

# The 4th Pan-Yellow Sea Rim Symposium on Mg Alloys

## 第 33 回高性能 Mg 合金創成加工研究会

### Technical Program

November 12-13,  
100th Anniversary Memorial Hall, Kumamoto University, Japan  
2009 年 12-13 日、熊本大学 100 周年記念館



Organized by  
*Kumamoto University*  
高性能 Mg 合金創成加工研究会

Supported by  
科学技術振興調整費  
アジア・アフリカ科学技術協力の戦略的推進「国際共同研究の推進」  
「先進 Mg 合金開発に関する東アジア連携の構築」

# PROGRAM

**Thursday, November 12, 2009**

**INVITED PRESENTATIONS**

**100<sup>th</sup> Anniversary Memorial Hall**

09:00-09:30	<b>Opening Ceremony</b> <b><u>Kazuki Takashima</u></b> , Chairperson
	<b>INTERNATIONAL SESSION 1</b> <i>Session Chairs: Prof. S. Ando &amp; Prof. D.H.Kim</i>
09:30-09:50	<b>Research and Development of Mg Alloys in Kumamoto University and Future Perspective of International Collaboration with East Asian Countries</b> <b><u>Kazuki Takashima</u></b> Department of Materials Science and Engineering, Kumamoto University, Japan
09:50-10:10	<b>The Status of Development and Research of Magnesium Alloy in China</b> <b><u>Zhenshan Cui</u></b> , Juan Liu, Fei Chen Department of Plasticity Technology, Shanghai Jiao Tong University, China
10:10-10:30	<b>Present Status of Magnesium Industries and Research Activities in Korea</b> <b><u>Jung-Chan Bae</u></b> Production Technology R&D Division, KITECH, Korea
10:30-10:50	<b>Recent Progress on Mg Based Metallic Glasses and Composites</b> <b><u>J. C. Huang</u></b> <sup>1</sup> , T. H. Hung <sup>1</sup> , H. M. Chen <sup>1</sup> , C. J. Lee <sup>1</sup> , J. S. C. Jang <sup>2</sup> <sup>1</sup> Department of Materials and Optoelectronic Science, National Sun Yet-Sen University, Taiwan, ROC <sup>2</sup> Department of Mechanical Engineering, Institute of Materials Science & Engineering, National Central University, Taiwan
10:50-11:10	<b>Coffee Break</b>
	<b>INTERNATIONAL SESSION 2</b> <i>Session Chairs: Prof. M. Yamasaki &amp; M. Shao</i>
11:10-11:30	<b>Research and Development in National Engineering Research Center of Near-Net-Shape Forming for Metallic Materials</b> Ming Shao, <b><u>Zhixin Kang</u></b> , Wei Xia, Yuanyuan Li National Engineering Research Center of Near-Net-Shape Forming for Metallic Materials, South China University of Technology, China
11:30-11:50	<b>Recent Progress on Magnesium Alloy Development and Corrosion Protection</b> <b><u>En-Hou Han</u></b> , Rongshi Chen Institute of Metal Research, Chinese Academy of Sciences, China
11:50-12:10	<b>Enhancement of Superplasticity of Mg Alloys Through Grain Refinement by Severe Plastic Deformation and Prediction of Failure of a Deforming Body Using a Zener-Holloman Parameter</b> <b><u>Woo-Jin Kim</u></b> Department of Materials Science and Engineering, Hong-Ik University, Korea
12:10-12:30	<b>Some Magnesium Researches in NDHU</b> <b><u>Jian-Yih Wang</u></b> , Jenn-Ming Song Department of Materials Science and Engineering, National Dong Hwa University, Taiwan

12:30-12:40	<b>Taking Group Photo</b>	<b>Frontage of 100<sup>th</sup> Anniversary Memorial Hall</b>
12:40-13:40	<b>Lunch</b>	<b>FORICO</b>
13:40-15:10	<b>POSTER SESSION</b>	
	<b>TECHNICAL SESSION 1</b>	<i>Session Chairs: Prof. M. Otsu &amp; Prof. E.H. Han</i>
15:10-15:30	<b>LPSO Mg-TM-RE Alloys Developed in Kumamoto University</b> <b>- KUMADAI Magnesium Alloys -</b> <u><b>Yoshihito Kawamura</b></u> Department of Materials Science and Engineering, Kumamoto University, Japan	
15:30-15:50	<b>Development of Strong Non-Basal Texture and Enhancement of Formability in Ca Containing Mg-Zn Based Alloys</b> Jeong Kyun Kim <sup>1</sup> , Hoo Dam Lee <sup>1</sup> , Joon Seok Kyung <sup>1</sup> , Won Tea Kim <sup>2</sup> , <u><b>Do Hyang Kim</b></u> <sup>1</sup> <sup>1</sup> Center for Non-crystalline Materials/ Department of Metallurgical Engineering, Younsei University, Korea <sup>2</sup> IT Division, Cheongju University, Korea	
15:50-16:10	<b>Tensile Properties with the Ductile-to-Brittle Transition and Friction Stir Processing of the <math>\alpha</math>+<math>\beta</math>-Type Mg-Li-Al-Zn Alloy</b> Chung-Wei Yang <sup>1</sup> , Fei-Yi Hung <sup>2</sup> , <u><b>Truan-Sheng Lui</b></u> <sup>1</sup> <sup>1</sup> Department of Materials Science and Engineering, National Cheng Kung University, Taiwan <sup>2</sup> Institute of Nanotechnology and Microsystems Engineering, Center for Micro/Nano Science and Technology, National Cheng Kung University, Taiwan	
16:10-16:30	<b>Coffee Break</b>	
	<b>TECHNICAL SESSION 2</b>	<i>Session Chairs: Prof. C. Iwamoto &amp; Prof. J.C. Bae</i>
16:30-16:50	<b>Inhomogenous Deformation Observed Using High-precision Markers Drawn by Electron Beam Lithography in a Magnesium Alloy with LPSO Phase</b> <u><b>Tatsuya Morikawa</b></u> <sup>1</sup> , Yuuki Mitani <sup>2</sup> , Jun Hirotani <sup>2</sup> , Kenji Higashida <sup>1</sup> <sup>1</sup> Department of Materials Science and Engineering, Kyushu University, Japan <sup>2</sup> Graduate School of Engineering, Kyushu University, Japan	
16:50-17:10	<b>Corrosion and Passivation Mechanisms of <math>\alpha</math>/LPSO Two-phase Mg Alloys Prepared by Cooling Rate-Controlled Solidification Technique</b> <u><b>Michiaki Yamasaki</b></u> , Shogo Izumi, Yoshihito Kawamura Department of Materials Science, Kumamoto University, Japan	
17:10-17:30	<b>Orientation Dependence of Deformation Behavior of Magnesium Single Crystals by Tension and Compression Test</b> <u><b>Shinji Ando</b></u> <sup>1</sup> , Masayuki Tsushida <sup>2</sup> , Hiromoto Kitahara <sup>1</sup> <sup>1</sup> Department of Materials Science and Engineering, Kumamoto University, Japan <sup>2</sup> Graduate School of Science and Technology, Kumamoto University, Japan	
18:00-20:00	<b>Banquet</b>	<b>Kusunoki Hall</b>

**Friday, November 13, 2009**

**INVITED PRESENTATIONS**

**100<sup>th</sup> Anniversary Memorial Hall**

	<b>TECHNICAL SESSION 3</b> <i>Session Chairs: Prof. K. Takashima &amp; Prof. Z. Cui</i>
09:00-09:20	<b>Study on Surface Modification of Magnesium Alloys with Functional Nanofilms by Polymer Plating</b> <b><u>Zhixin Kang</u></b> , Jing Sang, Xiaoming Lai, Fen Wang, Ming Shao, Yuanyuan Li National Engineering Research Center of Near-Net-Shape Forming for Metallic Materials School of Mechanical & Automotive Engineering, South China University of Technology, China
09:20-09:40	<b>Ductility Enhancement of AZ31B Magnesium Alloy in Warm Forging with Controlled Forging Speed on Servo Press</b> <b><u>Ryo Matsumoto</u></b> Division of Mechanical Engineering, Graduate School of Engineering Science, Osaka University, Japan
09:40-10:00	<b>Relationship of Composition, Microstructure and Mechanical Properties of Cast Mg-Al-Ca Alloys Processed Through Different Routes</b> <b><u>R.S. Chen</u></b> <sup>1</sup> , S.M. Liang <sup>1,2,3</sup> , E.H. Han <sup>1</sup> , Z.Fan <sup>2</sup> <sup>1</sup> State key laboratory for corrosion and protection, Institute of Metal Research, Chinese Academy of Sciences, China <sup>2</sup> Brunel Centre for Advanced Solidification Technology (BCAST), Brunel University, UK <sup>3</sup> Graduate School of the Chinese Academy of Sciences, China
10:00-10:20	<b>Microstructure of Mg<sub>96</sub>Zn<sub>2</sub>Y<sub>2</sub> Joints Welded by Resistance Spot Welding</b> <b><u>Chihiro Iwamoto</u></b> , Shinobu Satonaka, Yoshihito Kawamura, Kouichi Honda, Kenji Nakamura Graduate School of Science and Technology, Kumamoto University, Japan
10:20-10:40	<b>Coffee Break</b>
	<b>TECHNICAL SESSION 4</b> <i>Session Chairs: Prof Y. Kawamura &amp; Prof. W.J. Kim</i>
10:40-11:00	<b>Workability Study on Hot Forging of Magnesium Alloy AZ31B and Practice</b> <b><u>Liu Juan</u></b> , Cui Zhenshan National Die & Mold CAD Eng. Research Center, Shanghai Jiao Tong University, China
11:00-11:20	<b>Crystal Plasticity Analysis for Anisotropic Loading Behavior in Magnesium Single Crystal</b> <b><u>Tsuyoshi Mayama</u></b> <sup>1</sup> , Tetsuya Ohashi <sup>2</sup> , Kenji Higashida <sup>3</sup> <sup>1</sup> Priority Organization for Innovation and Excellence, Kumamoto University, Japan <sup>2</sup> Kitami Institute of Technology, Japan <sup>3</sup> Department of Materials Science and Engineering, Kyushu University, Japan
11:20-11:40	<b>Application of Friction Stir Incremental Forming to Forming Mg Alloy Sheets</b> <b><u>Masaaki Otsu</u></b> , Tsukasa Ichikawa, Mitsuhiro Matsuda, Kazuki Takashima Department of Materials Science and Engineering, Graduate School of Science and Technology, Kumamoto University, Japan

11:40-11:50	<b>Closing Address</b>
11:50-13:00	<b>Lunch</b> <b>FORICO</b>
13:00-15:30	<b>Campus Tour</b>

## **POSTER PRESENTATIONS**

**100<sup>th</sup> Anniversary Memorial Hall**

P-01	<b>The Evolution of Microstructure and Mechanical Properties of AZ31 Alloy Sheets by Symmetric Rolling, Different Speed Rolling and Cross-Roll Rolling</b> D.G. Kim <sup>1,2</sup> , H.T. Son <sup>1</sup> , S.K. Park <sup>1</sup> , Y.M Kim <sup>1</sup> , M.Y. Huh <sup>2</sup> , J.S. Lee <sup>3</sup> <sup>1</sup> Automotive Components Center, KITECH, Korea <sup>2</sup> Department of Materials Science and Engineering, Korea University, Korea <sup>3</sup> Efficiency and Resources Division, KETEP, Korea
P-02	<b>Effects of Ageing and Mn Addition on Microstructure and Mechanical Properties of Mg-Al-Sn and Mg-Zn-Sn Alloys Fabricated by Extrusion-Rolling Processes</b> Hyeon-Taek Son <sup>1</sup> , Seul-Ki Park <sup>1</sup> , Young-Mo Kim <sup>1</sup> , Dae-Guen Kim <sup>1</sup> , Yong-Hoon Cha <sup>2</sup> , Jae-Seol Lee <sup>3</sup> <sup>1</sup> Automotive Components Center, KITECH, Korea <sup>2</sup> Chosun University, Korea <sup>3</sup> Efficiency and Resources Division, KETEP, Korea
P-03	<b>Effect of Cooling Rate on Microstructure and Mechanical Properties of Mg-Zn-Y Cast and Extruded Alloys</b> Kenji Hashimoto <sup>1</sup> , Michiaki Yamasaki <sup>2</sup> , Yoshihito Kawamura <sup>2</sup> <sup>1</sup> Graduate School of Science and Technology, Kumamoto University, Japan <sup>2</sup> Department of Materials Science, Kumamoto University, Japan
P-04	<b>Deformation and Mechanical Properties of Fine Grained Mg Alloys</b> Ha-guk Jeong Eco Materials & Processing Department, Production Technology R&D Division, KITECH, Korea
P-05	<b>Efforts on Grain Refinement of AZ31 Alloy in Sheet Form</b> B. G. Hwang and W. J. Kim Department of Materials Science and Engineering, Hong-Ik University, Korea
P-06	<b>Relation Between Corrosion Behavior and Microstructure of Mg-Zn-Y Alloys with LPSO Phase</b> Shogo Izumi <sup>1</sup> , Michiaki Yamasaki <sup>2</sup> , Yoshihito Kawamura <sup>2</sup> <sup>1</sup> Graduate School of Science and Technology, Kumamoto University, Japan <sup>2</sup> Department of Materials Science, Kumamoto University, Japan
P-07	<b>Quasicrystalline Phase Formation and Enhanced Mechanical Properties in Mg-Sn-Zn-Al Alloys</b> Young Kyun Kim <sup>1</sup> , Do Hyung Kim <sup>1</sup> , Joon Seok Kyeong <sup>1</sup> , Won Tae Kim <sup>2</sup> , Do Hyang Kim <sup>1</sup> <sup>1</sup> Center for Noncrystalline Materials, Department of Metallurgical Engineering, Yonsei University, Korea

	<sup>2</sup> IT Division, Cheongju University, Korea
P-08	<b>Suppression of Basal-Plane Texture Development in Ca Containing Mg-Zn Based Alloys</b> Jeong Kyun Kim <sup>1</sup> , Hoo Dam Lee <sup>1</sup> , Won Tae Kim <sup>2</sup> , Do Hyang Kim <sup>1</sup> <sup>1</sup> Center for Noncrystalline Materials, Department of Metallurgical Engineering, Yonsei University, Korea <sup>2</sup> Applied Science Division, Cheongju University, Korea
P-09	<b>Microstructures and Mechanical Properties of Mg-Zn<sub>4.3</sub>Y<sub>1</sub> Alloy Powder Reinforced by Quasicrystalline Particle</b> Taek-Soo Kim Korea Institute of Industrial Technology, Korea
P-10	<b>Characteristics of Rapidly Solidified Mg Alloy Powders Compacted by Magnetic Pulsed Compaction (MPC) Method</b> Hong-Jun Chae and Taek-Soo Kim Korea Institute of Industrial Technology, Korea
P-11	<b>Sample Size Effect and Micro-Compression of Mg<sub>65</sub>Cu<sub>25</sub>Gd<sub>10</sub> Metallic Glass</b> C. J. Lee <sup>1</sup> , J. C. Huang <sup>1</sup> , T. G. Nieh <sup>2</sup> <sup>1</sup> Department of Materials and Optoelectronic Science, National Sun Yet-Sen University, Taiwan <sup>2</sup> Department of Materials Science and Engineering, The University of Tennessee, USA
P-12	<b>Hard Coating on Magnesium Alloy by Metallic Glass Sputtered Film</b> Y. H. Lai, B. Y. Chen, H. S. Chou, J. C. Huang Department of Materials and Optoelectronic Science, National Sun Yet-Sen University, Taiwan
P-13	<b>Flow Serration and Shear-Band Propagation in The Porous Mo Particles Reinforced Mg-Based Bulk Metallic Glass Composites</b> H. M. Chen <sup>1</sup> , J. C. Huang <sup>1</sup> , J. S. C. Jang <sup>2</sup> , <sup>1</sup> Department of Materials and Optoelectronic Science, National Sun Yet-Sen University, Taiwan <sup>2</sup> Department of Mechanical Engineering, Institute of Materials Science & Engineering, National Central University, Taiwan
P-14	<b>Effect of B<sub>2</sub>O<sub>3</sub> Addition on Microstructure of Mg-RE Alloy</b> Sayuri Yoshimoto <sup>1</sup> , Shouta Mahara <sup>2</sup> , Masayuki Tsushida <sup>2</sup> , Hiromoto Kitahara <sup>2</sup> , Shinji Ando <sup>2</sup> <sup>1</sup> Department of Materials Science and Engineering, Faculty of Engineering, Kumamoto University, Japan <sup>2</sup> Department of Materials Science and Engineering, Graduate School of Science and Technology, Kumamoto University, Japan
P-15	<b>Development of Magnesium Alloy by Ti and B<sub>2</sub>O<sub>3</sub> Addition</b> Shota Mahara <sup>1</sup> , Masayuki Tsushida <sup>1</sup> , Hiromoto Kitahara <sup>2</sup> , Shinji Ando <sup>2</sup>

	<sup>1</sup> Graduate student, Graduate School of Science and Technology, Kumamoto University, Japan <sup>2</sup> Department of Materials Science and Engineering, Kumamoto University, Japan
P-16	<b>On Making Truly High Strain Rate Superplastic ZK60 Sheets</b> B. H. Lee and W. J. Kim Department of Materials Science and Engineering, Hong-Ik University, Korea
P-17	<b>Microstructure and Superplasticity of Ca Containing AZ Alloys with Ultrafine Grain Sizes</b> Y. G. Lee and W. J. Kim Department of Materials Science and Engineering, Hong-Ik University, Korea
P-18	<b>Hot Compression Deformation Behaviors of 1%Ca-AZ80 Alloy at Elevated Temperature</b> H. W. Lee, W. J. Kim Department of Materials Science and Engineering, Hong-Ik University, Korea
P-19	<b>Improvement of Mechanical Properties and Texture Evolution in Mg-Zn-Y-Zr Alloys</b> Joon Seok Kyeong <sup>1</sup> , Won Tae Kim <sup>2</sup> , Sung Dae Kim <sup>3</sup> , Young Woon Kim <sup>3</sup> , Do Hyang Kim <sup>1</sup> <sup>1</sup> Center for Noncrystalline Materials, Department of Metallurgical Engineering, Yonsei University, South Korea <sup>2</sup> Applied Science Division, Cheongju University, Korea <sup>3</sup> Department of Materials Science and Engineering, Seoul National University, Korea
P-20	<b>Fatigue Behavior of Mg-Zn-Y Alloys with LPSO Phase</b> Takuya Yanagihara <sup>1</sup> , Masayuki Tsushida <sup>2</sup> , Hiromoto Kitahara <sup>2</sup> , Shinji Ando <sup>2</sup> <sup>1</sup> Department of Materials Science, Kumamoto University, Japan <sup>2</sup> Kumamoto Technology and Industry Foundation, CREATE Kumamoto University Laboratory, Japan
P-21	<b>Micro-Fracture Testing of Advanced Mg Alloys</b> Hajime Yoshimura, Shun Matsuyama, Masaaki Otsu, Kazuki Takashima, Yoshihito Kawamura Department of Materials Science and Engineering, Kumamoto University, Japan
P-22	<b>Tensile Testing of Mg-Zn-Y Alloys in Micrometer Scale</b> Yuichi Nagatomi <sup>1</sup> , Yuji Kawakami <sup>2</sup> , Masaaki Otsu <sup>1</sup> , Kazuki Takashima <sup>1</sup> , Yoshihito Kawamura <sup>1</sup> <sup>1</sup> Department of Materials Science and Engineering, Graduate School of Science and Technology, Kumamoto University, Japan <sup>2</sup> Industrial Technology Center of Saga, Japan
P-23	<b>Forming of Mg Alloy Sheets by Friction Stir Incremental Forming</b> Masaaki Otsu, Tsukasa Ichikawa, Mitsuhiro Matsuda, Kazuki Takashima Department of Materials Science and Engineering, Graduate School of Science and Technology, Kumamoto University, Japan

P-24	<p><b>Extrusion Characteristics of AZ91 in Hot Hydrostatic Process and Effect of the Process Variable's Change on Surface Condition</b></p> <p>Duk-Jae Yoon<sup>1</sup>, Eung-Zu Kim<sup>2</sup>, Ki-Sun Lee<sup>1</sup></p> <p><sup>1</sup>Advanced Forming Technology Service Center, Korea Institute of Industrial Technology, Korea</p> <p><sup>2</sup>Molding &amp; Forming Technology R&amp;D Department, Korea Institute of Industrial Technology, Korea</p>
P-25	<p><b>Microstructure of Mg<sub>96</sub>Zn<sub>2</sub>Y<sub>2</sub>/AZ31B Joined by Resistance Spot Welding</b></p> <p>Koichi Honda, Kenji Nakamura, Chihiro Iwamoto, Shinobu Satonaka, Yoshihito Kawamura</p> <p>Graduate School of Science and Technology, Kumamoto University, Japan</p>
P-26	<p><b>Asymmetrical Microstructure of Mg-Zn-Y Alloy Plate Welded by Friction Stir Welding</b></p> <p>Kenji Nakamura<sup>1</sup>, Chihiro Iwamoto<sup>1</sup>, Shinobu Satonaka<sup>1</sup>, Yoshihito Kawamura<sup>1</sup>, Masafumi Noda<sup>2</sup>, Takuya Tsumura<sup>3</sup>, Kazuhiro Nakata<sup>3</sup></p> <p><sup>1</sup>Graduate School of Science and Technology, Kumamoto University, Japan</p> <p><sup>2</sup>Kumamoto Technology and Industry Foundation, CREATE Kumamoto University Laboratory, Japan</p> <p><sup>3</sup>Joining and Welding Research Institute, Osaka University, Japan</p>
P-27	<p><b>Deformation Behavior Induced by Brinell Ball in Single Crystalline Mg</b></p> <p>Hiromoto Kitahara<sup>1</sup>, Yosuke Nagano<sup>2</sup>, Masayuki Tsushida<sup>1</sup>, Shinji Ando<sup>1</sup></p> <p><sup>1</sup>Department of Materials Science and Engineering, Graduate School of Science and Technology, Kumamoto University, Japan</p> <p><sup>2</sup>Department of Materials Science and Engineering, Faculty of Engineering, Kumamoto University, Japan</p>
P-28	<p><b>Analysis of {1012} Twin Structure by Molecular Dynamics Method</b></p> <p>Kounosuke Nakamura<sup>1</sup>, Masayuki Tsushida<sup>1</sup>, Hiromoto Kitahara<sup>2</sup>, Shinji Ando<sup>2</sup></p> <p><sup>1</sup>Graduate School of Science and Technology, Kumamoto University, Japan</p> <p><sup>2</sup>Department of Materials Science and Engineering, Kumamoto University, Japan</p>
P-29	<p><b>Desulphurization Process Using Mg Powder Coated CaO</b></p> <p>S.M.Kim<sup>1,2</sup>, T.S.Kim<sup>1</sup>, Y.D.Kim<sup>2</sup></p> <p><sup>1</sup>Echo materials &amp; Processing Department, Korea Institute of Industrial Technology, Korea</p> <p><sup>2</sup>Division of Material Science and Engineering, Hanyang University, Korea</p>
P-30	<p><b>Investigation of Extrusion Speed Effect on the Microstructure and Mechanical Properties of Mg-Zn-Y-RE Alloys with LPSO Phase</b></p> <p>Jonghyun Kim<sup>1</sup>, Yoshihito Kawamura<sup>2</sup></p> <p><sup>1</sup>Kumamoto Technology and Industry Foundation, CREATE Kumamoto University Laboratory, Japan</p> <p><sup>2</sup>Department of Materials Science, Kumamoto University, Japan</p>
P-31	<p><b>Grain Refinement of Magnesium Alloys during Friction Stir Welding and Processing</b></p> <p>Datong Zhang<sup>1</sup>, Yong Yan<sup>2</sup>, Feng Xiong<sup>3</sup>, Ming Shao<sup>4</sup>, Wei Xia<sup>5</sup></p> <p>School of Mechanical and Automotive Engineering, South China University of Technology, Guangzhou, 510640, P. R. China</p>