result an average compression strength of 4 179.92 N, likewise a percentage of deformation of 5.96% and a maximum compressive strength of 33.147 MPa. Because of the evidenced data, the rectangular pattern is useful for engineering and industrial applications, including substituting car parts, machinery or household appliances.

A bibliographic historical analysis on geopolymer as a substitute for Portland cement

F028

Prof. Lais Alves, Arissa Nogueira, Elaine Vazquez and Silvio de Barros
CEFET/RJ, Brazil

Growing concern about environmental degradation has expanded the search for new technologies that could ensure sustainable development. In civil construction, new materials have emerged as alternatives to reduce the impact of the activity on the environment, one of them is the geopolymer. This material, which can be characterized as a stable and synthesized composite of aluminosilicate materials, has emerged as a potential substitute for Portland cement because it presents similar characteristics of initial strength and good mechanical performance, but without the high emission of carbon dioxide (CO2) to obtaining it. This work brings a bibliographic analysis on geopolymer, it is intended to disseminate knowledge as of the state of the art on geopolymer as cement substitute.

Experimental Research of the Temperature Potential of Ventilation Emissions in Apartment Buildings.

F054

Gregory Vasilyev, Victor Gornov, Nikolay Timofeev, Alexander Dmitriev, Pavel Shapkin and **Ms. Marina Kolesova**
JSC “INSOLAR-INVEST”, Russia

Authors of this article presents the results of experimental research of the temperature potential of ventilation emissions in apartment buildings in Moscow. Also this paper offers an analysis and synthesis of technological schemes and technical solutions for natural ventilation systems used in apartment buildings. The systems of natural ventilation of lower-cost multi-storey buildings have been analyzed. The influence of various factors on the parameters of operating modes of natural ventilation systems have been also analyzed. As a result of the analyses it has been found, that the operated apartment buildings largely do not ensure air exchange required according to sanitary regulations, which results in adverse effects for the health, efficiency and life expectancy of population.

Study of the Attenuation Force Generated by a Magnetorheological Fluid in Industrial Robot Grippers Shock Absorbers

F055

Juan Carlos Valencia Salinas, Diego Alejandro Jumbo Auquilla and **Prof. Marco Singaña,** Caterine Donoso
Universidad de las Fuerzas Armadas ESPE, Ecuador

The attenuation force generated by the use of magnetorheological fluid (FMR) during the expansion and compression of the shock absorber in robot grippers has been studied. The shock absorber has a stroke of 25 mm and a volume of 4 071.50 mm3 in which the FMR made up of ferric micro-particles and nanoparticles is housed; this fluid modifies its rheological properties when exposed to a magnetic field of variable intensity generated by an electromagnet. The intensity of the magnetic field is gradually varied in order to obtain an attenuated and controlled dynamic force in the dissipation of energy. The research includes an analysis of magnetic field generation with the purpose that the particles of the fluid are aligned according to the polarity of the flow lines, thus forming a fibrillary structure chained in a few milliseconds. This magnetic field modifies the viscosity of the fluid, taking it from a low viscosity to a higher density state without altering its chemical composition and shape. The results are reflected in the direct correlation and in the obtaining of data where the saturation of the fluid is given to a maximum

intensity of magnetic flux (B) of 0.01 Tesla; and a damping force of 6,12 Newtons. This concludes that the theoretical and experimental analysis of attenuation in FMR based buffers serve to mitigate impact excitations, in order to provide a buffered velocity of motion.

The influence of the ground thermal energy and borehole heat exchangers depth on the efficiency of heat pump (GHSP) systems in Moscow geo-climatic conditions

Gregory Vasilyev, Victor Gornov, Alexander Dmitriev and **Ms. Marina Kolesova**
JSC "INSOLAR-INVEST", Russia

F048

The article presents the results of the numerical estimation of the influence of temperature potential of the geothermal heat energy extracted from the soil with the use of GHSP and borehole heat exchangers depth on the efficiency of the GSHP systems in Moscow and Moscow region geo-climatic conditions. The paper provides the assessment of natural temperature potential of geothermal energy in Moscow region and proposes "typical climatic years" referencing the natural change of average decade and monthly ground temperatures for Moscow geo-climatic conditions. The authors found that consumption of ground thermal energy in specific ground conditions of Moscow region generally results in decreasement of temperature potential of the extracted heat by 5-6 degrees by the 10th year of operation and by the 15th year the process is stabilized. The studies in the paper allow establishing that the borehole heat exchanger GSHP efficient depth for Moscow and Moscow region geo-climatic conditions is close to 60 meters. In this case the temperature potential of the geothermal heat energy extracted during many years of GSHP usage can be expected at the level of 5-10 degrees below Celsius.

Preparation and numerical simulation of heat transfer performance for methyl palmitate /expanded graphite phase change composite

Dr. Bichuan Chi; Yan Yao and Suping Cui
Beijing University of Technology, China

F009

Methyl palmitate (MP) is a promising phase change energy storage material. It features high latent heat, suitable phase change temperature, low degree of supercooling and so on. However, like other organic phase change materials, the common problem of lower thermal conductivity makes it unable to perform better in energy storage. Expanded graphite (EG) has been proven to be high-efficiency for enhancing the thermal conductivity of organic phase change materials. MP/EG phase change composite was prepared and characterized in this research, and the heat transfer performance was numerical simulated by finite element analysis software ABAQUS. Results show that MP can be absorbed into the layered pores of EG, and the stable absorption ratio is 77%. Numerical simulation results reveal that EG can significantly enhance the heat transfer performance of MP. Moreover, EG can decrease the system temperature gradient during phase change process that makes the heat transfer and temperature distribution more uniform.

Duplex Stainless Steel Subjected to Normalized Thermal Treatment

F039

Dr. Laura Sáenz, Jesús Chávez, Rubén González, Abraham Corona and Zuleika Tineo.
Universidad de las Fuerzas Armadas, ESPE, Ecuador

In the research, the mechanical behavior of duplex stainless steels SAF 2205 and 2507 subjected to Normalized thermal treatments at temperatures at temperatures

of 900, 950 and 1000 ℃ for a time of 7 minutes for SAF 2205 and 15 minutes for SAF 2507 were evaluated. It was determined that the mechanical strength increased considerably the higher value was found at 900 ℃. It was determined that the KIC values for the normalized conditions of 900 ℃ and 950 ℃, reduce strongly in both steels with respect to the original condition. However, it is clearly reflected that for the normalized condition at 1000 ℃ the KIC is fully recovered, and for the temperature range of 700 ℃ to 900 ℃, the values of impact toughness suffer a drastic decrease, caused by the appearance of intermetallic phases.

Coffee Break

16:05-16:25

Listener

L001

Prof. Daehyun Cho
Gyeongnam National University Of Science and Technology (Gntech), Korea

L002

Dr. Huoqing Liu
Nanjing University of Information Science & Technology, China

L003

Mr. Chaochun Lin
Shanxi Research Institute of Applied Chemistry, China

Author Index

One Day Visit-Salt Lake City

Date： August 4, 2019

Place： Salt Lake City

Time： 9:00-17:00

Gathering Place: University Guest House & Conference Center (110 S. Ft. Douglas Blvd. Salt Lake City, UT 84113-5036)

Route: Temple Square- Beehive House-Utah State Capitol Building- Hill Aerspace Museum-Antelope Island State Park- Great Salt Lake

Attention:

- This visit will charge **100USD** for each**.**
- or you could choose to enjoy free time on August 4 to explore Salt Lake City by yourself;
- Please be there on time, or you will miss the visit.
- The fees including: Traveling route, lunch, English guide and traveling bus service
- The itinerary / duration to visit may change without advance notice depending on group size or unexpected local situation.
- The participants should go to the assembly point by themselves, no pick-up service.
- Should you have any more doubt, please contact us via: icafm@sciei.org

Service excludes:

- Personal expenses (not mentioned above).

Scenic Introduction

Temple Square is much more than a religious icon. It's a collage of fascinating history, singular architecture, and gourmet dining. Temple Square in Salt Lake City is Utah's most popular tourist destination. Part of its appeal lies in its accessibility: three city blocks in downtown Salt Lake City contain nearly 20 attractions related to Mormon pioneer history and genealogy, including the Salt Lake Temple, the Tabernacle, and the Family History Library. This means that visitors can see all or most of these attractions in a relatively short period of time.

The Beehive House was Brigham Young's primary residence while serving as President of The Church of Jesus Christ of Latter-day Saints and governor of the Utah Territory. The house is named for the beehive which adorns the top of the structure and represents the strong work ethic exhibited by the early Saints as they labored to establish the State of Deseret.

Truman O. Angell, architect of the Salt Lake Temple, assisted President Young in the design of the home. Upon its completion in 1854, Mary Ann Angell Young and Lucy Decker Young, two of President Young's wives, moved into the Beehive House.1

The Beehive House served as the location where President Young would entertain distinguished guests and others who visited the early Salt Lake community including Mark Twain, Presidents Ulysses S. Grant, and P.T. Barnum.2 It contained a total of fourteen rooms, which were often occupied with visitors and guests.

Utah State Capitol Building: For nearly a century, the State Capitol has been one of Utah's most prominent landmarks. Designed by local architect Richard K. A. Kletting, the Capitol has been home to state government since its opening in 1916. From 2004 to 2008, the Utah State Capitol underwent one of the largest historical preservation projects in the United States. In addition to safe-guarding the building against the risk of an earthquake, the project also repaired and restored the original beauty and artwork of the Capitol. Each year, thousands of people visit the Capitol to witness its modern magnificence and historic significance. The Capitol Building is open 7 days a week for public access. Free guided tours start on the hour and run from 9:00 a.m. to 5:00 p.m. Monday - Friday, with the exception of state holidays. The last tour begins at 4:00 p.m.

Hill Aerospace Museum is located on approximately 30 acres of the northwest corner of Hill Air Force Base, five miles south of Ogden, Utah. The Museum, which opened in 1986, was founded in 1981 as a part of the United States Air Force Heritage Program. The Utah Museum moved to its current facility in 1991 and hosted its four millionth visitor in the spring of 2014. More than 320,000 visitors, coming from every state and from many foreign countries, visited the Museum last year. Not only does the Museum have close to 100 aircraft displayed in its two inside galleries and outside air park, it exhibits thousands of artifacts depicting the history of aviation of the United States Air Force, Hill Air Force Base and the State of Utah.

Antelope Island State Park is a great place to view wildlife. The island was without its namesake antelope for many years, but they were reintroduced in 1993 and can now be seen in many areas of the park. Deer, bobcats, coyotes, many varieties of birds and waterfowl also call the island home. But most famous is Antelope Island's American Bison, introduced to the island in 1893 and now numbering some 600 animals. Wild animals are often seen by people driving the park roads and hiking or biking the park's trails. The annual bison roundup each fall is a particularly good time to view the bison.

The Great Salt Lake is one of the most asked-about tourist destinations in Utah. A remnant of the massive ancient Lake Bonneville, the lake is now landlocked and its waters are salty. It is the largest lake between the Great Lakes and the Pacific Ocean, and is the largest saltwater lake in the Western Hemisphere.

Legends abound about the lake. Early explorers thought the lake was an inland extension of the Pacific Ocean, or that a river connected the lake to the ocean. Some Indians and early settlers thought the lake was inhabited by a terrible monster with an enormous head. The lake and its legends are an intriguing part of Utah's landscape and history.

MEMO