

# ICMEMSCE2021 WEBINAR CONFERENCE

2021 9<sup>th</sup> International Conference On Mechanical Engineering, Materials Science And Civil Engineering

December 7, 2021 | On Zoom



## Welcome Messages

Dear colleagues,

It is our great pleasure and privilege to welcome you to the virtual edition of ICMEMSCE2021, the 2021 9<sup>th</sup> International Conference On Mechanical Engineering, Materials Science And Civil Engineering. The conference will be held from December 7, 2021 and is now accessible to registered participants worldwide.

On this great gathering, Organizing Committee invites participants from all over the globe to take part in this annual conference with the theme "Mechanical Engineering, Materials Science And Civil Engineering". ICMEMSCE2021 aims to bring together researchers, scientists, engineers, and scholar students to exchange and share their experiences, new ideas, and research results about all aspects of materials science in Education, and discuss the practical challenges encountered and the solutions adopted.

Papers submitted to ICMEMSCE2021 will be reviewed by technical committees of the conference. All accepted and registered papers will be published in Materials Science Forum [ISSN print 0255-5476 ISSN cd 1662-9760 ISSN web 1662-9752, Trans Tech Publications]. And the press will submit all papers to major databases such as EI Compendex, Scopus, Scholar and many other major databases.

We would like to thank and welcome everyone, and hope you will enjoy ICMEMSCE2021.

## Supported By



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## **Note:**

- All the participants are strongly advised to attend 10 minutes before the Webinar is start.
- Zoom ID and instructions will also be sent 4 days before the conference.
- The standard time for all programs is Beijing Time.

## **Instructions about Oral Presentation**

- Materials Provided by the Presenters: PowerPoint or PDF files
- Duration of each Presentation: Regular Oral Session: About 10 Minutes of Presentation and 2 Minutes of Q&A.

# Committee

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# Time Schedule (Beijing Time, GMT+8)

December 7<sup>th</sup>

|                  |   |
|------------------|---|
| 9:25-9:30        | <b>Opening Speech</b>   |
| 9:30-10:30       | <b>Plenary Session</b>  |
| 9:30-10:00       | <b>Magnetic health monitoring for fatigue cracks in steels</b><br>Prof. Katsuyuki Kida   University of Toyama, Japan  |
| 10:00-10:30      | <b>Nanoparticle based gas sensor towards medical application</b><br>Prof. Mrinal Pal   CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI) Principal Scientist, India   |
| 10:30-14:30      | <b>Keynote Session</b>  |
| 10:30-11:00      | <b>Demountable Reinforced Concrete Structures-An Overview</b><br>Prof. R.Kumutha   Sri Venkateswara College of Engineering, India   |
| 11:00-11:30      | <b>Nanofluids and Hybrid nanofluids–Inception and Advancement</b><br>Prof. Muhammad Ramzan   Department of Computer Science, Bahria University Islamabad, Pakistan  |
| 11:30-12:00      | <b>Design of Electrocatalysts and their Potential Applications in Metal-air Batteries</b><br>Dr. Kwun Nam Hui   Institute of Applied Physics and Materials Engineering, University of Macau, Macau SAR, China                       |
| 12:00-12:30      | <b>A Perspective on The Future of Materials for Automotive Engineering: Additive-Manufactured Multi-Material Metamaterial (AM-4M) Structures</b><br>Dr. Mohammad Azadi   Faculty of Mechanical Engineering, Semnan University, Iran |
| 12:30-13:00      | <b>FATE &amp; TRANSPORT OF MICROPLASTICS IN URBAN ENVIRONMENT</b><br>Prof. Hossein Ganjidoust   Tarbiat Modares University, Iran  |
| 13:00-13:30      | <b>Analysis and characterization of quaternary alloys nanoparticles for optoelectronic and biomedical potential applications</b><br>Prof. Yarub Al-Douri   American University of Iraq, Iraq  |
| 13:30-14:00      | <b>Planar and Axisymmetric Ideal Flows in Pressure – Dependent Plasticity</b><br>Prof. Sergei Alexandrov   Ishlinsky Institute for Problems in Mechanics RAS, Russia  |
| 14:00-14:30      | <b>Helical structures: geometry, stress-strain analysis and rationalization</b><br>Prof. Marina Rynkovskaya   Civil Engineering at Peoples' Friendship University of Russia, Russia   |
| 14:30-14:40      | <b>Photo &amp; Break</b>  |
| <b>Paper ID:</b> | <b>Oral Session</b>   |
| 8                | <b>Influence of a micro-arc oxidation/poly-lactic acid composite coating on corrosion resistance of extruded Mg-2Zn-0.5Zr-1.5Dy (mass%) alloy</b><br>Huan Li   Henan University of Science and Technology, China                    |
| 9                | <b>Effect of solution temperature on microstructure and properties of Mg-2Zn-0.5Zr-1.5Dy alloy</b><br>Yuan Gong   Henan University of Science and Technology, China   |
| 14               | <b>Targeted design and analysis of layered bimetal Me-Cu/SiO<sub>2</sub> catalyst with superhigh dearsenic performance</b><br>Xiaolong Zhao   Liaoning Shihua University, China   |
| SC918            | <b>Evaluation of Hardness Distributions around Fracture Surface in Induction-Heated SUJ2 Steel after Rotating Bending Fatigue Test</b><br>Koshiro Mizobe   University of Toyama, Japan  |
| SC920            | <b>Effect of Natural Surface Defects on Flaking Failure of 13Cr-2Ni-2Mo and SUS 440C Stainless Steel Ball Bearings</b><br>Katsuyuki Kida   University of Toyama, Japan  |
| SC921            | <b>Weibull Distribution to Evaluate the Reliability of PEEK Thrust Bearings under Rolling Contact Fatigue in Water</b><br>Kerrie Gray   University of Toyama, Japan   |

## Speakers



**Prof. Katsuyuki Kida**

University of Toyama, Japan

**Speech Title:** "Magnetic health monitoring for fatigue cracks in steels "

Professor Katsuyuki Kida was born in 1968 in Osaka, where he studied mechanical engineering at Osaka University from 1988. Apart from course work, he studied rolling contact fatigue (RCF) occurring in TiC and TiN coated steels using both X-ray diffraction and scanning acoustic microscopy. After graduation he pursued his academic career and obtained a Ph.D. in engineering mechanics in 2000, investigating RCF problems of all-Si<sub>3</sub>N<sub>4</sub> bearings. By observing cracking and flaking failure under RCF, he succeeded in explaining the material's features from the viewpoint of fracture mechanics. From 2000 he focused his work on investigating the contact problems of several materials used in machine elements. He has also continued fundamental research on contact problems, for which he received 'The Best Paper Prize (FFEMS PRIZE)' from 'Fatigue & Fracture of Engineering Materials & Structures' journal in 2005. The awarded papers reported establishing a crack growth mechanism under contact pressure, a problem previously unsolved for over 70 years since S. Way's proposed theory. His research interests now include the development of three dimensional scanning Hall-probe microscope technologies, fatigue phenomena in polymer bearing, crack growth mechanism under contact stresses and refinement of high-carbon steels. He holds and has held a number of prestigious leadership roles in academy-industry corroboration programs: refinement of steels, new joint system in humanoid robots and fatigue of polymer bearings in "Strategic Fundamental Technologies Strengthening Assistance Programs" (Ministry of Economics, Trade and Industry, Japan, 2009-2013); scanning Hall-probe microscopy in "Fundamental Studies on Technologies for Steel Materials with Enhanced Strength and Functions" (Consortium of the JRCM, Japan, 2008-2012); and ceramic bearing elements in the project supported by "Japanese Energy and Industrial Technology Development Organization" (NEDO, Japan, 2007-2011)." As a chairperson of department of mechanical engineering in University of Toyama, Professor Kida is heading education and research projects (2019-).



**Prof. Mrinal Pal**

**CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI) Principal Scientist, India**

**Speech Title:** "Nanoparticle based gas sensor towards medical application"

Dr. Pal carried out his research work at Indian Association for the Cultivation of Science and got Ph.D. degree in 1997 from Jadavpur University. He started his Post-Doctoral venture with a short term assignment at University of Roma, Italy under the framework of an Indo-Italy exchange project. He successfully completed the prestigious Science and Technology Association (STA) fellowship of Govt. of Japan during 1998-2000. He also made a short term visit to Kotelnikov Institute of Radio-engineering and Electronics, MOSCOW under an Indo-Russian exchange project. Dr. Pal joined as a Lecturer in Physics at The University of Burdwan in May 2002 in Solid State Physics group. He moved to CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI), a premier research institute, in 2010 as Principal Scientist. Presently, he is a Senior Principal Scientist (Professor) at CSIR-Central Glass and Ceramic Research Institute (CSIR-CGCRI) and fully involved in synthesis of materials and fabrication of devices in the area of nanomaterials based semiconductor gas sensors prepared by chemical route for monitoring environment and human health. He has published more than 110 research articles in the International Journals of high repute. Dr. Pal has supervised 7 Ph.D.'s, 2 candidates are in the pipelines. He completed 7 Major Research Projects and 3 are ongoing sanctioned by different funding agencies. He contributed 5 Chapters in the different important books including Encyclopaedia on Nanoscience and Nanotechnology. He has also delivered several Plenary talks in the conferences, acted as a Chairman for various technical sessions and also organised many conferences in various capacities. He has been serving as one of the potential Referees to various International Leading Journals of ACS, RSC, Elsevier, Springer-verlag, Wiley and many Indian journals. He is also serving /served as key members in various research bodies. To mention few, he has served as an Advisory Board member of South African Nanoscience Initiative (SANi). Also, he is Executive committee member of West Bengal State Council of Science and Technology. Dr. Pal served as Member in Apex body (Court) of The University of Burdwan, Planning committee member of West Bengal State Council of Science and Technology. He received Materials Research Society of India (MRSI) Medal in 2016. Dr. Pal became a Fellow of West Bengal Academy of Science and Technology in 2018.



**Prof. R.Kumutha**

**Sri Venkateswara College of Engineering, India**

**Speech Title: "Demountable Reinforced Concrete Structures-An Overview"**

Dr.R.Kumutha is presently Professor & Head, Department of Civil Engineering, Sri Venkateswara College of Engineering, Sriperumbudur which is one of the Prestigious Higher Education Institutions in Tamilnadu, India. Her research area is Fibre reinforced Polymer Composites, Geopolymers and Sustainability in Construction. Dr.R.Kumutha has published papers in 55 International/National Journals out of which 24 Journal Publications are Scopus Indexed with 329 Citations and H index of 8 and 663 Citations in Google Scholar and H index of 10. Dr.R.Kumutha had received funded projects from Department of Science & Technology, University Grants Commission and AICTE, New Delhi. In total, she has fetched a grant of about Rs.40 lakhs from various funding agencies. In recognition of her outstanding research contributions, her Biographical profile has been included in Marquis who's who in the World 2009. Dr.R.Kumutha is the recipient of many Prestigious awards like Shayesta Akhtar Memorial National Award for Best Women Engineering College Teacher for the year 2018 from Indian Society for Technical Education, New Delhi, Prof. K Arumugam National Award for Innovative research in Engineering & Technology for the year 2014 from ISTE, New Delhi, State Award for Best Engineering College Teacher for the year 2016 from ISTE, Tamilnadu & Pondicherry Section and Best Guide Award from Entrepreneurs Council of India in National level Paper Presentation contest. She played the role of Scientific Committee member, Keynote Speaker and Session Chair in several International Conferences held in Singapore, Dubai and Czech Republic and she has also delivered Expert lectures for many Technical Institutions in India.



**Prof. Muhammad Ramzan**

Department of Computer Science, Bahria University Islamabad, Pakistan

**Speech Title: "Nanofluids and Hybrid nanofluids–Inception and Advancement"**

EDUCATION: Ph.D. (Mathematics), Quaid-i-Azam University, Pakistan, 2010. M.

Sc in Mathematics, Punjab University, Pakistan, 1992. Master's in Business Administration| Preston University, Pakistan, 1998.

EXPERIENCE: Professor :Bahria University, Islamabad, Pakistan. Assistant Professor: Majmaah University, College of Science, Al-Zulfi, Saudi Arabia; Mohammad Ali Jinnah University (MAJU), Islamabad, Pakistan; Bahria University, Islamabad, Pakistan; Lieutenant PN: Pakistan Navy, Pakistan, DEC 1994 – SEPT 2000.

AWARDS/ACHIEVEMENTS/MOST PROUD OF: Included in the list of top 2% scientists of the world; An independent study conducted by Stanford University, USA, 2021 and 2020. Visiting Professor, Jiangsu University, China 2018-2019. Visiting Professor, Sejong University, South Korea 2017-2020. Best Researcher 2019-20, Professor Category, Bahria University, Islamabad. Best Evaluation report in Professor category, Bahria University, Islamabad, 2019-2020. Keynote Speaker, 8th International Conference and Workshop on Basic and Applied Sciences (ICOWOBAS), Indonesia, August 25-26, (2021). Best Paper Award at 7th ICAT (International Conference on Advanced Technologies) conference, Antalya, Turkey, April 28 - May 1, 2018. Best Presenter Award at 4th ICONTES (International Congress on Technology - Engineering & Science conference, Kuala Lumpur, Malaysia, August 5-6, 2017. Started MS/Ph.D. (Mathematics) programs at Bahria University, Islamabad, Pakistan. Declared as an "Excellent Professor" for the year 2010-2011 by Mohammad Ali Jinnah University, Islamabad, Pakistan. Recipient of Research Productivity Award announced by "Ministry of Science and Technology, Pakistan" for the year 2010-11. Recipient of HEC Ph.D. Indigenous Scheme Scholarship. Got accelerated promotion in the account of outstanding performance in Research and Students Evaluation in 2009 at Bahria University. HEC Approved Supervisor for conducting Ph.D. degree. Nominated for Izzat-i-Fazeelat (Presidential Award) by Bahria University for the year 2009-10. Member Higher Education Commission (HEC) Inspection team since 2016, Accreditation Directorate, Visited about 80+ Universities across Pakistan for NOC issuance.





**Prof. Kwun Nam Hui**  
**Institute of Applied Physics and Materials Engineering, University of Macau, Macau SAR, China**

**Speech Title:** "Design of Electrocatalysts and their Potential Applications in Metal-air Batteries"

Dr. Kwun Nam Hui received his B.Sc. degree in physics from the Hong Kong University of Science and Technology in 2003. He obtained his M.Phil. (2006) and Ph. D. degree (2009) in Electrical and Electronic Engineering from the University of Hong Kong. He is an Associate Professor at the Institute of Applied Physics and Materials Engineering of the University of Macau. His current research focuses on the design and synthesis of nanostructured materials for electrochemical energy storage and conversion, including batteries, supercapacitors, and fuel cells. He has published more than 180 journal articles with a citation of over 6000 times and an h-index of 48 (Goolge Scholar).



**Prof. Mohammad Azadi**  
**Faculty of Mechanical Engineering, Semnan University, Iran**

**Speech Title:** "A Perspective on The Future of Materials for Automotive Engineering: Additive-Manufactured Multi-Material Metamaterial (AM-4M) Structure"

Mohammad Azadi was born in Shiraz, Iran in 1983. He received B.Sc. and M.Sc. degrees in mechanical engineering from Shiraz University, Shiraz, Iran and K.N. Toosi University of Technology, Tehran, Iran, respectively, in 2006 and 2008; and then, the PhD degree in mechanical engineering from Sharif University of Technology, Tehran, Iran, in 2013. During his PhD, he has awarded an exchange program by the Ministry of Science, Research and Technology and also Irankhodro Powertrain Company, in order to perform a fatigue testing project at the University of Leoben, Leoben, Austria, 2012. From 2008 to 2015, he has worked in Irankhodro Powertrain Company, Tehran, Iran and for the last two years, he was a project manager of a national turbo-charged engine. Since 2015, he has been an Assistant Professor in the Faculty of Mechanical Engineering, Semnan University, Semnan, Iran. Now, he is an Associate Professor, since 2019. He is the author of two chapter-books, two conference proceedings, more than 100 journal articles, about 120 conference papers, and 13 patents. He has been also funded to perform 8 research projects by Iranian universities and industries; in addition to one international project, entitled "Iran-Austria Impulse". He is the editor-in-chief of the International Journal of Additive-Manufactured Structures and also, an advisory board of the International Journal of Engineering, and also a reviewer in different ISI journals, such as the International Journal of Fatigue, Materials Science and Engineering A, etc. His research interests include solid mechanics, fatigue, fracture, creep, and wear plus to numerical methods, surface engineering, materials characterization, design of experiments, with the application of engine, aerospace, and automotive industries, besides biomechanics. Nowadays, he is working on additive manufacturing to fabricate composites and nano-composites by 3D-printing, in order to evaluate fatigue properties of materials. Moreover, 4D-, 5D-, and 6D-printing is interested besides the bi- and multi-material meta-materials



**Prof. Hossein Ganjidoust**  
**Tarbiat Modares University, Iran**

**Speech Title:** "FATE & TRANSPORT OF MICROPLASTICS IN URBAN ENVIRONMENT"

Hossein Ganjidoust received his BS in Chemical Engineering from Kansas State University, Manhattan, Kansas in 1976, 1st MS in Industrial Management from Central Missouri State University, Warrensburg, Missouri in 1977 and 2nd MS in Sanitary Engineering from the University of Missouri-Columbia in 1978 and PhD in Environmental Engineering from the University of Missouri-Rolla in 1988. From March 1995 to April 1996, he was on a Year of Sabbatical Leave At The National Institute for Resources & Environment (NIRE), Tsukuba Science City, Tsukuba, and Ibaraki, Japan. He has over 30 years experience in teaching and research in graduate levels and is presently engaged as Full Professor in the Department of Environmental Engineering, Civil & Environmental Engineering Faculty, at Tarbiat Modares University in Tehran, I.R. Iran. Dr. Ganjidoust's research interests include water & wastewater, industrial and hazardous waste handling, treatment and disposal. He has supervised more than 20 research projects, and many PhD and MS students' thesis. At present time, he has supervisor of 6 PhD theses and 8 MS thesis. He has published over 120 papers in scientific national and ISI Journals and over 150 conference proceedings on his research. He is co-author of the book entitled: "Application of Moving Bed Biofilm Reactor (MBBR) in Sanitary & Industrial Wastewater Treatment", Tarbiat Modares Univ. Published in February 2011 and a chapter on: "Hazardous Waste Management in Islamic Republic of Iran, HWM Policies and Practices in Asian Countries" published by Asian Productivity Organization (APO), Tokyo in October 2001.



**Prof. Yarub Al-Douri**  
**American University of Iraq**

**Speech Title:** "Analysis and characterization of quaternary alloys nanoparticles for optoelectronic and biomedical potential applications"

Prof. Dr. Yarub Al-Douri from American University of Iraq, Sulaimani. Al-Douri is a winner of World's Top 2% Scientist Career-Long Citation Impact by Stanford University, USA 2020, World's Top 2% Scientists by Stanford University, USA 2020, OeAD Award, Austria 2020, Japan Society for the Promotion of Science (JSPS) Award 2019, Asian Universities Alliance (AUA) Award 2019, Iraqi Forum for Intellectuals and Academics Award (IFIA) 2019, TWAS-UNESCO Associateship (Twice) Award 2015 & 2012 and Best Paper Award at Global Conference on Energy and Sustainable Development in UK 2015, the total is 69 awards. He has received numerous accolades. Al-Douri has initiated Nanotechnology Engineering MSc Program and Nano Computing Laboratory, the first in Malaysia. Al-Douri is a supervisor of more than 22 PhD and MSc students. Furthermore, external examiner for many of post-graduates' viva-voce, McGraw-Hill's publisher books and referee of King of Jordan Abdulla II bin Al-Hussein for Creative (Field: Recent Applications in Solar Energy). Al-Douri is Editor-in-Chief of Experimental and theoretical NANOTECHNOLOGY, and Associate Editor of Nano-Micro Letters (IF= 16.419, Q1). Al-Douri has more than 725 publications currently including patents, books, chapters review, papers, articles and conferences and US\$ 4.5M research grants. He has Citations = 7841, h-index = 40 & i10-index = 237 for the moment.





**Prof. Sergei Alexandrov**  
**Ishlinsky Institute for Problems in Mechanics RAS, Russia**

**Speech Title:** "Planar and Axisymmetric Ideal Flows in Pressure – Dependent Plasticity"

Sergei Alexandrov's field of study was Plasticity theory, Constitutive Equations, Fracture mechanics, Modeling of Metal Forming Processes, Structural Design. Sergei Alexandrov's education: 1. April, 1994, Doctor of Science in Physics and Mathematics, The Supreme Certificate Committee of the Russian Federation, theory of plasticity. 2. March, 1990, Candidate of Science (Ph.D.) in Physics and Mathematics, Kuibyshev State University (Kuibyshev), theory of plasticity of porous and powder materials. 3. September 1981 to July 1987, M.Sc. in Mechanical Engineering, All Union Machine-Building Institute (Moscow), Modeling of metal forming processes. Sergei Alexandrov now is Ishlinsky Institute for Problems in Mechanics, Russian Academy of Sciences (Moscow, Russia) Research Professor. Beihang University (Beijing, China) Research Professor under the sub-program of the "Recruitment Program for Global Experts" (the "1000 Talent Plan"). Sergei Alexandrov publications and related activity included 4 monographs, about 315 journal publications, about 240 publications in journals indexed in SCIE, section editor of Encyclopedia of Continuum Mechanics (Springer, <https://meteor.springer.com/continuummechanics>). Member of the Advisory Board of Scholarly Community Encyclopedia (<https://encyclopedia.pub/>). Guest editor of the special Issue "Advances in Innovative Engineering Materials and Processes" of Processes (2020, in progress). Guest editor of the special issue "Analysis and Design of Structures Made of Plastically Anisotropic Materials" of Symmetry (2020, in progress). Guest editor of the special issue "Analysis and Design of Metal Forming Processes" of Metals (2020, in progress). Editor of the book "Analysis and Design of Structures Made of Plastically Anisotropic Materials", MDPI, 2020, ISBN 978-3-03936-839-6. Guest editor of the special issue "Materials for Modern Technologies VI" of Materials Science Forum (2020, V.1003). Guest editor of the special issue "Analysis and Design of Structures Made of Plastically Anisotropic Materials" of Symmetry (2019, V.11). Guest editor of the special issue "Analytic and qualitative methods in elasticity and plasticity" of Structural Engineering and Mechanics (2016, V.58, No.4). Guest editor of the special issue "Deformation processes of rigid plastic materials" of Materials Science Forum (2009, V.623).



**Prof. Marina Rynkovskaya**  
**Civil Engineering at Peoples' Friendship University of Russia, Russia**

**Speech Title:** "Helical structures: geometry, stress-strain analysis and rationalization"

Dr. Marina Rynkovskaya (Rynkovskaya-mi@rudn.ru) is an associate professor at department of Civil Engineering at Peoples' Friendship University of Russia (RUDN University). She obtained BSc and MSc degrees in Civil Engineering in 2002 and 2004 respectively at Peoples' Friendship University of Russia (RUDN University). Since 2003 she had worked as a project engineer in industry for 10 years and defended her PhD thesis in Structural Mechanics at Moscow State University of Railway Engineering (MIIT) in 2013. Since 2006, she has worked at RUDN University (including as an associate professor since 2014). The main research topic concerns analytical methods of stress-strain analysis of spatial/shell structures, especially helicoids, optimization problems of shells, ecological aspects of shell structures. Since 2018 she is a member of the International Association for Spatial Structures (IASS). She is also involved in several research projects such as optimization of free-form roofs (in collaboration with CentraleSupélec, France) and stress solution for elastic/plastic FGM discs (in collaboration with Beihang University, China). She has the Honorary Diploma of the Rectorate of the RUDN University for active scientific and pedagogical activity (2016), the best teacher award of the Moscow City Professional Competition of Pedagogical Excellence and Public Recognition in the nomination "Young Teacher of the University - 2012", won several grants (Potanin grant for professors in masters programs 2020-2021, DAAD 2019, RFBR 2014, 2015, etc).

## Oral Session

### Paper ID: 8

#### **Title: Influence of a micro-arc oxidation/poly-lactic acid composite coating on corrosion resistance of extruded Mg-2Zn-0.5Zr-1.5Dy (mass%) alloy**

**Abstract:** Micro-arc oxidation (MAO) coating can significantly slow down the repaired degradation rate of biodegradable magnesium alloy, but the porous characteristics of the coating cannot provide long-term protection to magnesium alloy. In this paper, poly-lactic acid (PLA) was used to seal the porous MAO coating on the surface of extruded Mg-2Zn-0.5Zr-1.5Dy (mass%) magnesium alloy by a dipping coating method. Assessments were conducted by electrochemical experiment, immersion test, and hydrogen evolution experiment. The result shows that after the MAO-coated sample was dipped in PLA solution four times, the PLA could largely seal the porous and cracks of the MAO coating, and a dense MAO/PLA composite coating with a thickness of  $\sim 50 \mu\text{m}$  was prepared. The MAO/PLA composite coating provides good and stable protection to the alloy under 0~56 d immersion in the simulated body fluid than the single MAO coating, which shows an excellent application potential in the field of biodegradable magnesium alloy.

### Paper ID: 9

#### **Title: Effect of solution temperature on microstructure and properties of Mg-2Zn-0.5Zr-1.5Dy alloy**

**Abstract:** The purpose of this paper is to investigate the effect of solution temperature on the microstructure and properties of Mg-2Zn-0.5Zr-1.5Dy alloy was studied by optical microscopy (OM), immersion experiment and electrochemical experiment. The results show that the alloy has the best comprehensive properties when the solution temperature is  $470^\circ\text{C}$ . The minimum average grain size was  $97 \mu\text{m}$ . The  $I_{\text{corr}}$  and  $E_b$  of as-cast alloy are  $-3.55 \mu\text{A}/\text{cm}^2$  and  $-1.27 \text{ V}$ , respectively, according to polarization curve fitting. With the increase of solution temperature, the value of  $I_{\text{corr}}$  first decreases and then increases, and  $E_b$  first increases and then decreases. After solution treatment at  $470^\circ\text{C}$ ,  $I_{\text{corr}}$  and  $E_b$  are  $1.41 \mu\text{A}/\text{cm}^2$  and  $-1.14 \text{ V}$ , respectively.

### Paper ID: 14

#### **Targeted design and analysis of layered bimetal Me-Cu/SiO<sub>2</sub> catalyst with superhigh dearsenic performance**

**Abstract:** Arsenic element is widely present in crude oil. Because of its lively chemical structure, in the process of crude oil processing into refined oil, arsenic compounds can react with catalytic hydrogenation and restructuring process of platinum, palladium and other precious metal catalysts. This situation will lead to the catalyst be inactivation for permanently, and affect the normal progress of process production and it will bring huge economic losses. In addition, arsenides have some biotoxicity for human-beings. The presence of arsenic is a hazard to both health and living environment with the highly utilization of petroleum products.

Traditional dearsenic catalysts mainly use physical adsorption, but there are some disadvantages such as small arsenic capacity, poor selectivity and poor stability. At present, our laboratory use steam ammonia method to prepare Cu/SiO<sub>2</sub> molecular sieves with layered structure firstly, which not only have a high specific surface area, appropriate aperture and adsorption performance, but also distributed within high dispersion all over the body phase evenly. Besides, the molecular sieves have the adsorption active sites of Cu<sup>2+</sup> and -OH. These features are beneficial to improve the arsenic capacity of the catalyst and to increase the selection specificity during its adsorption. On this basis, three active metals of Fe, Mn and Cr were loaded to prepare the duplex metal catalyst system and study its dearsenic performance of industrial crude oil products.

The results show that the three bimetal loading catalysts prepared in the laboratory are better than the commonly used industrial agents. The secondary loaded active metals Fe, Mn, and Cr all promoted the dispersion of Cu in the molecular sieve matrix, and the load of active Cu was nearly three times higher than the industrial agents. The oxidation performance of the catalyst is also enhanced, and the catalyst surface exposed more active sites. Among them, the Cr-Cu/SiO<sub>2</sub> catalyst has the strongest dearsenic performance, as high as 99.19 % for industrial crude oil with an arsenic-containing quality fraction of  $609.97 \mu\text{g}/\text{g}$ .

### Paper ID: SC918

#### **Title: Evaluation of Hardness Distributions around Fracture Surface in Induction-Heated SUJ2 Steel after Rotating Bending Fatigue Test**

**Abstract:** Induction-heated carbon steel is used in various mechanical parts, and the fracture mechanism from internal cracks is still being investigated. In order to explain the fracture mechanism of the induction-heated SUJ2 steel bar specimen, we investigated Vickers hardness distributions around the fracture surface after rotating bending fatigue test. We found the transition area near the fracture surface whose HV values decreased about 150 HV and this area was formed by the fatigue crack during the rotating bending fatigue test.

**Paper ID: SC920**

**Title: Effect of Natural Surface Defects on Flaking Failure of 13Cr-2Ni-2Mo and SUS 440C Stainless Steel Ball Bearings**

**Abstract:** The sectional observations of 13Cr-2Ni-2Mo and SUS 440C stainless steel ball bearings were done. Two features were found from the observations: parabolic-shaped cracks generated the flaking failure of 13Cr-2Ni-2Mo stainless steel bearing; jellyfish-shaped wear affected the flaking failure of SUS 440C stainless steel bearing.

**Paper ID: SC921**

**Weibull Distribution to Evaluate the Reliability of PEEK Thrust Bearings under Rolling Contact Fatigue in Water**

**Abstract:** Bearings are important in moving machinery. Today machines are used in varied fields, including environments where metals are not ideal materials. Industrial polymers are a possible alternative due to their mechanical properties, and the thermoplastic polymer Polyether ether ketone (PEEK) is suitable in many varied conditions. The failure mechanisms of PEEK are not fully understood, so the purpose of this study is to continue examining the relationship between load and rotation speed in rolling contact fatigue of PEEK thrust bearings in water conditions, to evaluate fatigue strength and life.