2017 BOSI EDU XIAMENCONFERENCE SCHEDULE

2017 5th International Conference on Metallurgy Technology and Materials（5thICMTM2017）

2017 5th International Conference on Energy Engineering and Environmental Engineering

(5thICEEEE2017)

Xiamen, China

April 15-16, 2017

http://www.icmtm.org/

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Simple Version of the Schedule

April 15 p.m.

Xiamen SeaShine Hotel Palace

(14:00-16:00)

April 16 a.m.

- Plenary Speech 1(9:00-9:40)
- Plenary Speech 2(9:40-10:15)
- Photos & Coffee Break

(10:15-10:30)

- Session 1 (10:30-12:00)

- Lunch (12:00-13:00)

April 16 p.m.

- Plenary Speech 3(13:00-13:45)
- Session 2 (13:45-15:00)
- Coffee Break (15:00-15:15)
- Session 3 (15:15-17:00)

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Dr. Tim K.T. TSE, The Hong Kong University of Science and Technology, Hong Kong

Prof. Chi-Wen Lin, National Yunlin University of Science and Technology, Taiwan

Venue

Conference venue: Xiamen SeaShine Hotel Palace

Add: Xiahe Road No.819, Xiamen City, China

Map to Xiamen SeaShine Hotel Palace for Reference

2017 BOSI EDU XIAMEN CONFERENCE

ICMTM2017&ICEEEE2017 will be held on Xiamen SeaShine Hotel Palace.
CONFERENCE SCHEDULE as below.

April 15, 2017 (Saturday) **Lobby of Xiamen SeaShine Hotel Palace**	
14:00--16:00	Registration
April 16, 2016 (Saturday) **Palace Hall on 2/F**	
09:00--09:40	Plenary Speech 1 Professor Katsuyuki Kida
09:40--10:15	Plenary Speech 2 Professor Mohini M. Sain
10:15--10:30	Photos &Coffee Break
10:30--12:00	Session 1
12:00--13:00	Lunch
13:00--13:45	Plenary Speech 3 Associate Professor HAJIME HIRAO
13:45-15:00	Session 2
15:00--15:15	Coffee Break
15:15--17:00	Session 3

Note:

1. All the participants are strongly advised to arrive before 8:50, April 16, 2016.

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

3. Please copy PPT files of your presentation to the secretary 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@icmtm.org (for ICMTM2017) cfp@iceeee.org (for ICEEEE2017)

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 5 Minutes of Q&A

Plenary Speech

Plenary Speech 1　9:00-9:40

Professor Katsuyuki Kida

University of Toyama, Professor, Solid Mechanics Laboratory

Prof. Katsuyuki Kida was born in 1968 in Osaka, where from 1988 he studied mechanical engineering at Osaka University. 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 completed a Ph.D. course in engineering mechanics in 2000, investigating RCF problems of all-Si3N4 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 elements used in automobiles such as high-pressure pump of new type diesel engines.

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 bearing 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)."

Plenary Speech 2 9:40-10:15

Professor Mohini M. Sain

Director, Centre for Biocomposites and Biomaterials Processing, University of Toronto

Professor Dr. Mohini Sain, currently Dean of Faculty of Forestry at University of Toronto, Dr. Sain is a fellow of Royal Society of Chemistry, UK and Fellow of Academy of Canadian Engineers. Professor Sain is globally known for his pioneering work on Biocar Initiative and in 2009 issue of Toronto Life magazine featured his idea as the second best among 25 World Changing Ideas from the Smartest Torontonians. Dr. Sain holds several awards; few recent ones are Plastic Innovation Award and KALEV PUGI Award for his innovation and contribution to Industry. Author of more than 500 papers and is designated as a "hi-cited" researcher, Professor Sain hugely contributed to the society at large by translating research to commercialization. Professor Sain's role as a pioneer in creating non-profit organizations that are highly meaningful for society at large. He is the founding member of Canadian natural Composite Association, Ontario BioAuto Council and many more. He has championed world's WPC industry by actively perusing his vision of global important of this green and emerging industry. He chaired many of these global committees and helped nurturing this industry to over billion dollar market.

10:15-10:30	Photo & Coffee Break

Session List

Session1

Session Chair

Professor Katsuyuki Kida

University of Toyama, Professor, Solid Mechanics Laboratory

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April 16, 2016 (10:30-12:00)

1-Paper ID: M724-ICMTM2017

Title: Plastic Flow Analysis in Hot Aluminum Extrusion of Asymmetric Parts

Authors: Yeong-Maw Hwang and Yi-Hung Lin

Abstract: In this study, a design guideline for the die cavity and die bearing length distribution is proposed during an extrusion process of an asymmetrical thin sheet, such as clips of cell-phones. The plastic flow pattern of the billet inside the die cavity is analyzed using a commercial finite element package "DEFORM 3D". The Module of Die Stress Analysis in the finite element software "DEFORM 3D" is also used to simulate the stress, strain, and the displacement distributions of the die during extrusion of clips of cell-phones. The extrusion load, the stress and strain distributions of the die, the temperature distribution, and thickness distribution of the extruded product are investigated. Furthermore, hot extrusion experiments using A6061 as the specimen are executed. The experimental results of temperature, thickness distribution of the product, extrusion force, etc, are compared with the analytical values to verify the validity of the proposed die design guideline.

2-Paper ID: 19-ICEEEE2017

Title: Rapid-Convergent Sliding Mode Proportional-Integral Technology with Fuzzy Gain Scheduling for Hydrogen Energy Applications

Authors: En-Chih Chang

Abstract: This paper presents a rapid-convergent sliding mode proportional-integral (PI) technology with fuzzy gain scheduling for hydrogen energy applications. The rapid-convergent sliding mode control can provide insensitivity to system uncertainties and finite system-state convergence time to origin, however undesirable chattering behavior exists. The proposed technology utilizes the expansion of the plant model for designing the formation of a rapid-convergent sliding mode PI control and then the chatter is remarkably lessened. Moreover, a fuzzy gain scheduling assists in tuning the PI control parameters against uncertain disturbances. Simulations show that the presented hydrogen energy system leads to low distorted output-voltage under nonlinear load and fast transience under step-load change. Lab experiments obtained with a developed hydrogen energy system using a digital signal processing algorithm have been offered to demonstrate the performance improvement, especially in the presence of seriously nonlinear circumstance. In contrast with the proposed hydrogen energy system, the classic sliding mode-controlled hydrogen energy system has also been evaluated via both

simulation and experiment.

3-Paper ID: M726-ICMTM2017

Title: Present Development Status of Anti-creep Magnesium Rare-Earth Alloys

Authors: Yunwei Gui, Quanan Li and Xiaoya Chen

Abstract: The research status of creep resistance of rare earth magnesium alloy at home and abroad is reviewed, and the mechanism of high temperature creep resistance and the way of improving the creep resistance of magnesium alloy were also discussed. The problems of high temperature resistance and creep resistance of cast magnesium alloy are pointed out, and its future development direction is forecasted. The purpose of this paper is to provide the idea and basis for the development of creep resistant and heat resistant magnesium alloy.

4-Paper ID: M730-ICMTM2017

Title: Investigation of the rebound number and compressive strength of concrete with quarry dust as fine aggregate

Authors: Suppachai Sinthaworn

Abstract: This article presents the consideration of relation between compressive strength and rebound number of concrete cooperating with quarry dust as fine aggregate (natural river sand was replaced by quarry dust at the rate of0%, 25%, 50%, 75% and 100% by weight of fine aggregate). The properties of the concrete samples are w/c = 0.6,maximum size of coarse aggregate is 20 mm., cement contents are between 308 and 348 kg/m3, slumps range from 0to 100 mm., the 28-day compressive strength from 14 to 30 MPa. It was found that the rebound number results were affected by quarry dust especially the standard deviator of rebound number. The cube compressive strength at 28 days and the supplementary curve from the instruction manual were discussed. Moreover, an equation used to predict the28-day compressive strength of concrete cooperating with quarry dust as fine aggregate is proposed.

5-Paper ID: M734-ICMTM2017

Title: Durability of Alkali-activated Fly Ash/Slag Concrete

Authors: Maochieh Chi, Hsian Chen, Tsailung Weng, Ran Huang and Yihchang Wang

Abstract: This study investigated the durability of alkali-activated binders based on blends of fly ash (FA) and ground granulated blast furnace slag (GGBFS). Five fly ash-to-slag ratios of 100/0, 75/25, 50/50, 25/75, and 0/100 by mass were selected to produce alkali-activated fly ash/slag (AAFS) concrete. Sodium oxide (Na2O) concentrations of 6% and 8% of binder weight and activator modulus ratios (mass ratio of

SiO2 to Na2O) of 0.8, 1.0, and 1.23 were used as alkaline activators. Test results show that the total charge passed of AAFS concrete is between 2500 and 4000 coulombs, higher than the comparable OPC concrete. However, AAFS concrete exposed to sulfate attack performed better than OPC concrete. Based on the results, 100% slag-based AAFS concrete with Na2O concentration of 8% and activator modulus ratio of 1.23 has the superior performances.

6–Paper ID: M746-ICMTM2017

Title: Limestone dissolution in FeO-CaO-SiO2-MgO-MnO slag at 1573K

Authors: Wenwen Mao, Hua Lu, Chenxiao Li, Hong Li

Abstract: Through thermal simulation experiment and SEM analysis, limestone dissolution in a steelmaking slag was studied. The results showed that the dissolution rate of limestone is 5.4 times greater than lime under the same conditions in slag, the dissolution rate of limestone in slag increases rapidly with the increase of stirring gas flux. The rapid dissolution of limestone in the slag can be explained on two sides. Limestone decomposition and dissolution happens simultaneously, the newly generated lime participates in slagging in its highest activity. On the other hand, CO2 from limestone decomposition not only strengthen the mixing strength of the molten pool, but also helps to remove the high melting point 2CaO·SiO2 product.

12:00-13:00	Lunch

Plenary Speech

Plenary Speech 3 9:00-9:40

Associate Professor HAJIME HIRAO

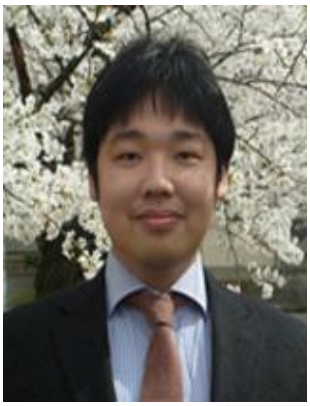
Department of Biology and Chemistry, College of Science and Engineering, City University of Hong Kong

Dr. Hajime Hirao received his BEng and MEng degrees from Kyoto University and his PhD from The University of Tokyo. He underwent his postdoc training at The Hebrew University of Jerusalem, Emory University, and Kyoto University. Before joining City University of Hong Kong, he worked as faculty at Nanyang Technological University in Singapore. Over the years, he has been interested in computational and theoretical aspects of chemistry, especially chemical reactions. One of the major goals of his research is to figure out how difficult chemical transformations can be achieved using simple catalytic platforms built from earth-abundant elements.

Dr. Hirao's research applies quantum chemistry, multiscale models, and many other computational chemistry techniques to a variety of complex molecular systems of practical importance such as transition-metal catalysts, metalloenzymes, drugs/drug targets, porous materials, and nanomaterials. Using computational approaches and often with experimental collaborators, his group seeks to derive key insights into chemical reaction mechanisms and bonding patterns of complex molecules, with the ultimate aim of designing new functional molecules and materials. He is also interested in developing new concepts and computational methods that may enhance our understanding of chemistry or improve the efficiency of computational analyses.

Session 2

Session Chair



Associate Professor Koshiro Mizobe
University of Toyama, Japan

Dr. Mizobe Koshiro obtained his Bachelor and Master degrees in the Department of Mechanical Engineering at the Kyushu University, Japan. Now he is an assistant professor in Department of Mechanical Engineering, University of Toyama, Japan. His main areas of research include: (1) rolling contact fatigue of polymer bearings, (2) refinement of high-carbon steels, (3) hydrogen embrittlement, (4) threshold stress intensity factor of short cracks, and (5) scanning electron and laser confocal microscopy. He received The 59th Best Presentation Award from The Society of Materials Science, Japan (JSMS) in 2010. In past six years he has published many original papers in well-known conferences.

April16, 2016 (13:00-15:00)

1-Paper ID: M747-ICMTM2017

Title: Microstructure and Mechanical Properties of Mg-9Gd-4Y-0.5Zr alloy

Authors: Bobo Meng, Quan-an Li, Xiaoya Chen

Abstract: The effects of heat treatment on microstructure and mechanical properties of Mg-9Gd-4Y-0.5Zr alloy were studied by XRD, OM, SEM and tensile testing machine. The results show that the alloy mainly consists of α-Mg matrix, Mg5Gd and Mg24Y5. Through solid solution and aging heat treatment process, the tensile strength, yield strength and elongation rate respectively achieves 263.1MPa, 235.2MPa and 3.11%.

2-Paper ID: M749-ICMTM2017

Title: Research on Protective Coating on Inner Surface of Alloy Tube

Authors: Ying Ce Zhang, Yan Hong Liu, Zhang Jian Zhou, Ming Min Zheng, Shu Yan

Kong, Hai Hong Xia and Huai Lin Li

Abstract: Materials are one of the most important factors which limit reactor development. Molten salt not only used as the coolant but used as application in which fissile materials and fission products are dissolved in Molten Salt Reactors (MSRs). Therefore the corrosion resistance of structure materials is the one of most important aspects for application in MSRs. Compatibility and chemical stability with the molten salt should be considered for some common structural alloys such as Incoloy-800H. In this research, the pure nickel coating was obtained by electroplating on the inner surface of nickel alloy to improve the corrosion resistance. However, there are some problems for plating on the inner surface of tube. For example the current is shielded and the anode is easy to passivate. The inner anode was used for solving these problems in this study. Pure nickel coating was obtain and the microstructure and properties of coating were analyzed using this method. The thickness, hardness and microstructure of coating were observed by metallographic microscope, microhardness tester and field emission scanning electron microscope, and the influence of deposition duration and annealing treatment duration on properties were analyzed. Thermal shock performance was investigated as well. The results showed that the coating thickness increased linearly with the increasing of plating durations and the size of grain increased with the durations as well, the surface of coating became unhomogeneous correspondingly. The hardness of coating changed as the change of durations of annealing treatment. The thermal shock test showed that bonding strength of coating with substrate was good.

3-Paper ID: 8-ICEEEE2017

Title: Numerical study on the cavitating flow in liquid hydrogen through elbow pipes with a simplified cavitation model

Authors: Yao Zheng, Huawei Chang, Xiaoshu Xie, Shuiming Shu

Abstract: Cavitation is usually caused by the pressure difference between the static pressure and the saturated vapor pressure under the local temperature and may result in huge damage to the pipelines. This paper developed asimplified cavitation model based on Rayleigh-Plesset bubble equation and Zwart cavitation model and conducteda series of numerical simulationswith the process of phase change and latent heat added to the solver by UDFs (User Defined Functions). The aim of the paper is to study the affecting factors onthe cavitation process of liquid hydrogen in elbow pipes.The results showed that the thermal effect can suppressthe occurrence and development of

cavitation. As the process of cavitation goes on, the suppression ofthermal effect is more remarkable. Before the cavitating flow reachesits steady state, cavitation process is very sensitive to the changes of inlet velocity and outlet pressure. Increasing the inlet velocity or decreasing the outlet pressure can both strengthen the cavitation process. The turbulent viscosity ratio has little effects on cavitation process of liquid hydrogen, but the increase of turbulent viscosity ratio can enhance the thermal effect and lower the temperature gradient in the cavity. In addition, the structure of the cavity is found to be related to the bend angles. The cavitation process is enhanced with the decrease of the angles since the duration of centrifugal force is longer.

4-Paper ID: E436-ICEEEE2017

Title: Flowing BottomHole Pressure Prediction for Gas Wells based on Support Vector Machine and Random Samples Selection

Authors: Wei Chen, Qinfeng Di, Feng Ye, Jingnan Zhang, Wenchang Wang

Abstract: Dynamic analysis and optimum production strategies of gas wells demand accurate prediction of flowing bottomhole pressure (FBHP). Due to the existence of many uncertain relations between the changeable influence factors and the limitations of existing methods, no single model was found to be applicable over all ranges of variables with suitable accuracy. In this paper, a FBHP prediction method based on support vector machine (SVM) and random samples selection way, named the FBHP-SVM method, was investigated, and a support vector regression model with ε-insensitive loss function (ε-SVR) based on radial basis function (RBF) was used topredict the FBHP. Compared with the true values, the average absolute and relative prediction errors were 0.20MPa and 2.62%, respectively. It is worthy to note that a reliable prediction of FBHB can be made when the true value of verification data is in the true values range of training samples.

5-Paper ID: E420-ICEEEE2017

Title: Enhanced photo-fermentative hydrogen production of Rhodopseudomonas sp. nov. strain A7 by biofilm reactor

Authors: Han-Quan Wen, De-Feng Xing, Guo-Jun Xie, Jie Ding, Nan-Qi Ren, Bing-Feng Liu

Abstract: To achieve stable and efficient photo-fermentative hydrogen production, this work investigated photo-fermentative hydrogen production by forming biofilm on the surface of carrier in the biofilm reactor (BR). Results showed the hydrogen production performance was greatly improved by formed biofilm. The time of hydrogen production and efficiency of substrate utilization were enhanced obviously compared

to the control reactor (CR). When the CR was used, hydrogen production stopped at 7th day and maximum cumulative hydrogen volume and hydrogen yield were 1730 ± 87 mL/L and 1.44 ± 0.07 mol H2/mol acetate, respectively. However, in the BR hydrogen production volume of 3028 ± 150 mL/L and hydrogen yield of 2.52 ± 0.13 mol H2/mol acetate were obtained, which were enhanced about 75% compared to that of the CR. The time of hydrogen production extended from 7 days of CR to 12 days of BR and the substrate conversion efficiency increased from 36% of CR to 63% of BR. It was worth noting at 8th day that substrate was almost utilized completely but hydrogen production still lasted for 4 days. This suggested that the formation of biofilm in BR was favorable to continuous hydrogen production and substrate utilization with high efficiency. Results demonstrated the BR can get a more stable and consistent operating process and it was a proper and potential way to produce hydrogen by photo-fermentative bacteria (PFB).

6-Paper ID: E438-ICEEEE2017

Title: Cathode materials of LiNixMnyCo1-x-yO2form battery recycling reproduction

Authors: Yenchun Liu, Minchi Liu

Abstract: In this study, Co, Li and Ni were acquired from waste battery to remake positive electrode material of Li battery, then the battery was assembled and battery charging and discharging was conducted. By doing so, the waste can be turned into resource, and pollution issue to the environment from the battery can be reduced and manufacturing cost of the battery can be reduced too. Presently, the recycling treatment of waste li battery was to adopt wet metallurgical method to separate Li, Co, Ni and Mn elements and to prepare respectively all kinds of pure oxide or carbonate, therefore, the process was very tedious, and the economic efficiency was not as expected. In this study, Co, Li and Ni were acquired from waste battery to make Li, Ni, Mn, Co ternary material positive electrode powder. In the process, Li, Ni, Mn and Co proportion in the solution was analyzed, and insufficient metallic ion composition was then added. After it was adjusted to correct composition, it was sintered into positive electrode material powder. Therefore, element separation procedure can be saved, and the cost can be greatly reduced. In this study, waste battery was used to remake positive electrode material, and SEM and XRD were used first to observe micro structure, then it was assembled into battery. After battery charging and discharging performance test, it can reach 122.21 mAh/g, which was about 88% of that made by pure material. Consequently, the purposes of low manufacturing cost of positive electrode

material, the recycling of valuable Co material from the waste battery, the reduction of waste material and the turning of waste into resource can be reached.

7-Paper ID: E435-ICEEEE2017

Title: Comparison and effect of cinder and Lanthanum supported with Magnesium oxide for biodiesel production

Authors: Sadia Nasreen, Muhammad Nafees, Liaqat Ali Qurashi

Abstract: In this study, transesterification of soybean oil to biodiesel with Cinder and La supported with Mn catalyst is proposed. Moreover, the reaction mechanism was also discussed along with the effects of reaction temperature, methanol to oil molar ratio, mass ratio of catalyst to oil. In order to compare the stability and durability of catalyst reusability of catalyst, resistance toward water and FFA was also studied. The results showed that the yield of biodiesel produced with Lanthanum supported with Mn catalyst was in excess of 99% at temperatures below 1500C within 90 min. Cinder supported with Mn shows conversion of triglycerides from soybean oil in
reaction with methanol after 60 minutes was over 99% using 3wt% of catalyst based on oil, 30:1 methanol/oil molar ratio, at 120°C. Both catalyst shows long life activity and could be reused for 14 cycles with regeneration. The catalyst exhibited good tolerance toward soybean oil containing 2.5 water and 1% wt fatty acids.

8-Paper ID: 20-ICEEEE2017

Title: 3D simulation of hydride-assisted crack propagation in zircaloy-4 using XFEM

Authors: Siddharth Suman, Mohd. Kaleem Khan, Manabendra Pathak, R.N. Singh

Abstract: Influence of hydride precipitated at the tip of the crack on crack propagation in zircaloy-4 is numerically investigated using the extended finite element method (XFEM). Numerical simulation is performed on compact tension specimen to understand the effects of crack and hydride lengths on crack propagation in terms of stress intensity factor and J-integral. The values of stress intensity factor and J-integral indicate that hydride induces the crack instability. The stress intensity factor decreases with the precipitation of brittle hydride phase at the crack tip, resulting in hydride-assisted crack propagation. A comparison of crack propagation behaviour with different hydride lengths is also presented. The crack remains stable in the absence of the hydride while it propagates when hydride is considered at its tip for the same given stress. The crack arrests only after reaching to the zircaloy metal matrix causing complete fracture hydride.

15:00-15:15	Coffee Break

Session 3

1-Paper ID: M782-ICMTM2017

Title: Phase transformation of Co-Ni alloy nanowires in electrodeposition

Authors: Aiman Mukhtar and Tahir Mehmood

Abstract: The effect of potential on the structure and composition of Co-Ni alloy nanowires is studied using conventional method. The Co-Ni alloy nanowires deposited at –3.5 V has fcc structure and at –1.0V has hcp structure. The phase transformation of Co-Ni alloy nanowires can be attributed to smaller critical clusters formed at the high potential.

2-Paper ID: M791-ICMTM2017

Title: Effect of ultrasonic vibration and solution-aging treatment on microstructure and properties of in-situ TiAl3/7050Al composites

Authors: Lili Chen, Zhiming Du, DanZhao, Lihua Chen, Changshun Wang

Abstract: Ultrasonic vibration have positive effect on formation of in-situ TiAl3/7050Al composites, the role of ultrasound in the reaction process was described systematically. The best solution-aging treatment parameters were discussed and effects of the selected treatment on the resultant microstructure and mechanical properties were investigated. The results show that ultrasonic vibration not only promote the reaction process, but also result in significant spreading particles fallen off from the reaction interface, therefore creating a finer and homogeneous distribution of TiAl3 particles in the composite. In solution process, the skeleton second phase dissolve into matrix with increasing temperature and holding time, the transformation is more sensitive to solution temperature. Residual second phase transform into finer-size rod

or discoid shape and a large amount of finer phase (MgZn2 and CuAl2) precipitates after aging-treated. As a result, the strength, hardness and elongation of the composite are slightly increased after using ultrasonic vibration and significantly increased after solution-aging treatment.

3-Paper ID: M799-ICMTM2017

Title: Observation of Fracture Surface of Induction-heated JIS SUJ2 Bearing Steel under Rotating Bending Fatigue

Authors: Isamu YOSHIDA, Koshiro MIZOBE and Katsuyuki KIDA

Abstract: Martensitic high-carbon chromium bearing steel is used for rolling contact applications in various mechanical parts. Induction heating is one of heat treatment methods which take shorter time and lower energy compared with furnace heating. In the present work, we prepared induction-heated and furnace-tempered JIS SUJ2 bearing steel bar specimens. After rotating bending tests, we observed their fracture surfaces. It was found that the very large fisheye crack failures occurred and the crack size increased with increasing number of cycles to failure.

4-Paper ID: M800-ICMTM2017

Title: Observation of furnace-induction quenched microstructure in high carbon high chromium steel

Authors: Koshiro Mizobe, Kohei Egawa and Katsuyuki Kida

Abstract: There are two major heating methods used in industrial situations. One is furnace heating which is popular for mass production as it hardens the steel uniformly. The other is induction heating which is energy saving but hardens the steel unevenly. We developed a combined heat treatment method, furnace-induction heating (FIH), and observed the material structure using picral and nital etching.

5-Paper ID: E450-ICEEEE2017

Title: THEORETICAL ANALYSIS FOR THE CENTRIFUGAL EFFECT ON PREMIXED FLAME SPEED IN A CLOSED TUBE

Authors: Lei Sun, Yong Huang, Yingyi Ji

Abstract: A theoretical analysis is described to study the effect of centrifugal acceleration, especially high centrifugal acceleration, i.e. more than 200 times of gravity acceleration (200g), on the premixed flame speed in a rotating closed tube. Based on one-dimensional (1-D) steady adiabatic flame model, simplified governing equations are directly solved by integration method in the reaction zone. A theoretical prediction that describes the premixed flame speed in a rotating closed tube is obtained. The

theoretical prediction agrees well with the experimental data obtained by Lewis & Smith. The result verifies that the flame speed accelerated by the centrifugal force is nearly proportional to the square root of the centrifugal acceleration. It is shown by theoretical analysis that the flame speed in a rotating closed tube is determined by the initial temperature, the critical ignition temperature, the adiabatic flame temperature and the thicknesses of reaction zone. The premixed flame speed in a rotating closed tube increases nearly linearly with the increasing of the initial temperature or square root of the thicknesses of reaction zone, or with decreasing of the critical ignition temperature or the adiabatic flame temperature.

6-Paper ID: 42-ICEEEE2017

Title: Studies on air core size in a simplex pressure-swirl atomizer

Authors: Zhilin Liu, Yong Huang, Lei Sun

Abstract: The air core formed in the pressure-swirl atomizer has been experimentally and theoretically investigated. The experiments were implemented from the pressure of 0.1MPa to 1.4MPa at the room temperature. Five types of atomizers with different swirl chamber length and five types of mixture of the glycerol and water with different liquid viscosity were employed for discussing effects of the swirl chamber length and the liquid viscosity on the air core size. In addition, a semi-theoretical prediction correlation of the air core size was derived by establishing a control-volume model based on the angular momentum theorem in the particles system, and then was verified with the experimental results. It is found that the air core size increases with the decrease of the swirl chamber length and the decrease of the liquid viscosity. The air core will disappear when the swirl chamber length is greater than a critical length or the ejected liquid viscosity exceeds a threshold if other parameters are unchanged. The critical swirl chamber length decreases with an increase of the liquid viscosity and the viscosity threshold decreases with an increase of the swirl chamber length. Compared with some available correlations proposed in the literatures, predictions by the new correlation derived in the present paper roughly show better agreement with the experimental results at a wide range of liquid viscosity.

7-Paper ID: M825-ICMTM2017

Title: Study of Cold Coiling Spring Steel on microstructure and cold forming performance

Authors: Yun Jiang, Yi-Long Liang, Ming Yang and Fei Zhao

Abstract: Medium- carbon cold-coiling locomotive spring steels were treated by a novel

Q-P-T (quenching-partitioning-tempering) process. The microstructures of the test steel were characterized by optical microscopy (OM), scanning electron microscopy (SEM), transmission electron microscope (TEM) and X-ray diffraction (XRD). Results show that the microstructure of tested steel treated by Q-P-T process is a complex microstructures composed of martensite, bainite and retained austenite. The volume fraction of retained austenite (wt.%) is up to 31% . After predeforming and tempering again at 310℃, the plasticity of samples treated by Q-P-T process is still well. Fracture images show that the Q-P-T samples are ductile fracture. It is attributed to the higher volume fraction of retained austenite and the interactions between the multi-phases in Q-P-T processed sample. Therefore Q-P-T process can provide better cold coiling performance for locomotive spring steels.

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Thanks again for all your great attention and kind support to ICMTM2017 and ICEEEE 2017.

Thank you for all of your contributions!