It is a pleasure for me to welcome you to the TMS 2017 Annual Meeting & Exhibition in San Diego and to present to you the proceedings of Light Metals 2017. First of all, I would like to honor all of you who have contributed to make this an excellent reference for the developments within aluminium. All the efforts by you are extremely important for bringing better processes and better products to our society, making aluminium the preferred metal for growth and prosperity in a global perspective.

In 2016, the Hall-Héroult process celebrated its 130-year anniversary, in a period with aluminum experiencing an exceptional growth, surpassing all other metals over a long period. Moreover, there is no reason to believe this will not continue in the years to come.

The growth is adding extra pressure on the bauxite and alumina industry, especially on environmental issues related to mining and the red mud residue. In addition, more alumina refineries are located apart from the mines, making bauxite emerging as a bulk commodity in the trading market.

The growth in aluminum production in the East, especially China, has been tremendous, and more plants are on the drawing board. Unfortunately, this has caused an oversupply with low market prices for aluminum, which may continue for several years to come unless environmental restrictions on CO₂ emissions in China slow down the expansive policy. The recent growth, mostly based on coal-fired power plants, with an environmental footprint ten times that of aluminum produced from hydro- or nuclear power is challenging aluminum as a green metal.

As more aluminum is being recycled, in some areas reaching close to 50 %, both casting and alloying operations are prone to become more demanding due to the variety in composition of recycled aluminum. Fortunately, we also see a healthy growth in aluminum replacing more heavy metals in transportation, leading to better energy efficiency. The growth in both electric and plug-in hybrid cars and trucks are promising for our industry and makes us eager to reply to new demands for products and leaner production strategies.

In spite of the pressure on the aluminum price, which we have to cope with through process and technology improvements, the overall picture of the industry is good. In times with low market prices, it may be comfortable to cut back on R&D as a means to improve economical results. However, lack of continuity in long-term R&D may eventually slow down the drive for making the industry, even more cost-effective and environmentally sustainable. In this perspective, industrial contributions and participation at The Minerals, Metals & Materials Society’s (TMS) meetings are not reflecting an aggressive attitude. For highly educated people recruited to the industry, not being able to participate with scientific contributions is a loss of opportunity to meet experienced people in the industry and from academia, reducing the opportunity to create networks and to get new inspiration useful in their daily work. We should all work together, share ideas, and contribute to develop new opportunities for our industry and our society.

In the organizing of the proceedings and the sessions, I would like to express my appreciation to the efforts of the subject chairs: Yanjun Li, David Gildemeister, Houshang Alamdari, Mark Dorreen, and Ting-an Zhang, as well as their session chairs that have reviewed the
manuscripts. I also have to mention Anne Kvithyld and John Grandfield for organizing the LMD Symposium in Honor of Christian Simensen and Thorvald Abel Engh together with David Gildemeister.

This year, the procedure for submitting manuscripts changed. This may have caused some confusion; however, as it is with our industry, improvements are not possible unless we are willing to change. And, the lessons learned this year will be used to improve next year’s procedure. Finally, I would like to express my great appreciation to the TMS staff for their devoted support in the preparation of this volume.

Arne P. Ratvik
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Program Organizers

Alumina and Bauxite

Ting-an Zhang is a full professor at Nonferrous Metallurgy of Northeastern University (NEU), China. He has his B.S., M.Sc., and Ph.D. in rare metal metallurgy, metallurgical physical chemistry and energy engineering respectively from NEU (Northeastern University), and studied at the National University of Science and Technology, Russia Federation, for half a year. He served a ten-year term as Dean of School of Metallurgy and Materials at NEU.

Dr. Zhang has more than 30 years’ experience in metallurgy process and technology. He is currently Director of Special Metallurgy and Process Engineering Institute, where his research activities are focused on alumina clean production with an emphasis on transformation of the red mud construction, besides pressure hydrometallurgy, SHS metallurgy, and physical and mathematic simulations of metallurgical processes and reactors. He has been project manager of more than 20 projects including National Key Research and Development Program, National Natural Science Fund and alumina-related projects for plants. Dr. Zhang has co-authored more than 300 papers and 7 books, and proposed more than 100 invention patents. His work on calcification-carbonation method for red mud treatment has been awarded both internationally and in China.

Aluminum Alloys, Processing, and Characterization

Yanjun Li is a full professor at Norwegian University of Science and Technology (NTNU), Norway. Yanjun has a Ph.D. degree in materials science and engineering. Before joining NTNU, he worked as a research metallurgist at Hydro Aluminium for 3 years, and research scientist and senior research scientist at SINTEF Materials and Chemistry for 6 years. Dr. Li’s research is focusing on physical metallurgy of aluminum alloys, including solidification and casting, heat treatment and phase transformation, deformation and mechanical properties, advanced microstructure characterization, and microstructure simulation model developments.
Aluminum Reduction Technology

Mark Dorreen After completing a Ph.D. focused on current efficiency measurement and anode effect gases, Mark Dorreen worked in various commercial and technical aspects of electric arc steelmaking for 10 years. He then returned to the Light Metals Research Centre at the University of Auckland in 2008, where he now holds the role of director, with responsibility for all the commercial activities and the day to day running of the centre.

Mark’s particular interests are in anode plant operations, in particular the rodding room, as well as aspects of potroom operations and pot emissions, and he has travelled widely to work on many LMRC projects, most frequently to smelters in China.

In addition to his LMRC role, Mark is also vice president–technical at Energia Potior Limited, a new company set up to commercialize the Shell Heat Exchanger technology developed at the University of Auckland.

Cast Shop Technology

Cast Shop Technology: Recycling and Sustainability Joint Session

David Gildemeister received a B.S. in metallurgical engineering at South Dakota School of Mines and Technology in 1993 and a Ph.D. in materials science and engineering from Carnegie Mellon University in 2016. He has worked for Alcoa (formerly Alcoa, Inc.) for more than 24 years. Thirteen years in four different production facilities as a process and product metallurgist have exposed him to numerous billet, ingot, and continuous casting processes, as well as hot rolling. For the past eleven years, he has conducted research and development in aluminum casting and solidification at the Arconic Technology Center in New Kensington, Pennsylvania.

Electrode Technology

Houshang Alamdari received his M.Sc. degree in 1996 and Ph.D. degree in 2000 from Université Laval, Canada. He pursued research activities at the Hydro-Quebec Research Institute, Canada, on the synthesis of nanocrystalline materials for hydrogen storage. He held the process director position at Nanox Inc, Canada, and was involved in the development and scale up of a production process for nanostructured perovskite-type materials for automotive catalysts. In 2006, he joined Laval University as professor at the Department of Mining, Metallurgy, and Materials Engineering, Université Laval, Canada. He is currently director of the Regal-Laval Research Center, where his research activities are focused on the anode manufacturing process for aluminum production.
The Science of Melt Refining: An LMD Symposium in Honor of Christian Simensen and Thorvald Engh

**John Grandfield** is the director of Grandfield Technology Pty Ltd, a consulting and technology firm, and adjunct professor at Swinburne University of Technology in the High Temperature Processing Group. John has a Bachelor of Applied Science degree in metallurgy (RMIT), an M.Sc. in mathematical modelling (Monash University), and a Ph.D. in materials science (University of Queensland).

John has 30 years’ experience in light metals research and technology in smelting, continuous casting, and metal refining (Rio Tinto Alcan, CASTcrc and CSIRO). He has conducted plant benchmarking audits, technology reviews, optimised existing technology, managed technology transfer, and developed and commercialised new cast house technologies. He remains active in research with a current focus on ingot cavity control and inclusion removal.

His work on direct chill and ingot casting of aluminium and magnesium has been awarded both internationally and within Australia. John is regularly invited to give training courses, participate in in-house innovation workshops, and conduct R&D program reviews around the world.

John has four patents, has published two book chapters, more than 50 conference, and journal papers, and has co-authored a book on DC casting of light metals. He is a member of the TMS Aluminum Committee and was editor of *Light Metals 2014*.

**Anne Kvithyld** is a senior scientist at SINTEF in Trondheim, Norway. She earned her Ph.D. from the Norwegian University of Science and Technology (NTNU) in 2003. She has been a visiting scholar at the Colorado School of Mines, USA. Her research interests are on production of metals, in particular refining and recycling. She is an active member of The Minerals, Metals & Materials Society (TMS).
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