

Report on Asian Light Metals Association Forum 2016 (ALMA 2016)

The International Communication Committee (ICC) of the Japan Institute of Light Metals (JILM) held Asian Light Metals Association Forum 2016 (ALMA 2016) on August 5, 2016 at Kyoto TERRSA (Kyoto, Japan). The objective of this forum is to establish a network among researchers and engineers of light metals in Asia. The eminent presenters recommended from each region of Japan, China, Taiwan, Korea and Australia made valuable presentations on recent R&D activities, industrial trends and topics on light metals (Al, Mg and Ti alloys) in this forum.

The history of ALMA (former AFLM) started in 2006, when JILM started organizing International Communication Program (ICP) and held an Asian Symposium on light metals in Japan. Then, the member regions take turns to host both ICP meeting and AFLM. The host country was Japan in 2006, 2012 and 2014, Taiwan in 2007, Korea in 2008 and China in 2010. Since 2012, the forum has been held only in one day with only invited talks in a single session so as to make dense and open-minded discussions in a family-like atmosphere. In addition, AFLM was renamed to ALMA in 2014. The policy was explained by Prof. Kubota (Chairperson of ALMA) at the opening address.

Session 1

1. Yuri Estrin (Professor, Monash University, Australia), "Ultrafine Grained Titanium and Magnesium Alloys for Permanent and Bioresorbable Medical Implants"
2. Wenfang Shi (Professor, China Nonferrous Metals Industry Association, China), "Development and Application of Light Metals in China"

Session 2

3. Kwang Seon Shin (Professor, Seoul National University, Korea), "Research Activities on Magnesium Alloys in Korea"
4. Jian-Yih Wang (Professor, National Dong-Hwa University, Taiwan), "Microstructure and Mechanical Properties of LZ91/Al Multilayer Fabricated by Accumulative Roll Bonding"
5. Andrey Molotnikov (Dr., Monash University, Australia), "An Overview of Light Metals and Additive Manufacturing Research at Monash University"

Session 3

6. Makoto Kobashi (Professor, Nagoya University, Japan), "Materials Processing for Light Metals with Meso-scale Structures; Porous Metals"

7. Jun-Yen Uan (Professor, National Chung Hsing University, Taiwan), "Heating Rate Effect on Superplastic Behaviors of an As-cold-rolled 5083 Al-Mg-Mn Alloy"

8. Chayong Lim (Dr., Korea Institute of Materials Science, Korea), "KIMS Research Activities on Light Metals"

Session 4

9. Alexei Vinogradov (Professor, Norwegian University, Norway) "Fatigue of Ultrafine Grained Light Metals"

10. Naoyuki Nomura (Assoc. Professor, Tohoku University, Japan) "Recent Progress on Additive Manufacturing of Metals"

In session 1, two lectures were given by Prof. Estrin from Australia and Prof. Shi from China.

Prof. Estrin explained the present status on the research in severe plastic deformation (SPD) in light metals. Examples to apply the results of basic research activities in practical use were presented. On the applications for permanent implant, the effect of SPD on titanium has been highlighted, and magnesium alloys are considered as temporary implants.

Prof. Shi explained the progress in research and development of aluminum, magnesium and titanium light alloy products in China's business enterprises, research institutions and universities over recent years. Their current applications in various areas and key directions of the 13th five-year plan were also presented.

In sessions 2, two lectures on magnesium alloys were given by Prof. Shin from Korea and Prof. Wang from Taiwan, and an overview on research topics in Monash University was given by Dr. Molotnikov from Australia.

Prof. Shin explained current R&D activities on magnesium alloys in Korea. A significant R&D project for magnesium alloys for super-light vehicles was launched by the Korean government, and recent topics were explained. One of the examples explained in the lecture was a twin-roll cast magnesium sheet of 2 meters in width which was installed in some commercial and concept vehicles in recent years.

Prof. Wang explained a research activity on LZ91 Mg-Li alloy in Taiwan. The topic was on microstructure and mechanical properties of LZ91/Al multilayer fabricated by accumulative roll bonding. Reduction in weight and good formability have been achieved in the LZ91/Al multilayer, but further strengthening and improved corrosion resistance will be required in future.

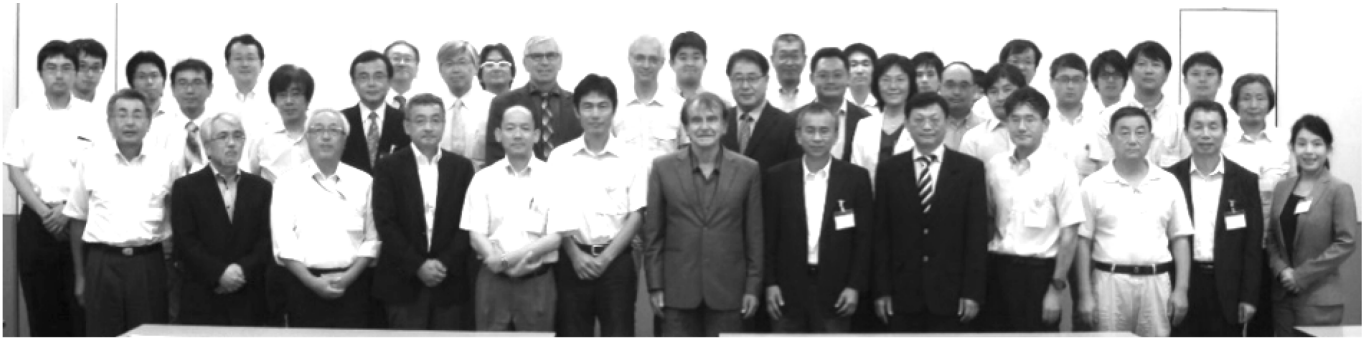


Photo 1 Representatives, attendees, Prof. Kubota (Chairperson) and ICC members.

Dr. Molotnikov provided an overview of research activities on light metals and additive manufacturing in Monash University. Brief introduction of several research activities were reviewed from basic studies on physical metallurgy, evaluations of microstructure and properties to advanced studies on surface treatment, fatigue properties and alloy designing.

In sessions 3, two lectures on aluminum alloys were given by Prof. Kobashi from Japan and Prof. Uan from Taiwan, and an overview on research topics in KIMS was given by Dr. Lim from Korea.

Prof. Kobashi explained research topics on conventional methods to fabricate porous aluminum alloys and novel processing methods to obtain high melting-temperature porous aluminides with a focus on the reactive precursor process. Possible applications of the porous materials and future requirements were also discussed in the lecture.

Prof. Uan explained a research activity in Taiwan with regard to the effect of heating rate on the superplastic behaviors of cold-rolled 5083 aluminum alloy. Detailed studies on microstructure have proved that controlling heating rate is effective to reduce the process time for superplastic forming.

Dr. Lim provided an overview of research activities on aluminum and titanium alloys in KIMS. Brief introduction of several research activities were reviewed on alloy design, microstructure control and processing in aluminum alloys, and also on improvement of mechanical properties and formability, method of controlling elastic modulus in titanium alloys.

In session 4, two lectures on recent topics were given by Prof. Vinogradov from Norway and Assoc. Prof. Nomura from Japan.

Prof. Vinogradov, from Norway University, was invited to the present ALMA forum because he has a long-time research experience in Japan, and gave a presentation on the fatigue properties of magnesium alloys processed with SPD. Grain refinement achieved by SPD process is effective to improve the fatigue properties as well as static mechanical properties.

Assoc. Prof. Nomura presented recent progress on additive manufacturing from the basic background of 3D printing to topics on novel method of powder bed fusion with laser. Some features including benefits and drawbacks on light metals and other metals fabricated by selective laser melting electron beam melting process were addressed.

This forum was a precious occasion to listen to dense lectures among wide variety of light metal topics; aluminum, magnesium, titanium and their alloys in one day. Taking advantage of this opportunity, ALMA meeting was also held during lunch break. Delegations from each country discussed about the ALMA web page (<http://www.jilm.or.jp/alma/>) and its utilization.

At the end of the forum, Dr. Kubota (ICC chairperson) gave a memorial plaque to each lecturer, and Prof. Kawamura (vice-chair) addressed the closing remarks.

After the ALMA forum, a buffet party was held at Kyoto TERRSA. The party was so family-like with a small group that all of the participants communicated each other. The next ALMA forum will be held in 2018 in Tokyo-metropolitan area in the occasion of JILM fall meeting.



Photo 2 Opening address by Prof. Kubota.