ICMMPM
July 19-20,2018 | Jeju Island,South Korea

CONFERENCE SCHEDULE

2018 International Conference on Metal Material Processes and Manufacturing (ICMMPM2018)

Jeju Island, South Korea

July 19-20, 2018

http://www.icmmpm.org/

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Web of Conferences

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Compendex on Engineering Village

Simple Version of the Schedule

July 19
p.m.

lobby of Jeju Hana Hotel

Hotel (13:00-17:30)

July 20
a.m.

- Plenary Speech (9:10-10:10)
- Photos &Coffee Break (10:10-10:30)
- Keynote Speech (10:25-11:25)
- Keynote Speech (11:25-12:25)

- Lunch (12:25-13:00)

July 20
p.m.

- Session 1 (13:00-15:00)
- Coffee Break (15:00-15:15)
- Poster Session (15:15-16:00)
- Session 2 (16:00-18:00)

Committee

Conference Chairs:

Prof. Dong-Won Jung, Jeju National University, South Korea

Technical Program Committees:

Professor Marcin Barburski, Lodz University of Technology, Poland

Dr.Roya Darabi, Jeju National University, South Korea

Dr. Wu-Le Zhu, Kyoto University, Japan

Professor Hwang Yi, Ajou University, South Korea

Dr. Oscar Hui, University of East Anglia, UK

Professor Ing. Abdullah Al-Janabi, Sultan Qaboos University, German

Professor Fatma Yalcinkaya, Technical University of Liberec, Turkey

Professor Huan-Liang Tsai, Da-Yeh University, Taiwan

Dr. Kim Si jin, Samsung Display Company, South Korea

Dr. BROURI Adil, Moulay Ismail University, Morocco

Professor GHORBEL Elhem, University of Cergy-Pontoise, France

Dr. Abdeen Mustafa Omer, Energy Research Institute (ERI), Nottingham, UK

Dr. Hugo Miguel Andrade Lopes Figueiredo da Silva, University of Minho, Portugal

Professor DEBILI MOHAMED YACINE, Badji-Mokhtar University, Algeria

Professor Mohamed Abdel Moneim Deyab, Egyptian Petroleum Research Institute (EPRI), Cairo, Egypt

Professor Ayssar Nahlé, University of Sharjah, Sharjah

Dr. Zh. Algazy, Satbayev University, Kazakhstan

Dr. RAJIV KUMAR, Goswami Ganesh Dutt Sanatan Dharam College, India

Dr. Subhasis Roy, University of Calcutta, India

Dr. Siamak Hoseinzadeh, Islamic Azad University, Iran

Dr. Yasin Polat, Erciyes University, Turkey

Prof. N.ETHIRAJ, Dr. M.G.R Educational and Research Institute, Chennai

Prof. Farid ABED-MERAIM, Laboratory of Microstructure Analysis and Mechanics of Materials, French

Prof. Osman ADIGUZEL, Ankara University, Turkey

Dr. Yasin Polat, Nevşehir Hacı Bektaş Veli University, Turkey

Assoc. Prof. Achanai Buasri, Silpakorn University, Thailand

Dr. Antonio Riveiro Rodríguez, University of Vigo, Spain

Prof. Ji Shijun, Jilin University, China

Dr. Brahim Safi, University M'hamed Bougara of Boumerdes, Algeria

Prof. Arnulfo Luévanos-Rojas,Autonomous University of Coahuila, México

Dr. Yanjun Li, Florida Atlantic University, USA

Assoc. Prof. Soumya Mukherjee, Amity University, India

Dr.Beddiaf ZAIDI, University of Batna 1, Algeria

Prof.Vineet Jain,Amity University Haryana,Gurgaon

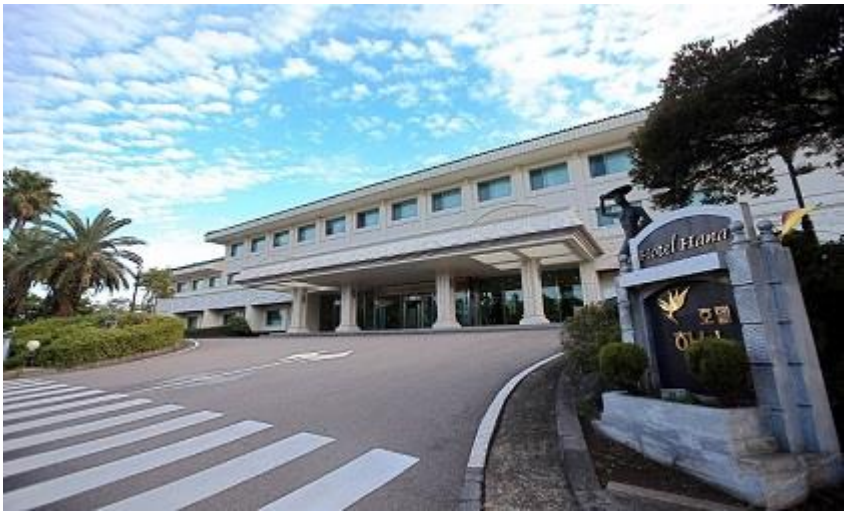
Conference Secretary

Dr. Rachel Ren, X-academy Co., Ltd, China

Venue

Conference venue: Jeju Hana Hotel, Jeju, South Korea

Add: 135, Jungmun Gwangwangjiroro, Seogwipo-city, Jeju-do, 697-808, Republic of Korea
Website: http://www.hotelhana.co.kr
Email: hotelhana@hotmail.com



ICMMPM

July 19-20,2018 | Jeju Island,South Korea

2018 Jeju National University CONFERENCE

ICMMPM2018 will be held on Jeju Hana Hotel.

This schedule is subject to change. Please visit the conference website often for the most current schedule.

CONFERENCE SCHEDULE as below

July 19 (Thursday)

lobby of lobby of Jeju Hana Hotel

13:00--17:30	Registration

July 20 (Friday) Meeting Room

09:00--09:10	Opening Ceremony
09:10--10:10	Plenary Speeches
10:10--10:25	Photos &Coffee Break
10:25--11:55	Keynote Speeches
11:55--12:25	Keynote Speeches
12:25--13:00	Lunch
13:00--15:00	Session 1
15:00--15:15	Coffee Break
15:15--16:00	Poster Session
16:00--18:00	Session 2

Note:

1. All the participants are strongly advised to arrive before 8：50, July 20, 2018.

2. Certificate of Participation can be collected at the registration counter.

3. Please copy PPT files of your presentation to the Dr. Ren when registration.

4. The organizer doesn't provide accommodation, and we suggest you make an early reservation.

5. If you want to deliver oral presentation but your paper is not in the session list, please contact us by Email: cfp@icmmpm.org (for ICMMPM2018)

Instruction about Oral Presentation

Devices Provided by the Conference Organizer:

Laptops

Projectors & Screen

Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF files

Duration of each Presentation:

Regular Oral Session: about 8-10 Minutes of Presentation and 3-5 Minutes of Q&A

Plenary Speech

Plenary Speech-1 09:10-09:40

Prof. Dong-Won Jung

Department of Mechanical Engineering, Jeju National University, South Korea

Title: The Parametric Study of Preheated U-bending with High Strength Steel in Roll Forming

Professor Dong-Won Jung works in School of Mechancial Engineering. He has rich experience in metal forming field. He is a professional reviewer of plenty Journals, such as KSME (Korean Society of Mechanical Engineers), KSPE(Korean Society for Precision Engineering), KSTP(Korean Society for Technology of Plasticity), KSAE(Korean Society for Automobile Engineers), Journal of Ocean Engineering and Technology, Journal of Korea Society for Power System Engineering, the Korean Journal of CAE, etc. He also has lot of publications and academic conference experiences.

Plenary Speech-2 09:40-10:10

Prof. Ching-Ting Lee (IEEE Fellow/ IET Fellow/ TVS Fellow)

Vice President, Department of Photonics Engineering, Yuan Ze University, Taiwan

Title: Progress fabrication of metal oxide films and devices

Prof. Ching-Ting Lee was born in Taoyuan, Taiwan. He received his B.S. and M.S. degrees in the Electrical Engineering Department of the National Cheng Kung University, Taiwan, in 1972 and 1974, respectively. He received his Ph.D. degree from the Electrical Engineering Department from the Carnegie-Mellon University, Pittsburgh, PA, in 1982.

He worked at Chung Shan Institute of Science and Technology, before he joined the Institute of Optical Sciences, National Central University, Chung-Li, Taiwan, as a professor in 1990. He joined on National Cheng Kung University as the Dean of the College of Electrical Engineering and Computer Science from 2003 to 2009, the honor chair professor of the National Cheng Kung University from 2018 and now is the Vice president of Yuan Ze University. Among the awards and honors, he has received are the Fellow of IEEE, the Fellow of IET, the Fellow of TVS, Fellow of Asia-Pacific Academy of Materials, the Outstanding Research Professor Fellowship from the Ministry of Science and Technology (MOST) (3 times), the Distinguish Service Award from the Institute of Electrical Engineering Society, the Optical Engineering Medal from the Optical Engineering Society, the Distinguish Electrical Engineering Professor Award from the Chinese Institute of Electrical Engineering Society, the Distinguish Engineering Professor Award from the Chinese Institute of Engineers, the Excellent Research Award of Technology Transfer and Cooperation between Industry and University from the National Cheng Kung University, the Yu-Ziang Hsu Scientific Chair

Professor from the Far Eastern Science and Technology Memorial Foundation, and The Kwoh-Ting Li Honorary Scholar Award from the National Cheng Kung University.

He is the chair professor of the National Cheng Kung University, National United University, Da-Yeh University and Yuan Ze University. His current research interests include nano materials and devices, light emission of Si nanoclusters, solar cells, GaN-based light-emitting diodes, GaN-based field effect transistors. His research activities have also investigated material oxide material and devices, III-V semiconductor lasers, photodetectors and high-speed electronic devices, and their associated integration for electrooptical integrated circuits

10:10-10:25	Photo and Coffee Break

Keynote Speech

Keynote Speech-1 10:25-10:55

Prof.Han-Yong Jeon

Department of Applied Organic Materials Engineering, Inha University, South Korea

Title: Analysis of Sustainable Performance of Reinforced Geosynthetics to Predict Long-Term Service Period by Reduction Factor Determination

Prof. Han-Yong Jeon, geosynthetics/technical organic materials researcher, He works for Inha University. Since 1998, he is the director of Geosynthetics Institute (USA)-Korea Directory. He worked in International Geosynthetics Society as Council member (2006~2012) and he was the 6th president of Korean Geosynthetics Society (2011~2013). Also, he is members of ASTM D35 and ISO TC221 on geosynthetics from 1998.He was the 32nd President of Korean Fiber Society (2014~2015). He has published more than 842 procedings in the domestic and international conferences. He wrote 20 Korean and English texts including 'GEOSYNTHETICS'. He has awards of Marquis Who's Who - Science and Engineering in 2003~2017 and Top 100 Scientists in the World: 2005/2011 of IBC (International Biographical Centre, UK). Also, he got the 33rd Academy Award of Korean Fiber Society in 2006 and "Excellent Paper Award of 2012" by The Korean Federation of Science and Technology Societies.

Keynote Speech-2 10:55-11:25

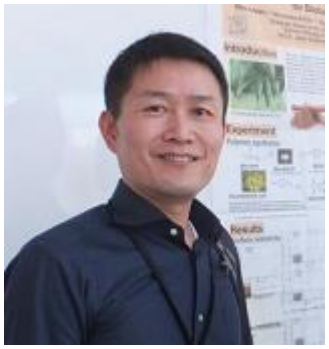
Associate professor Ewa Kowalska

leader of Research Cluster for Plasmonic Photocatalysis in Institute for Catalysis, Hokkaido University, Japan

Title: Development of plasmonic photocatalysts for decomposition of organic compounds and microorganisms

Ewa Kowalska is an associate professor and a leader of Research Cluster for Plasmonic Photocatalysis in Institute for Catalysis, Hokkaido University. She received her PhD degree in chemical technology from Gdansk University of Technology, Poland in 2004. After completing JSPS fellowship (2005-2007), GCOE postdoctoral fellowships (2007-2009) in Japan, and Marie Curie fellowships in France (2002-2003) and in Germany (2009-12), she joined Institute for Catalysis as an associate professor in 2012. She got various awards, scholarships and grants, including doctoral dissertation with distinction (2004), award in STEF-NANO-ACC contest for the best PhD thesis in the field of nanotechnology, nanoscience and multifunctional materials under the European Commission Sixth Framework Programme (2005), Brigitte Schlieben-Lange-Programme stipend from Ministry of Science, Research and the Arts of Baden-Württemberg (2012), Grand Challenges Explorations Grant from Bill & Melinda Gates Foundation (2012), Global Networking Award (WinGS Project, Hokkaido University, 2014). She has published more than 50 peer-reviewed papers, 10 book chapters, and delivered 25 invited talks (including 3 key-note lectures). Her research focuses on environmental protection, heterogeneous photocatalysis, advanced oxidation processes (AOPs), noble metals, solar energy conversion. Recently, her main interest is plasmonic photocatalysis for degradation of chemical and microbiological pollutants.

Keynote Speech-3 11:25-11:55



Prof. Tetsu Mitsumata

Department of Materials Science, Niigata University, Japan

Title: Magnetic-Field Responsive Gel and Its Applications

He received his PhD degree in Polymer Science from Hokkaido University in 1999 under the supervision of Profs. Y. Osada and J. P. Gong. In this year, he moved to Graduate School of Science and Engineering, Yamagata University as an assistant professor. In 2002, he joined the laboratory of Dr. P. De Kepper of CRPP Bordeaux in France as a research fellow of Ministry of Education, Culture, Sports, Science and Technology. His research focuses on the physical properties of stimuli-responsive composites consisting of soft materials and inorganic compounds. He works currently at Graduate School of Science and Technology, Niigata University as a research professor since 2016. He has published more than 110 scientific papers (including reviews and books) and 11 patents dedicated to soft materials, especially magnetic responsive gels or elastomers.

Keynote Speech-4 11:55-12:25

Prof. Takahiro OHASHI

Head of Mechanical Engineering Department,School of Science and Engineering, Kokushikan University, Japan

Title: Friction stir forming and its applications for mechanical joining of dissimilar materials

Head of Mechanical Engineering Department of Kokushikan University (December 2012-Present); Representative delegate of Japan Society for Technology of Plasticity (April 2016-Present); The board of trustees of Aluminum Forging Association in Japan; Experience in directing a national research project for a new die structure of Ministry of Economy, Trading and Industry (METI); Experience in directing 3 research teams of National Institute of Advanced Industrial Science and Technology (AIST)

12:25-13:00	Lunch

Session List

Session 1(13:00-15:00)

1-Paper ID: 7

Title: Effect of the substitution of nickel by cobalt in the M position on the carbides characteristics in M-25Cr-0.4C-6Ta and M-25Cr-0.4C-2Ti alloys elaborated by foundry

Authors: Patrice Berthod, Lydia Toubal, Zohra Himeur

University: Institut Jean Lamour, Campus Victor Grignard, Faculty of Science and Technologies, University of Lorraine, France

Abstract: Applications at high temperature, for transportation (e.g. aero-engines), power production (e.g. gas turbine) or industry (e.g. tools shaping molten glass) may require refractory metallic alloys. In case of complex shapes of pieces devoted to work at elevated temperature using cast equiaxed superalloys may be a solution due to their fabricability into all geometries and their coarse grains favorable to high creep resistance. Since they are polycristalline, grain boundaries must be reinforced by carbides. Among them the MC-type carbides are of great interest. Indeed, the primary MC carbides precipitate with a eutectic script-like shape, imbricated with matrix, morphology particularly favorable for combatting creep.

The MC carbides can be TaC, TiC, NbC, or more exotic: HfC and ZrC. The TaC and TiC are particularly interesting for the rather low cost of their carbide-former metallic element. They can be successfully obtained as single carbides present in cobalt-chromium superalloys but they are in competition with chromium carbides in nickel-chromium alloys.

In this study, the association of cobalt and nickel as base elements for refractory alloys containing carbon and either tantalum or titanium in equal molar proportions was explored to look for thermodynamic stabilization of MC carbides and absence of any chromium carbides. After preliminary thermodynamic calculations using the Thermo-Calc software, two series of alloys, both with progressive replacement of Ni by Co, one containing C and Ta and the other containing C and Ti, were elaborated by foundry. They were exposed at 1400K for about one day. Their as-cast microstructures and the ones after high temperature aging were characterized by SEM/BSE, EDS, XRD and image analysis.

It appears that TaC successfully formed as single carbides as soon as the Co content becomes higher than the Ni one. In contrast this is only when the Co is wholly replaced by Co that TiC exists alone without any other carbide phase.

2-Paper ID: 6

Title: Correction and accuracy improvement of non-parallel shear zone model

Authors: Yaoke Wang, Meng Kou, Wei Ding, Huan Ma1 and Liangshan Xiong

University: Huangzhong University of S & T, School of Mechanical Science and Engineering, China

Abstract: When applying the non-parallel shear zone model to predict the cutting process parameters of carbon steel workpiece, it is found that there is a big error between the prediction results and the experimental values. And also, the former approach to obtain the relevant cutting parameters of the non-parallel shear zone model by applying coordinate transformation to the parallel shear zone model has a theoretical error – it erroneously regards the determinant (|J|) of the Jacobian matrix (J) in the coordinate transformation as a constant. The shape of the shear zone obtained when |J| is not constant is drew and it is found that the two boundaries of the shear zone are two slightly curved surfaces rather than two inclined planes. Also, the error between predicted values and experimental values of cutting force and cutting thrust is slightly smaller than that of constant |J|. A corrected model where |J| is a variable is proposed. Since the specific values of inclination of the shear zone (α, β), the thickness coefficient of the shear zone (as) and the constants related to the material (f0, p) are not given in the former work, a method to obtain the above-mentioned five constants by solving multivariable constrained optimization problem based on experimental data was also proposed; based on the obtained experimental data of AISI 1045 steel workpiece cutting force, cutting thrust, chip thickness, the results of five above-mentioned model constants are obtained. It is found that, compared with prediction from uncorrected model, the cutting force and cutting thrust of AISI 1045 steel predicted by the corrected model with the obtained constants has a better agreement with the experimental values obtained by Ivester.

3-Paper ID: PM701

Title: The hot flow behavior of Al-2wt.%Cu-1wt.%Mn alloy based on Gleebe-3800 hot compression simulation

Authors: JinLong Chen, Hengcheng Liao and Heting Xu

University: School of Materials Science and Engineering, Southeast University, Jiangsu Key Laboratory for Advanced Metallic Materials, China

Abstract: Flow behavior of Al-2.0wt.%Cu-1.0wt.%Mn aluminum alloy was investigated by hot compressive test using a Gleebe-3800 thermal simulator. The test parameters about temperature and strain rate ranges from 573K to 773 K and from 0.01s-1 to 5s-1, respectively, and the true strain is up to 0.6. It can be seen that the peak flow stress increases with increasing the strain rate and decreases by deformation temperature. And the deformation activation energy of Al-2.0wt.%Cu-1.0wt.%Mn alloy is 183.02KJ/mol. A constitutive equation has been constructed to predict the hot deformation behavior, and correlate the peak flow stress predicted with strain rate and deformation temperature.

4-Paper ID: 9

Title: Modelling of macrosegregation with mesosegregates in a binary metallic cast by the diffuse approximate meshless method

Authors: **Katarina Mramor**, Vanja Hatić, Boštjan Mavrič1,and Božidar Šarler

University: Chienkuo Technology University, Changhua City, Taiwan

Abstract: The solidification of binary metallic alloy (Sn-10%Pb) is simulated in 2D with a diffuse approximate meshless method. The macrosegregation with mesosegregates is described by a coupled set of volume-averaged partial differential equations. The incompressible Newtonian fluid is described by coupled mass and momentum equations and the mushy zone is treated as a Darcy porous media. The energy transport is described with enthalpy formulation and the species transfer is incorporated by considering the Lever rule approximation. The thermo-solutal Boussinesq hypothesis is applied in order to account for the double-diffusive effects in the melt. The mathematical model is solved by a diffusive approximate method on local subdomains with Euler time stepping. Pressure-velocity coupling is incorporated by applying the fractional step method. The instabilities due to the convective terms are smoothed out by applying the upwinding technique. The results are presented on a regular node arrangement and are compared to other benchmark results. The present paper demonstrates that the results calculated with the diffuse approximate meshless method are in good agreement with reference results.

5-Paper ID: 15

Title: Improved performance of the perovskite solar cells with ITO array

Authors: Hsin-Ying Lee, Ching-Ting Lee, and Guan-Syun Chen

University: Department of Photonics, National Cheng Kung University, Taiwan, Republic of China

Abstract: In recently, the green energy is widely investigated. The perovskite solar cells attract many attentions. The increase rate in power conversion efficiency of the perovskite solar cells is very rapid from 3.8% to more than 22%. In this work, the ITO array between the electrode and the hole-transport layer were designed and manufactured in perovskite solar cells. The ITO array was used to reduce the reflectivity and increase the contact area between the hole-transport layer and the active layer, which could improve the carrier collection probability. The laser interference lithography technique was used to form the array patterns on ITO glass. The 50-nm-thick ITO was deposited on the sample with the array patterns using a magnetron radio frequency sputtering system and the excess ITO was removed by life-off technique. The reflectance of the ITO glass without and with 50 nm rod-length ITO array was measured in the visible light wavelength range. The reflectivity of the ITO glass without and with ITO array was 9.8% and 7.2%, respectively. Consequently, the quantity of the incident light of the solar cells with ITO array could be increased. Compared with the perovskite solar cell without ITO array, the short current density and the power conversion efficiency of the perovskite solar cell with 50 nm rod-length ITO array increased from 23.56 mA/cm2 to 36.63 mA/cm2 and from 11.7% to 16.1%. These improvements could be attributed to that the ITO array could increase the quantity of the incident light and increase the contact area between the hole-transport layer and the active layer, which could improve the probability of charge collection. Consequently, the performance of the perovskite solar cells could be improved by inserted the ITO array between the electrode and the hole-transport layer. This work was supported from the Ministry of Science and Technology of the Republic of China under contract No. MOST 105-2221-E-006 -149-MY2.

6-Paper ID: PM710

Title: Nanooptical Characterisation of Body and Face Centered Crystal Structures using the Nonlinear Bond Model

Authors: Hendradi Hardhienata, Tony Sumaryada, and Adalberto Alejo-Molina

University: Theoretical Physics Division, Department of Physics, Bogor Agricultural University, Indonesia

Abstract: The investigation of metal and semiconductor surface properties using nonlinear optics offers several advantages due to its nondestructive nature and ability to perform experiments in nonvacuum and real time condition. Nonlinear optics can be used to investigate corrosion in metals and study nanosurface properties such as molecular orientation or surface defects. Nanooptical characterization using classical nonlinear optical models has progressed rapidly especially since the discovery of the nonlinear bond model which was first applied to silicon structures. The bond model was soon applied and modified to investigate nonlinear dipole contribution in zincblende structures and electric field induced second harmonic in diamond semiconductors. In this work, we describe the third and fourth rank tensors of body and face centered cubic systems and derive the s and p-polarized SHG far field using the simplified bond hyperpolarizability model. We also briefly discuss bulk nonlinier sources in such structures: quadrupole contribution, spatial dispersion, electric field second harmonic generation, and third harmonic generation, deriving the corresponding fourth rank tensor. We show that all the third and fourth rank tensorial elements require only one independent fitting parameter.

7-Paper ID: PM712

Title: Investigation of tribo-mechanical properties and structure of specimens obtained by selective laser melting of stainless steel powders

Authors: Leonid Belyaev, **Aleksey Zhdanov** and Valentin Morozov

University: Department of the mechanical engineering, Vladimir State University, Russia

Abstract: The article presents experimental data about the quality parameters of the stainless steel three-dimensional parts obtained by the selective laser sintering procedure. The results of the porosity, tribological properties, tensile test, hardness measurement and density for different values of the focal point position during the engineering process of the three-dimensional parts sintering were given. For parts made from steel powder CL20ES at a laser radiation power of 200 W in a different focal length range, it is demonstrate that the specimens with the highest density and microhardness values are obtained during the synthesis by using a converging laser beam.

8-Paper ID: PM716

Title: Magnetic properties of silicon steel sheet core with different processing stress

Authors: Toshiki Matsui, and **Kyyoul Yun**

University: Gifu University, Faculty of Engineering, Japan

Abstract: The motor core including a rotor core and a stator core, which is made from silicon steel sheets. Iron loss increases during fixation of the stator core, e.g., by interlocking, welding, and shrink fitting installation. In this paper, the magnetic properties changes by each processing such as wire cutting, punching, interlocking and shrink fitting are investigated. Iron loss of the toroidal cores using punching, interlocking and shrink fitting are increased from 1.16 W/kg to 1.56 W/kg (34.4 % increased) at 50Hz, and from 21.1 W/kg to 27.5 W/kg (30.3 % increased) at 400 Hz compared with iron loss of wire cut toroidal core.

9-Paper ID: PM718

Title: Novel biosensing strategies based on enzyme-like reactions of nanomaterials

Authors: Moon Il Kim

University: Dept. of BioNano Technology, Gachon University, South Korea

Abstract: In this presentation, I will discuss novel biosensing strategies based on enzyme-like reactions of nanomaterials.1,2 First, I will describe a new and simple colorimetric strategy for the detection of nucleic acids, which relies on target DNA-induced shielding action against the peroxidase mimicking activity of magnetic nanoparticles (MNPs) or oxidase mimicking activity of cerium oxide nanoparticles (CeO2 NPs). With the strategy, assay samples containing target DNA showed a significantly reduced colorimetric signal, while those that do not contain target DNA displayed an intense colorimetric response due to the normal peroxidase or oxidase activity displayed by MNPs or CeO2 NPs, respectively. Second, I will discuss a nanostructured multi-catalyst system consisting of MNPs and an oxidative enzyme entrapped in large pore sized mesoporous silica for convenient colorimetric detection of biologically important target molecules. The oxidative enzyme in the multi-catalyst system generates H2O2 through its catalytic action for a target molecule, which subsequently activates MNPs to convert a selected substrate into a corresponding colored product. The analytical capabilities of this strategy were successfully verified by colorimetrically detecting several target molecules such as glucose, cholesterol, and galactose with excellent selectivity, sensitivity, reusability, and stability. Besides, I will also introduce highly efficient electrochemical biosensing system

by employing conductive nanocomposite and ultrafast colorimetric immunoassay system by employing a nanocomposite entrapping magnetic and platinum nanoparticles. Finally, I will describe colorimetric biosensors based on new peroxidase mimetics including Fe-aminoclay, Cu-nanoflower, and MNPs-gold nanoclusters hybrids. These achievements should accelerate and widen the utility of enzyme-mimicking nanomaterials as next-generation alternatives to natural enzymes.

10-Paper ID: PM728

Title: Design and Fabrication of Friction Stir Welding Machine

Authors: Jithin Ambarayil Joy, Muhammad Sajjad, Dong-Won Jung

University: Department of Mechanical Engineering, Jeju National University, South Korea

Abstract: The aim of the project is to manufacture a welding machine which simplifies the work and improve the accuracy. The working principle of this machine is different other that of other welding machine. The aluminum work piece is held in the vice. The two pieces of aluminum work piece is welded with the help high speed drilling head with friction tool. The working principle is very easy and at the same time production time is very much reduced. This machine is best suitable for mass production.

15:00-15:15	Coffee Break

Poster Session (15:15-16:00)

1-Paper ID: PM708

Title: Structural and optical properties of GaN and InGaN nanowires formed on Si(111)

Authors: Sangmoon Han, Ilgyu Choi, Jihoon Song, and **Jin Soo Kim**

University: Department of Electronic and Information Materials Engineering, Division of Advanced Materials Engineering, and Research Center of Advanced Materials Development, Chonbuk National University, South Korea

Abstract: In this paper, we report the structural and optical characteristics of GaN and InGaN nanowires (NWs), formed by so called Ga pre-deposition method, on Si(111) substrates. The strong and narrow photoluminescence (PL) spectra were observed from the GaN and InGaN NWs at room temperature. In order to evaluate the origin of the optical characteristics of the NWs, structural characteristics were analyzed using field-emission scanning electron microscope (FE-SEM), transmission electron microscope (TEM), and double-crystal x-ray diffraction. By controlling chemical potentials and interface energy between the NW and the SiN/Si surface using Ga droplets, the GaN and InGaN NWs with uniform shapes were formed. Furthermore, structural defects including stacking faults inside GaN and InGaN NWs were significantly reduced compared to those of Si-based InAs and GaAs NWs [1,2]. Figures 1(a) and (b) show the FE-SEM and TEM images of GaN NWs, respectively. When applying the NWs to optoelectronic devices, optical and structural characteristics as well as length can be one of the important parameters. Therefore, the NWs having a length more than 1 m were grown by changing growth conditions such as growth time and V/III ratio. To evaluate the applicability of our NWs, photo-sensors with 500 nm-long GaN NWs and graphene channel were fabricated on SiO_2/Si. Figures 1(c) and (d) show temperature-dependent PL spectra and current (I)-voltage (V) characteristics curves of photo-sensors with the GaN NWs, respectively. The photo-currents of the GaN NW photo-sensors were significantly increased with increasing incident light intensity of white source. As an example, when the light intensity was 100 mW/cm2, the photo-current was measured as 20.8 mA at the voltage of 1.1 V, which is much higher than those reported in previous studies.

2-Paper ID: PM709

Title: Mechanism of green to red upconversion emission in NaYF4 hexagonal structure

Authors: Hyeon Mi Noh, Ju Hyun Oh, Jung Hyun Jeong

University: Department of Physics, Pukyong National University, South Korea

Abstract: Upconversion (UC) is a process that generating higher energy emission from low energy of incident light. Many trivalent rare earth ions such as Er3+, Tm3+ and Pr3+ are doped as emission and absorption centers in these materials. Recently, the UC phosphors have attracted much attention due to their potential in various fields, such as solid-state lasers, solar energy converter, biodetection. Among these applications, the biodetection especially have attracted much attention. The excitation source of the UC phosphors is not ultraviolet (UV) but near-infrared (NIR). NIR as an excitation source have much advantage, such as do no reaction with body and high quantum efficiency on nanoparticles. Among various UC materials, the NaYF4 host lattice is known as one of the most efficiency host lattices.

In this study, we synthesized the Yb3+ and Er3+ co-doped NaYF4 with cubic and hexagonal structures. After then, we investigated UC properties of the Yb3+, Er3+ co-doped NaYF4 phosphors by various Yb3+ concentrations. We confirmed that the UC luminescence efficiency is better, while changing the hexagonal structure with cubic structure. The morphology of the phosphors show the spherical and hexagonal prism on cubic and hexagonal structure, respectively. In addition, emission spectra of all phosphors reveal mainly three colors, correspond to blue (2H9/2 → 4I15/2), green (2H11/2 and 4S3/2 → 4I15/2) and red (4F9/2 → 4I15/2) transition of Er3+. The Yb3+ and Er3+ co-doped NaYF4 phosphors with hexagonal structure have different properties to cubic structure. We examined the UC luminescence mechanism in hexagonal structure phosphors using a decay time, pump power dependence and energy level diagram.

3-Paper ID: 14

Title: Trimetallic plasmonic nanoparticles as visible light induced photo-system for efficient carbon dioxide conversion

Authors: D. Kumar, R. Jaswal, C. H. Park, C. S. Kim

University: Department of Bionanosystem Engineering, Graduate School, Chonbuk National University, South Korea

Abstract: The strong localized surface plasmon resonance of gold nanoparticles, due to collective oscillation of electrons with incident light at a particular wavelength, has been

widely investigated for the direct solar energy conversion to chemical energy through photocatalysis and being used for artificial photosynthesis.1 In present study, we have exhibited the photocatalytic performance of monodisperse trimetallic colloidal gold nanoparticles like platinum nanoparticles (4-5 nm) decorated graphene (2-3 nm) coated gold nanoparticles (AuNPs@rGO-Pt) and titanium dioxide (4-5) coated gold nanoparticles (AuNPs@TiO2-Pt) for CO2 photoconversion to HCOOH in high yield under visible, NIR, and sunlight irradiation. Bimetallic, platinum nanoparticles coated gold nanoparticles (Pt@AuNPs) and silver nanoparticles coated gold nanoparticles (Ag@AuNPs) were also prepared for comparative photocatalytic CO2 conversion studies.2,3 The AuNPs@rGO-Pt nanoparticles showed higher CO2 photoconversion efficiency with the quantum yield of 1.9% and chemical yield of 3.3% as compared to AuNPs@TiO2-Pt which showed the quantum yield of 1.8% and chemical yield of 3.1%. Among bimetallic nanoparticles, Pt@AuNPs have shown higher selectivity towards CO2 reduction as compared to Ag@AuNPs, and rGO showed higher efficiency as interface material when compared with TiO2.

Moreover, AuNPs@rGO-Pt and AuNPs@TiO2-Pt were found to be recyclable for at least five reaction cycles without losing photocatalytic activity. The Pt nanoparticles coating on AuNPs@rGO and AuNPs@TiO2 increases the structural stability of prepared nanoparticles and could be the reason for their robust structure and consistent performance for multiple reaction cycles.

4-Paper ID: PM714

Title: Reduced Graphene Oxide Coating for Durable Electrodes of Resistance Spot Welding

Authors: Duck Hyun Lee, Changwook Ji, Hong-Dae Kim

University: Korea institute of industrial technology, South Korea

Abstract: Lightweight materials offer great potential for increasing vehicle efficiency because it takes less energy to accelerate a lighter object than a heavier one. A 10% reduction in vehicle weight can lead to a 6%-8% fuel efficiency improvement. Thus, replacing cast iron and traditional steel components with lightweight materials such as Al and Al matrix composite can directly reduce the weight of a vehicle's body. Resistance spot welding (RSW) is the welding method that the base materials are overlapped and bonded with large current and pressure, and it has been a representative welding method for vehicles. However, Al and Al matrix composite have critical issues with RSW,

and there has been a challenge to develop durable welding electrodes with high productivity and low cost. Graphene is consisted of mono-layered sp2 hybrid carbon atoms, and it has been received considerable attention for the adoption of industrial fields due to the excellent electrical and mechanical properties. In this study, we developed "dry" and "wet" processes based coating technologies of graphene on the welding electrodes. The reduced graphene oxide (rGO) layer was coated on the tip of RSW electrodes with GO dispersion and the following reduction process, and the electrical properties of rGO layer was measured with 4-point-probe method. The prepared electrodes showed outstanding welding properties with extended durability compared with the normal electrodes. The rGO layer prepared with 'dry' process showed higher electrical conductivity compared with "wet" process, however, the rGO layer prepared with "wet" process showed higher productivity. The results can provide useful graphene coating method for future work on various electrodes as well as other classes of graphene application.

5-Paper ID: PM715

Title: Electric Conductivity and Dielectric Property for Biobased Polyimide Films

Authors: Mika KAWAI, Tatsuo KANEKO, Tetsu MITSUMATA

University: Niigata University, Japan

Abstract: We have investigated the electric resistivity at high electric fields and dielectric constant for biobased polymer films. The development of high-performance biobased polymers such as polyimides (PIs) is indispensable to establish a sustainable green society, but it is very difficult due to the incompatibility of their monomeric aromatic diamines with microorganisms. One of coauthors has developed biobased PIs from bioavailable aromatic diamines, which were photodimers of 4aminocinnamic acid (4ACA) derived from genetically manipulated Escherichia coli. These biobased PI films showed ultrahigh thermal resistance with T10 values over 425 °C and no Tg values under 350 °C, which is the highest value of all biobased plastics reported thus far. This advanced thermal property can be useful for electric devices which have both high electric conductivity by metal deposition and super insulating properties. The electric resistance measurement was carried out at room temperature using two terminals method with an ultrahigh resistance meter. The dielectric constant was measured by an LCR meter at frequencies of 1 kHz to 6 MHz. The biopolyimide films demonstrated a high resistivity with an order of 1016 cm comparable with KaptonTM film, and the

relative dielectric constant at 1 MHz (~4.8) was somewhat higher than that of KaptonTM. In this paper, we present the electric resistance and dielectric constant for biobased PI films, and discuss the mechanism of electric conduction and polarization.

6-Paper ID: PM720

Title: Impregnating transition metal on hexagonal boron nitride for improved thermal stability and nano-sized dispersion

Authors: Myeung-jin Lee, Minwoo Lee, Bora Ye, Do-Hyun Kim, Heesoo Lee, Hong-Dae Kim

University: Korea Institute of Industrial Technology, South Korea

Abstract: The hexagonal boron nitride(h-BN) has high thermal stability with high melting point, 2973℃. Also, h-BN is a stable material to 1000℃ at air atmosphere and normal pressure. Nevertheless, there is a limit for application in various field, because it is hard to modify the structure of BN having high thermal stability below 1000◦C at air. Addition of the transition metal induces the surface reaction between Nitrogen on h-BN with Oxygen at air below 1000℃. As result of this surface reaction, removed sites of Nitrogen becomes the formation of porous region.

The Transition Metal Nano-Particles(NPs) are easily aggregated at high temperature. Through the addition of h-BN, it is possible to disperse NPs on generated porous h-BN which has a holding effect caused by functional group, dangling bond of pores, and high thermal stability. In other words, owing to interaction between transition metal NPs and porous h-BN, transition metal NPs have enhanced dispersion on surface without any aggregation and h-BN has porous surface. In our study, manganese and cerium precursors are used as transition metal to generate the porous hexagonal boron nitride. Then we observe and analyze the dispersion of transition metal nano-sized particles on h-BN surface and thermal stability depend on temperature.

7-Paper ID: PM722

Title: Fabrication of 3D Casting Sand via Additive Manufacturing Process

Authors: Seung-Yeop Chun, Bora Jeong, Jinwoo Kim, Heesoo Lee and Hong-Dae Kim

University: Korea Institute of Industrial Technology, South Korea

Abstract: Polymers are the most utilized class of materials for 3D additive manufacturing (AM) process, however, casting sand based AM process has been considered attractive and practical recently. In this research, we have studied the production of casting sand

based structures fabricated with the AM process. In the case of 3D printing made from ceramics, it is difficult to maintain the shape and strength of the product during the sintering process because of the minimum additives. Methyl cellulose (0.5, 1 and 2 wt% of MC) was used as an aqueous binder containing the optimum solute component. The casting sand particles calcined at 500 °C exhibited various shrinkage and strength change because the raw materials were densified and assembled during calcination process. The ceramic structures fabricated with 1 wt% of MC exhibited less shrinkage and cracking compared with the ones synthesized with 0.5 and 2 wt% of MC. The optimal processing parameters were successfully determined for AM process to minimize shrinkage and eliminate cracking for sintering strength.

8-Paper ID: PM725

Title: Environmental Evaluation of Melting & Refining process of Magnesium Alloy Scrap via Flame-Retardant Technology

Authors: Byoung-Gi Moon, Min-Soo Kim, Ha-Sik Kim, Ki-Ho Koh

University: Korea Institute of Materials Science · Korea Magnesium Industry (KMI), South Korea

Abstract: Magnesium is the lightest metal element among structural metal materials, and has been applied to automobiles and mobile electronic devices due to its unique light weight, excellent castability, and machinability. However, a large amount of sulfur hexafluoride (SF6) gas, which is one of the greenhouse gases, is used to prevent extreme oxidative loss and ignition of the molten metal due to the high reactivity with oxygen in the manufacture of the magnesium ingot, the productization and the recycling process. This is offsetting the effect of reducing carbon dioxide emissions through weight reduction of vehicles. Especially, sulfur hexafluoride gas is known to have the highest greenhouse effect, of which GWP (Global Warming Potential) is estimated at 23,900 times that of carbon dioxide. Furthermore, the use of fluoride compounds is strictly restricted in the European Union since 2018. Therefore, it is inevitable to develop a technique for drastically reducing the use amount thereof. The purpose of this study is to reduce the amount of greenhouse gases used during the melting and refining of scrap by using the flame retardant technology which can increase the ignition temperature and improve the corrosion resistance of the magnesium products. For the experiment, calcium (Ca) and yttrium (Y) were added to prevent the sever

e oxidation and ignition in the melting process for recycling AM50 scrap, which is a typical magnesium alloy used in automobiles. And the ratio of the amount of carbon dioxide (kgCO2/kgMg) to the total amount of recycled materials was measured. Experimental results using a continuous refining plant consisting of tw o 130kg furnace and an ingot casting system show that the estimated amount of greenhouse gas consumption for the five consecutive processes was about 0. 58 kgCO2/kgMg, which is about 92% lower than that in the typical recycling pro cess of magnesium alloys. This technology is expected to contribute greatly to t he reduction of greenhouse gas consumption during scrap melting and refining.

9-Paper ID: 20

Title: Drop-test Simulations to Investigate Collision Characteristics of Automobile Front bumper beam Structures

Authors: Min-sik Lee, Jun Park, Ok-dong Lim, Hyung-yoon Seo and Chung-gil Kang

University: Pusan National University, South Korea

Abstract: Development of environment-friendly materials to improve the safety and fuel efficiency of automobiles has attracted great research attention with regards to the automobile industry in recent years. With increase in demand for technological developments to improve performance and efficiency, an increased number of researches are being performed concerning the use of advanced high-strength steel in parts manufactured by means of the hot-press forming process. Furthermore, research concerning the improvement in fuel efficiency through additional weight reduction using tailor-welded blanks (TWBs) and partial quenching (PQ) has gained popularity in the automobile industry in recent times. Many car components are, nowadays, being fabricated using different materials to improve collision toughness and safety in the event of a car crash. However, no standard has yet been established to evaluate the replacement of automobile parts, and such a standard must account for mechanical properties of the material under tensile and flexural loadings. A car crash test was conducted at the Insurance Institute for Highway Safety (IIHS) to evaluate automobile safety. However, collision-toughness evaluation of each car component is expensive and difficult to realize. In this study, drop tests were simulated, and collision characteristics of the bumper beam were correspondingly evaluated for front crash. Values of fracture toughness were compared in accordance with the materials of front bumper beam for evaluating collision-test conditions.

10-Paper ID: PF731

Title: Theoretical and Experimental Study on Deformation Behavior of Inconel 625 Alloy During Hot Compression Test Considering Strain rate

Authors: J. Park, G.U. Jeong, Y.H. Moon, C.G. Kang

University: Pusan National University, South Korea

Abstract: It is currently expected that Inconel 625 alloys will be widely used for high corrosion resistance and as highefficiency materials in aeronautical, aerospace, chemical, nuclear, petrochemical, and marine industries. Although Inconel 625 alloys are excellent materials, they cannot be formed at room temperature owing to difficulties in processing. To improve the formability of Inconel 625, it is necessary to investigate the formability at a high temperature range and strain rates.

In this study, high temperature deformation behavior after forming is investigated. A high temperature compression test is performed with a Gleeble 3500 testing machine at various temperatures (approximately 900~1200℃) and strain rates (10/s and 30/s) to obtain high temperature deformation characteristics of Inconel 625. Furthermore, high temperature tensile tests are preformed to measure elongations and reductions in the area of Inconel 625.

The tests focused on obtaining the flow stress data and optimal hot forging conditions under various conditions of strain rates and temperatures. A rigid-plastic finite element method is applied to the high temperature compression simulation to compare the same to an actual high-temperature compression test.

The results of the experiment and analysis are presented for various conditions of temperatures and strain rates, and it is expected that this will be used in other hot forming processes.

Session 2(16:00-18:00)

1-Paper ID: 8

Title: Influence of the Cr content on the microstructures and the behaviors in high temperature oxidation of Ni(bal.)-xCr-0.4C-6Ta cast alloys (Cr varying from 0 to 50 wt.%)

Authors: Patrice Berthod, Zohra Himeur, Ouarda Abed, Mélissa Léglise

University: Institut Jean Lamour, Campus Victor Grignard, Faculty of Science and Technologies, University of Lorraine, France

Abstract: When working at high temperature superalloys may be exposed to both mechanical and mechanical solicitiations. Solid solution strengthening and hardening by intergranular and interdendritic hard particles may allow them resisting creep and chromium and other elements may give good resistance against oxidation by gases and corrosion by agressive liquid substances.

Some conventionally cast superalloys can compete with / ' nickel-based single-crystals if they are reinforced by script-like carbides. For instance TaC recently demonstrated high efficiency in this way in Co-based alloys up to 1200°C. High content in Cr may allow the alloy well behaving in term of hot oxidation by burners gases and of corrosion by molten glasses, especially in nickel-based superalloys.

From the observation of the difficulty for tantalum carbides (TaC) to appear alone at solidification or to stay alone during high temperature exposure when the a nickel-based alloy contains 25-30wt.%, because of the systematic presence of chromium carbides which are prejudicious to high melting point for the alloy, the microstructures in as-cast condition and their evolution during isothermal high temperature exposure were investigated by preparing a series of alloys based on nickel and containing 0.4C and 6Ta, in which the Cr content varied from 0 to 50 step 10wt.%.

The microstructures of these alloys were characterized in their as-cast condition and after exposure to 1127 and 1237°C, as well as the oxidation products formed on surface. Contrarily to what was expected the decrease in Cr from 30wt.% down to 0wt.%Cr did not promote TaC but led to the disparition then absence of any carbides. At the same time the oxidation behavior became worse and worse. Increasing the Cr content from 30 to 50wt.% did not change the balance between TaC and chromium carbides, but induced the formation of a BCC Cr-based second matrix phase beside the FCC Ni-based one.

2-Paper ID: AM881

Title: Effect of impact energy on wear behavior of high chromium white iron produced by liquid die forging

Authors: B Qiu, S M Xing, Q Dong, H Liu

University: School of Mechanical, Electronic and Control Engineering, Beijing Jiaotong University, China

Abstract: Impact abrasive wear behavior of high chromium white iron (HCWI) produced by liquid die forging process were investigated. the wear tests were performed with the MLD-10 abrasive wear testing machine, using SiO_2 abrasive and with four impact energies of 1.5 J, 2.5 J, 3.5 J and 4.5 J for 120 min. The results indicated that the cumulative volume loss of HCWI sample increases with the growth of impact energy, and exhibits best wear resistance under low impact condition. For given impact energy, the volume loss increases with the increasing of wear time, which shown an approximately liner tendency. The macro-morphologies, SEM images of worn surface and cross-sectional images of wear samples were observed by optical microscope and SEM, and the wear mechanism and characteristics were analyzed. Results shown that the wear characteristics is mainly based on the shallow ploughing and accompanied by plastic deformation under lower impact energy, while the fatigue peeling and embedded abrasive become the most significant characteristics when the impact energy is higher.

3-Paper ID: 13

Title: A Rolling Simulation System for Reversing Rolling Mills

Authors: **Umut Hanoglu** and Božidar Šarler

University: Laboratory for Simulation of Materials and Processes, Institute of Metals and Technology, Slovenia

Abstract: In this work a rolling simulation system has been developed for rolling schedules which consists of multiple reversing rolling mills. A slice model approach is applied where the position of a slice can only be determined by considering total deformation. Each slice is parallel to each other and perpendicular to the rolling direction. The solution of coupled thermal and mechanical models over each slice, at a given time and position, are achieved by a novel meshless Local Radial Basis Function Collocation Method (LRBFCM). Mechanical material model obeys ideal plastic flow rule defined by Von Mises. Unknown fields over the slices are interpolated by a certain number of collocation points distributed over the physical domain and its boundary. A

system of equations is solved for each collocation point considering its local neighbouring points in the range between 5 and 7. A non-linear system of equations is solved by direct iteration. Groove geometries of each roll are implemented in a compatible way with the slice model and every roll has a horizontal orientation. In between each rolling pass the billet is rotated either 90 or 45 degrees clockwise or counter clockwise. Reduction at each of the passes can be very high, and in such cases, the material completely fills up the groove. This requires a special attention regarding the contact boundary conditions and the collocation node distribution due to numerical instability issues. Coulomb model of friction or sticking boundary conditions are used at the contact boundaries and Gauss-Seidel iterative elliptic node generation algorithm is used for redistributing collocation nodes over the physical domain, when necessary. The simulation results for arbitrary initial position of the slice in the billet are shown in terms of temperature, displacement, strain and stress fields as well as roll forces and torques. A user friendly computer application is created for industrial use based on C# and .NET.

4-Paper ID: 16

Title: Improved performance of indium oxide thin-film-based nitrogen dioxide gas sensors

Authors: Li-Yi Jian, Ching-Ting Lee, and Hsin-Ying Lee

University: Department of Photonics, National Cheng Kung University, Taiwan, Republic of China

Abstract: Recently, several types of nitrogen dioxide (NO_2) gas sensors are investigated. To increase sensitivity and selectivity of indium oxide (In_2O_3) thin-film-based NO_2 gas sensors were studied in this work. Furthermore, the dependence of sensitivity on the surface morphology of In_2O_3 sensing membrane was also studied. The 50-nm-thick In_2O_3 films were deposited on quartz substrates by radio frequency magnetron sputtering system with various Ar/O_2 gas flow ratios, such as 50/0 and 20/30 sccm. Subsequently, the In_2O_3 sensing membranes were annealed at 400°C using a furnace tube. Finally, the Ni/Au metals were deposited as electrodes on the In_2O_3 sensing membranes using an electron beam evaporator. The In_2O_3 NO_2 gas sensors with Ar/O_2 gas flow ratio of 50/0 and 20/30 were hereafter referred as sensor-A and sensor-B, respectively. The sensitivity and selectivity of the sensor-A and the sensor-B were measured and investigated. Compared with sensor-A, the sensitivity of sensor-B was improved from 17.21 to 30.33 under 100 ppm NO_2 gas at an operating temperature of 150°C. The surface roughness of

2.68 nm and 0.80 nm for the In_2O_3 sensing layer deposited with and without O_2 gas flow was obtained using an atomic force microscopy, respectively. In general, the roughed sensing layer could improve the sensitivity of the gas sensors due to the larger sensing surface. Consequently, the sensitivity of the sensor-B was better than that of the sensor-A. To verify the selectivity of the In_2O_3 gas sensors, the sensor-B was also measured under NO_2, NO, NH_3, and C_2H_6O gases with a concentration of 100 ppm at an operating temperature of 150oC. Corresponding, the sensitivity of the sensor-B was 30.33, 8.95, 0.33, and 0.29, respectively. According to the experimental results, the In_2O_3 thin film was a suitable sensing membrane for the NO_2 gas sensors. This work was supported from the Ministry of Science and Technology of the Republic of China under contract No. MOST 105-2221-E-006-199-MY3.

5-Paper ID: PM719

Title: The Effect of Lanthanum Addition on the Optical Properties of Lithium Niobate Thin Film ($LiNbO_3$)

Authors: Irzaman, Khomariah N, Nutri Y.S, Safutra H, Husin Alatas, Andrivo Rusydi, **Hardhienata H**

University: Bogor Agricultural University, Indonesia

Abstract: Lithium Niobate thin films have been successfully deposited on p-type silicon substrate (100) using CSD (Chemical Solution Deposition) method with spin coating technique at 8000 rpm rotary speed at annealing temperature of 850 ^{O}C within 8 hours. In this research, we study the optical properties of Lithium Niobate thin films at different variations of molarity (1M, 2M, 3M and 4M) and different variation of Lanthanum concentration addition (0%, 2%, 4% and 6%). Energy gaps is calculated using reflectance data at 1M, 2M, 3M and 4M Lithium Niobate solubility which is 1.36 eV, 2.79 eV, 2.38 eV, and 1.75 eV respectively whereas for different Lanthanum concentration addition of 0%, 2%, 4% and 6% the obtained energy gaps are 2.75 eV, 3.19eV, 3.21 eV, and 2.45 eV respectively. Variation in the refractive index ranges from 1.0 to 5.0. Structural analysis using X-ray reveal that the film structure is rhombohedral with lattice parameter a = b whereas the c parameter is different.

6-Paper ID: PM723

Title: Investigation on Damping Capacities of Spherical Mg2Si Magnesium Matrix Composites Prepared by Super-Gravity Method

Authors: Yun-si Wang, Rui-long Niu, Fang-jia Yan, Dong-ping Duan, Xue-min Yang

University: Qinghai Institute of Salt Lakes, Chinese Academy of Sciences, China

Abstract: Due to inherent high damping capacities of Mg, Mg-based alloys or composites can absorb enormous elastic energy, thus, can be used as damping materials playing important role in reducing vibration and noise. Spherical Mg2Si magnesium matrix composites were prepared by super-gravity method with fly ash floating beads with particle sizes of 80, 125 and 500 μm. The microstructures and damping capacities of prepared samples were discussed. Spherical and fragment-shaped Mg2Si phases were observed in the matrix by SEM micrograph. Increasing particle size of fly ash floating beads can lead to an obviously decreasing tendency of internal friction $\tan\varphi$.The critical strain ε_{cr} =1.9×10−2 of $\varepsilon-\tan\varphi$ curve and critical temperature T_{cr} =150 °C of $T-\tan\varphi$ curve for $\tan\varphi$ changing from slowly to greatly increasing. Damping peaks occur in the vicinity of strain ε =5.2×10-2 in $\varepsilon-\tan\varphi$ curve whereas no damping peaks occur in $T-\tan\varphi$ curve.

7-Paper ID: PM724

Title: Deep Drawing of a Ni-Ti Shape Memory Alloy Sheet

Authors: Kuang-Jau Fann and Chun-Hao Chang

University: National Chung Hsing University, Department of Mechanical Engineering, 402 Taichung, Taiwan, R.O.C

Abstract: This study is aimed to investigate the properties of Ni-rich Ni-Ti shape memory alloy sheet parts during and after deep drawing process at room temperature, which is under plane tensile-compressive stress state. After undergoing heat treatment at different elevated temperatue, shape memory alloy sheet is formed at room temperature by a circular cylidrical punch in different strokes. Thereafter the deep drawn sheet part is subjected to aging treatment for shape memory. A free recovery experiment is further conducted onto the deep drawn shape memory alloy sheet part. As a result, the sheet metal has austenitic phase at room temperature, which shows superelasticity. Too small forming amount causes severe springback and the form of the deep drawn sheet part is very hard to detect with the naked eye. Only if a forming amount beyond the critical value is applied, a form can be achieved on to the sheet part.

The subsequent aging shape memory treatment can induce further springback of the deep drawn sheet part. The higher the temperature of the previous heat treatment, the less the springback by aging. The free recovery experiment shows that the deep drawn sheet part only undergoing solid solution without shape memory treatment still possesses shape memory effect. Nevertheless, the deep drawn sheet part treated with shape memory aging can show a better shape recovery rate.

8-Paper ID: 19

Title: The FAC Experimental Research on Vapor-water Two-phase Flow Piping System of CAP1400 Secondary Loop

Authors: Shenhui Zhai, **Simin Pang**, Jie Shao, Hongqing Zhu, Xian Zhang1 and Pengfei Liu

University: State Nuclear Electric Power Planning Design & Research Institute Co., Ltd, China

Abstract: CAP1400 power plant is one of the advanced Third-generation Pressurized Water Reactor power plant. To ensure the safety and stability of the power plant secondary loop during operation, the corrosion characteristic of CAP1400 secondary loop should been investigated. This paper set up a test facility to study the vapor-water two-phase flow corrosion status, which could be seen in the piping system after the control valve of heater drain line. The key parameters, such as pressure drop, temperature, and surface topography have been observed and measured, and the different corrosion characteristic in straight pipe, elbow, tee, and reducer also have been acquired in the tests. The test results and analysis could provide the basis for the corrosion resistance design of the drain pipelines in the CAP1400 nuclear power plant.

9-Paper ID: PM729

Title: A Study on Laser Micromachining

Authors: Muhammad Sajjad, Jithin Ambarayil Joy and Dong Won Jung

University: Department of Mechanical Engineering, Jeju National University, Jeju, South Korea

Abstract: Ultra Violet (UV) pulse are widely used for micromachining in the research and development of Information Technology (IT), Nano Technology (NT), and Bio Technology (BT) products because due to short wavelength of the laser it not only allows micro drilling, micro cutting and micro grooving with high accuracy, but acts also as high penetrating coefficient, which give opportunity for different materials to machined

properly. A finite element model considering photo-thermal and photomechanical properties was recommended to study the micro phenomena subject by mechanical pressure impacts and thermal heat transfers during a very short processing time. From the results of this research work, few of dynamic deformation behaviours such as deformation shape, strain, and stress distributions were examine and compare it with the experimental results of previous research work. The results from this comparison will help to know better knowledge about interference of UV laser beam and metal materials.

10-Paper ID: PM730

Title: Surface modification of Cr-Mo steel by new technology using high speed jet in water under ultrasonic irradiation

Authors: Masataka Ijiri and Toshihiko Yoshimura

University: Tokyo University of Science, Japan

Abstract: In this study, to further improve current MFC techniques, the surface modification of Cr–Mo steel was further investigated using 1200 W ultrasonic power. In MFC using 1200 W ultrasonic power, the corrosion resistance, compressive residual stress, and strength of the specimens were improved when the processing time was 10 min; however, decarburization occurred at longer processing times, causing these characteristics to worsen. The decarburization that occurs at high ultrasonic outputs may be caused by a decrease in the amount of dissolved oxygen in the water, an increase in the water temperature, and of the heating of the specimen surface.

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Thank you for all of your contributions!