Semi Solid Processing of Alloys and Composites XVI

16th International Conference on Semi Solid Processing of Alloys and Composites
S2P 2020
September 28-30, 2021
Leoben, Austria

Preface

The S2P International Conferences are dedicated to the science and technology of semi-solid processing of metal alloys and composites. Since the discovery of the specific flow behaviour of metals in semi-solid state during the early seventies, this fascinating technology has experienced a dynamic and turbulent development history which has led to a whole family of new production processes, new equipment, and industrial applications. In order to fully exploit the technical and economic potential of flow behaviour, it is of great necessity to further improve material and process modelling as well as process control. The S2P International Conferences have contributed to achieve this goal by providing a forum for scientists to share the common knowledge and to develop a common sense on fundamental topics and industrial requirements.

The first S2P Conference was held in 1990 at the Ecole des Mines de Paris in Sophia Antipolis, France. Other conferences followed in 1992, Cambridge, MA, USA; 1994, Tokyo, Japan; 1996, Sheffield, England; 1998, Denver, CO, USA; 2000, Torino, Italy; 2002, Tsukuba, Japan; 2004, Limassol, Cyprus; 2006, Busan, South Korea; 2008, Aachen and Liege, Germany and Belgium; 2010, Beijing, China; 2012, Cape Town, South Africa; 2014, Muscat, Sultanate of Oman; 2016, Salt Lake City, USA and 2018, Shenzhen, China.

The 16th S2P Conference (S2P2021), organized by Montanuniversität Leoben, took place from 28th – 30th September, 2021 in Leoben, Austria. The conference was previously planned on 28th – 30th September, 2020 but due to the COVID-19 sanitary restriction it was delayed to 2021, one whole year later.

To ensure a high quality of the conference contributions the submitted papers have been individually reviewed. We definitely want to thank both, the reviewers and the authors for their valuable time and efforts to achieve the best possible results. The conference concentrates on the advancement of fundamental knowledge and development of materials and industrial processes for semi-solid manufacturing of high performance metal components. The conference and proceedings are organized in three distinct sections: Material Development and Characterisation; Rheology, Modelling and Simulation; Process Development and Industrial Application.

The S2P2021 conference attracted more than 100 abstracts submitted by scientists from 15 different countries. After revision, 39 papers have been selected and published in the conference proceedings. 6 publications have been awarded to be the best papers. The conference included 3 invited keynote talks and 20 invited talks. In addition, 25 regular oral contributions were presented.

It is my pleasure to thank the members of the International Scientific Committee for their valuable help, especially for proposals for keynote speakers and invited speakers. I acknowledge particularly support from the

Bürgermeister in Leoben, Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK) and the Montanuniversität in Leoben. I am grateful for industrial support from SAG Group, AVL, ThermoCalc, Anton Paar, COMP Tech, QATM and KOVOLIS HEDVIKOV a.s..

Finally, I wish all participants to have an enjoyable and successful meeting.

Jiehua Li

Conference chairman

S2P 2020

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Jiehua Li

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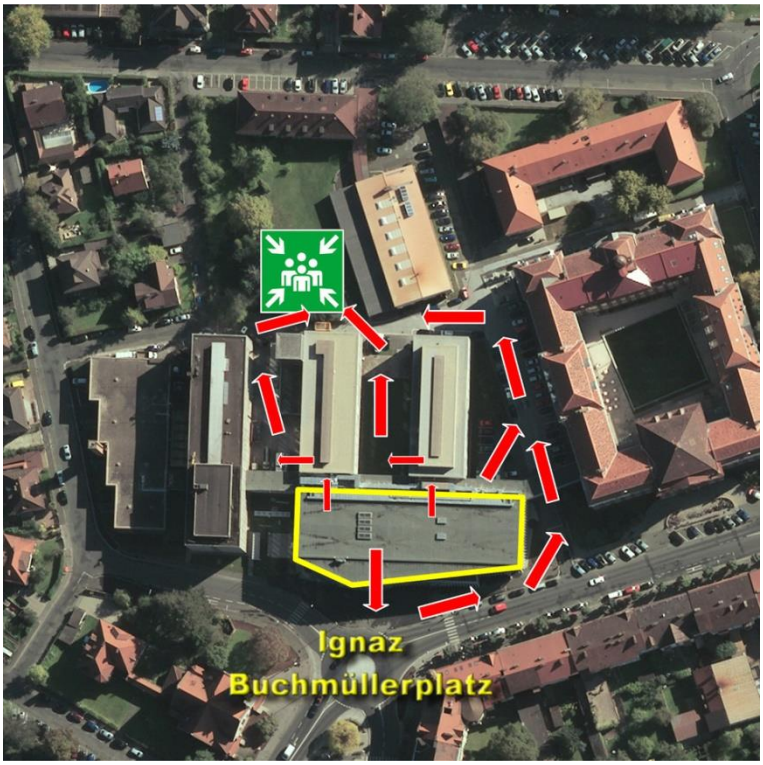

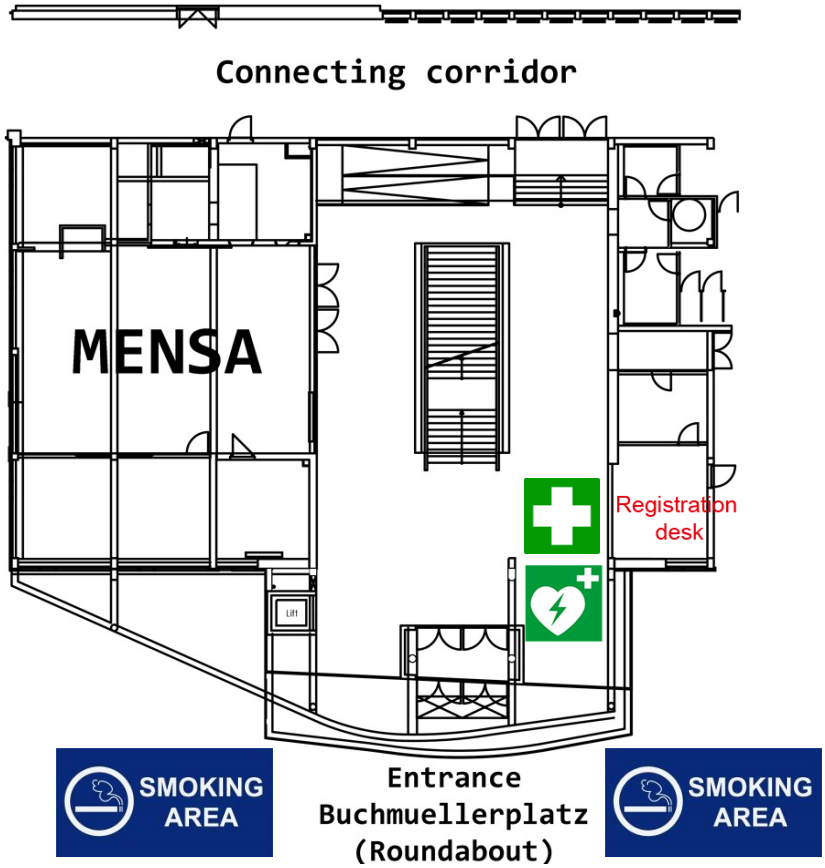

Please leave the building before 20:30.

	Tuesday, 28th September
8:00	**Registration (on-sites)**
9:00	**Opening ceremony** **(including welcome from the Rektor Montanuniversität Leoben (Univ.-Prof. Dr. Wilfried Eichlseder) and the Mayor of Leoben (Kurt Wallner))** **Seminar HS Miller, Chairman: Peter Schumacher**
	Material development and characterization **Seminar HS Miller, Chairmen: Ahmed Rassili and Qiang Zhu**
9:20	Keynote lecture A short history of MIT studies on fluid flow in solidification, 1952- 2009 Merton C. Flemings (MIT, USA)
9:50	Invited lecture About residual stress state of casting: the case of HPDC parts and possible advantages through semi-solid processes M. Rosso (INSTM c/o Polytechnic of Turin (DISAT) Alessandria, Italy)
10:15	Coffee break
10:45	Invited lecture Semisolid casting and die casting of Al-4.8%Mg-2%Si alloy Toshio Haga (Osaka Institute of Technology, Japan)
11:10	Invited lecture Coarsening and deformation behaviour of semi-solid light alloys: knowledge learned from synchrotron studies Enyu Guo (Dalian University of Technology, China)
11:35	Invited lecture Variation of microstructure and mechanical properties of ZW61 magnesium alloy solidified under different pressures Shusen Wu (Huazhong University of Science and Technology, China)
12:00	Lunch and lunch break
	Material development and characterization **Seminar HS Miller, Chairmen: Mario Rosso and Annalisa Pola**

14:00	Invited lecture Microstructure evolution of a semisolid magnesium alloy slurry obtained via an internal rapid cooling process (IRCSP) Xiangjie Yang (Nanchang University, China)
14:25	Invited lecture Short-term oxidation behavior, microstructure evolution and compression behaviour of Nickel-based superalloy GH4037 in solid and semi-solid states Jufu Jiang (Harbin Institute of Technology, China)
14:50	Role of iron-rich phases and porosity on the ductility of rheocast Al-Mg-Si alloys Qing Zhang (Jönköping University, Sweden)
15:10	Effect of solute Ta on grain refinement of Al-7Si-0.3Mg based alloys Ivo Spacil (Montanuniversität Leoben, Austria)
15:30	Coffee break
16:00	Phase transformation of M2 high speed steel during semi-solid cooling and conventional cooling Yongjin Wang (University of Science and Technology Beijing, China)
16:20	Microstructure and mechanical properties of rheo-die casting Mg-10Gd-3Y-1Zn-0.4Zr (wt.%) alloy Zhiyu Chang (Shanghai Jiao Tong University, China)
16:40	Influence of solution treatment on microstructure and mechanical properties of semi-solid processed nano-SiC_P/Al-Cu composites Jianyu Li (Huazhong University of Science and Technology, China)
17:00	Microstructure and properties of semi-solid CuSn10P1 alloy shaft sleeve under different melt treatment processing Yongkun Li (Kunming University of Science and Technology, China)
17:20	Recycling Al-Si alloys by semisolid materials dragged during continuous-casting strip processing Antonio de Pádua Lima Filho (Unesp-São Paulo State University, Brazil)
17:40	Cooling curve analysis of A356 alloy by conventional casting and the effect of stirring Sanjuan-Sanjuan Gerdardo (Universidad Nacional Autónoma de México)
18:00	Control of morphology of α-Al phase in near eutectic Al-Si alloy by electromagnetic stirring Yuichiro MURAKAMI (National Institute of Advanced Industrial Science and Technology Nagoya, Japan)
18:20	Effect of the Mg_3N_2 nanoparticle on the grain refinement of AZ80 alloy

	Ernst Neunteufl (Montanuniversität Leoben, Austria)
19:00	Get together and go to dinner

	Wednesday, 29th Setember
	Rheology, modelling and simulation **Seminar HS Miller, Chairmen: Anders Jarfors and Michael Modigell**
8:30	Keynote lecture Progress of semi-solid processing of alloys and composites in China Qiang Zhu (Southern University of Science and Technology, China)
9:00	Preparation of semi-solid 357.0 slurries with different α-Al phase features by solidification from full liquid state and remelting Juan Chen (Southern University of Science and Technology, China)
9:20	Invited lecture Understanding the rheological transitions in semi-solid alloys by a combined in-situ imaging and granular micromechanics modelling approach T.C. Su (National Taiwan University, Taiwan)
9:45	Invited lecture New parameters for casting processes: the rheology of metal alloys in the solid-liquid phase Daniela Ehgartner (Anton Paar, Austria)
10:10	Coffee break
10:40	Experimental and numerical study of the effect of pouring temperature and fluid convection on spherical grain formation Wenying Qu (Southern University of Science and Technology, China)
11:00	Visco-elastic properties of semi-solid alloys Marialaura Tocci (University of Brescia, Italy)
11:20	Flow behaviour of semi-solid slurries with and without dendrites Min Luo (Southern University of Science and Technology, China)
11:40	Numerical study of the influence of Taylor vortex on the viscosity measurement of semi-solid metallic slurry by the concentric cylinder rotational rheometer Zhong Li (Southern University of Science and Technology, China)
12:00	Lunch and lunch break
12:30	SC meeting
	Material development and characterization

	Seminar HS Miller, Chairmen: Sagren Govender and Pascal Côté
14:00	Invited lecture Semisolid materials processing: a sustainability perspective A.E.W. Jarfors (Jönköping University, Sweden)
14:25	Invited lecture Semi-solid processing of advanced structural alloys Lukasz Rogal (Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Poland)
14:50	SSM processing window determination Eugênio José Zoqui (University of Campinas, Brazil)
15:10	Properties of semisolid parts: comparison with conventional and innovative manufacturing technologies Pietro Tonolini (University of Brescia, Italy)
15:30	Effect of serpentine channel pouring process on the microstructure of semi-solid 6061 aluminum alloy slurry Naiyong Li (University of Science and Technology Beijing, China)
15:50	Coffee break
16:20	Invited lecture Superheated slurry principle and its applications in the die casting industry Jessada Wannasin (Prince of Songkla University, Tailand)
16:45	Invited lecture A new technology for preparation of semisolid slurry of aluminium alloy and its application in rheological die-casting of large thin-walled parts Yong-Lin Kang (University of Science and Technology Beijing, China)
17:10	Effect of filling length on segregation, microstructure and mechanical properties of a semi-solid die cast Al-6Si-3Cu-0.4Mg alloy Jian Feng (General Research Institute for Nonferrous Metals, China)
17:30	Structure optimization of semi-solid die cast steering knuckle and its experiment verification Song Chen (GRIMAT Engineering Institute Co., Ltd., China)
17:50	Bending strength and fracture behaviour of metal-ceramic interpenetrating phase composites manufactured by using semi-solid forming technology Laura Schomer (University of Stuttgart, Germany)

18:10	Manufacturing of hybrid Al-Cu-heatsinks by combining powder pressing with thixoforming Marco Speth (University of Stuttgart, Germany)
18:30	Invited lecture Using micro-CT scanning to quantitative characterize porosity in conventional die castings and semi-solid castings Stephen Midson (Colorado School of Mines, USA)
19:00	Get together and go to dinner

	Thursday, 30th Setember
	Material development and characterization **Seminar HS Miller, Chairmen: Jufu Jiang and Johannes Winklhofer**
8:30	Keynote lecture Using recycled materials for semi-solid processing of Al-Si-Mg alloy Johannes Winklhofer (SAG Business Improvement GmbH, Austria)
9:00	Invited lecture Development of high strength high toughness and high thermal conductivity cast aluminum alloys Nagaumi Hiromi (Soochow University, China)
9:25	Invited lecture Research & development of rheocasting by the coupling of shear and vibration Renguo Guan (Dalian Jiaotong University, China)
9:50	Invited lecture Melt treatment technology for superalloy casting Jun Zhang (Northwestern Polytechnical University, China)
10:15	Coffee break
10:45	И-shaped curve of hot-tearing susceptibility affected by secondary phase in cast Al-Mg-Si alloys Dejiang Li (Shanghai Jiao Tong University, China)
11:05	Microstructure evolution and quench sensitivity characterizations of Mg-9.5Gd-0.9Zn-0.5Zr alloy Guangyu Yang (Northwestern Polytechnical University, China)
11:25	Corrosion resistant additively manufactured high entropy alloy Qian Li (Shanghai Univerisity, China)
11:45	Heat-resistant Al-alloys with quasicrystalline and L12-precipitates Franc Zupanič (University of Maribor, Slovenia)
12:05	Lunch and lunch break
	Economic aspects and industrial applications **Seminar HS Miller, Chairmen: Stephen Midson and Xiangjie Yang**
14:00	Invited lecture Recent industrial application and perspectives of rheo-diecast process in China Daquan Li (General Research Institute for Nonferrous Metals, China)

14:25	Invited lecture Predicting alloy solidification using CALPHAD type thermodynamic and kinetic calculations A. Nicholas Grundy (Thermo-Calc Software AB, Sweden)
14:50	Invited lecture Enhanced process stability through new process control strategies and improved machine components in thixomolding Philipp Ochotta (Yizumi Germany GmbH, Germany)
15:15	Invited lecture Virtual assessment and optimization of semisolid metal casting process Goetz Hartmann (MAGMA GmbH, Germany)
15:40	Closing ceremony and best paper award
16:00	Company visit to ÖGI (Austrian Foundry Research Institute in Leoben)

Note: after S2P2021, company visit to SAG is planned on 1st October 2021. If you are willing to participate, please contact with us in advance.

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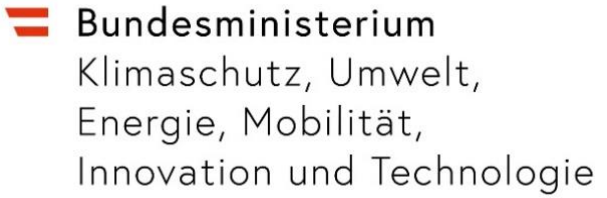
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