

DRAFT IWMCG-9 Final Program**Session 1: Monday Oct 22
CZ SILICON 1 (Chair: xxx)**

Order	Time (minutes)	Start	Title	Authors
1	0:30	8:00	Limitations of the Growth Rate During Pulling of Large Diameter Silicon Crystals by the Czochralski Technique (Invited)	Jochen Friedrich, Thomas Jung, Fraunhofer IISB, Erlangen, Germany; Frank Mosel, Andreas Muehe, PVA Tepla Crystal Growing Systems GmbH, Wetztenberg, Germany; <u>Jan Seebeck</u> , Fraunhofer IISB, Erlangen, Germany
2	0:20	8:30	Numerical Analyses and Experimental Validations on Transport and Control of Carbon in Czochralski Silicon Crystal Growth	<u>Xin Liu</u> , Hirofumi Harada, Yoshiji Miyamura, Xue-Feng Han, Satoshi Nakano, Shin-ichi Nishizawa, Koichi Kakimoto, Kyushu University
3	0:20	8:50	3D Numerical Studies of Thermal Convection and Impurities Transport in a Czochralski Process for Solar Silicon Growth	Popescu Alexandra, West University of Timisoara; Martin Bellmann, SINTEF Materials and Chemistry; <u>Daniel Vizman</u> , West University of Timisoara
4	0:20	9:10	Melt flow instability and its effect on the crystal/melt interface in a large size CZ-Si crystal growth	<u>Junling Ding</u> , Lijun Liu, Zaoyang Li, Yuqing Li, Xi'an Jiaotong University
5	0:20	9:30	Physical Model of the Czochralski Crystal Growth in a Horizontal Magnetic Field	<u>Josef Pal</u> , HZDR Innovation GmbH, Dresden, Germany; Ilmars Grants, Institute of Physics, University of Latvia, Salaspils, Latvia; Sven Eckert, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Dresden, Germany; Gunter Gerbeth, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Dresden, Germany
total	1:50			

9:50 **Coffee Break****Session 2: Monday Oct 22
CZ SILICON 2/MELT GROWTH 1 (Chair: xxx)**

Order	Time (minutes)	Start	Title	Authors
1	0:30	10:20	Melt Flow Behavior of Industrial Scale Silicon Czochralski Growth with a Transverse Magnetic Field (invited)	<u>Ryusuke Yokoyama</u> , Tsuyoshi Nakamura, Toshiyuki Fujiwara, SUMCO Corporation; Koichi Kakimoto, Kyushu University
2	0:20	10:50	Numerical Modeling of Effect of Thermal Stress and Heavy Doping for Behavior of Intrinsic Point Defects in Large-diameter Si Crystal Growing by Czochralski Method	<u>Y.Mukaiyama</u> , M.Iizuka, STR Japan K.K.; V.M.Mamedov, STR Group - Soft Impact, Ltd.; S.Maeda, GlobalWafers Japan Co.,Ltd.; K.Sueoka, Okayama Prefectural University
3	0:20	11:10	Numerical investigation of the effect of rotation on thermocapillary convection and dopant transport in a liquid bridge	<u>Chengcheng Le</u> , Lijun Liu, Zaoyang Li, Xi'an Jiaotong University
4	0:20	11:30	Three Dimensional Modeling of Thermal Stress in Semi-transparent Oxide Crystals Grown by Czochralski and EFG Methods	<u>T.Duffar</u> , Universite Grenoble INP; C.Stelian, CNRS
5	0:20	11:50	CZT growth in vertical Bridgman configuration with the rotating baffle	Natasha Dropka, Leibniz Institute for Crystal Growth; <u>Aleksander G. Ostrogorsky</u> , Illinois Institute of Technology
total	1:50			

12:10 **Lunch****Session 3: Monday Oct 22
OPTIMIZATION AND ANALYSIS (Chair: xxx)**

Order	Time (minutes)	Title	Authors
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1	0:30	14:00	Towards Optimization of Bulk Crystal Growth Recipe by Dynamic Neural Networks (Invited)	N. Dropka , Leibniz Institute for Crystal Growth; M. Holena, Leibniz Institute for Catalysis; S. Ecklebe, Institute of Control Theory; Ch. Frank-Rotsch, Leibniz Institute for Crystal Growth; J. Winkler, Institute of Control Theory
2	0:20	14:30	Using of Computer Modeling to Increase Pulling Rate and Productivity in Cz Si Crystal Growth for Solar Applications	Zhixin Li , Dalian Linton NC Machine Co., Ltd; Andrey Smirnov, STR Group - Soft Impact, Ltd.; Zhanwen Lu, Yue Zhang, Dalian Linton NC Machine Co., Ltd; Vladimir KalaeV, STR Group - Soft Impact, Ltd.; Hao Fu, Lili Zhao, Harbin Institute of Technology
3	0:20	14:50	Prediction System of CFD Simulation in Solution Growth Constructed by Machine Learning-application for Sic Top-seeded Solution Growth	Toru Ujihara , Yosuke Tsunooka, Tomoki Endo, Can Zhu, Shunta Harada, Nagoya University
4	0:20	15:10	Tailoring chemical stress to avoid cracking of scintillator crystals during Bridgman growth	Chang Zhang , University of Minnesota; Bing Gao, Wuhan University; Anton S. Tremsin, University of California at Berkeley; Didier Perrodin, Tetiana Shalapska, Gregory A. Bizzarri, Edith D. Bourret, Lawrence Berkeley National Laboratory; Drew Onken, Sven Vogel, Los Alamos National Laboratory; Jeffrey J. Derby, University of Minnesota
5	0:20	15:30	Effect of Nitrogen / Aluminum on Silicon Carbide Poly-type Stability	Shin-ichi Nishizawa , Kyushu University; Frederic Mercier, Universite Grenoble Alpes
total	1:50			

15:50 **Coffee Break**

16:20 **Session 4: Monday Oct 22
Memorial for F. Dupret (Chair: xxx)**

Order	Time (minutes)	Title	Authors
1	0:20	16:20 Prof. François Dupret: over 30 years of dedication to research and innovation in bulk crystal growth modelling	Nathalie van den Bogaert
2	0:20	16:40 Prof. François Dupret: a journey to address crystal growth challenges for a variety of practical applications	Liang Wu
total	0:40		

**Session 5: Tuesday Oct 23
SOLUTION GROWTH (Chair: xxx)**

Order	Time (minutes)	Title	Authors
1	0:30	8:00 Crystal Growth from Solution - Prediction of Relative and Absolute Growth Rates (Invited)	M. N. Joswiak, C. J. Tilbury, B. Peters, M. Doherty , University of California Santa Barbara
2	0:30	8:30 The Challenge of Simulating Mineral Growth from Aqueous Solution (Invited)	Alicia Schuitemaker, Katarzyna Koziara, Curtin University; Marco De La Pierre, Pawsey Supercomputing Centre; Raffaella Demichelis, Paolo Raiteri, Curtin University; Andrew G. Stack, Oak Ridge National Laboratory; Julian D. Gale , Curtin University
3	0:20	9:00 Subcritical Nucleation Clusters in Solution: Structures, Populations, and Energetics	Benjamin A. Legg , University of Washington; Marcel D. Baer, Evgenii O. Fetisov, Mirza Galib, Gregory K. Schenter, Pacific Northwest National Laboratories; J. Ilja Siepmann, University of Minnesota; Christopher J. Mundy, James J. De Yoreo, Pacific Northwest National Laboratories
4	0:20	9:20 Carbon in Liquid Silicon: Diffusion, Solubility, and Nucleation of Silicon-carbide Particles	Abdullah Alateeqi , University of Pennsylvania; Jinping Luo, Lijun Liu, Xi'an Jiaotong University; Talid Sinno, University of Pennsylvania

5	0:20	9:40	Numerical Investigation of Optimal Crystal Growth Furnace Design in the RF-heating TSSG Process	Takashi Horiuchi , Lei Wang, Osaka University; Takuya Yamamoto, Tohoku University; Atsushi Sekimoto, Yasunori Okano, Osaka University; Toru Ujihara, Nagoya University; Sadik Dost, University of Victoria
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total 2:00

10:00 **Coffee Break**

**Session 6: Tuesday Oct 23
NOVEL TOPICS (Chair: xxx)**

Order	Time (minutes)		Title	Authors
1	0:30	10:30	Displacive Transformations in Floppy Colloidal Crystallites: Unearthing the Role of Hydrodynamic Interactions (Invited)	Young Ki Lee, Yifan Wang, John C. Crocker, Talid Sinno , University of Pennsylvania
2	0:20	11:00	Modelling of Nucleation and Crystallization in Simple Metals Via Non-equilibrium Molecular Dynamics Simulations	L. A. Zepeda-Ruiz , Lawrence Livermore National Laboratory
3	0:20	11:20	Effect of Oxygen on Dislocation Generation in Si Single Crystal	T. Ide, Kyushu University; S. Nakano , H. Harada, Y. Miyamura, RIAM, Kyushu University; M. Imai, University of Miyazaki; K. Kakimoto, RIAM, Kyushu University
4	0:20	11:40	Numerical Simulation of the Effect of Shear Stress on Graphite Exfoliation into Graphene in Taylor-couette Flow	D. Seo , D.H. Kim, KAIST

total 1:30

12:00 **Lunch**

**Session 7: Tuesday Oct 23
VAPOR-PHASE GROWTH 1 (Chair: xxx)**

Order	Time (minutes)		Title	Authors
1	0:30	14:00	Modeling of Bowing, Stress and Threading Dislocation Density Evolution in III-nitride Heterostructures Grown on Si Substrate (Invited)	Yuji Mukaiyama, STR Japan KK; Mikhail Rudinsky, Roman Talalaev , STR Group - SoftImpact Ltd.; Momoko Deura, Takuya Nakahara, Takeshi Momose, Yoshiaki Nakano, Masakazu Sugiyama, Yukihiro Shimogaki, University of Tokyo
2	0:20	14:30	Flow Influence on Gan MOVPE Growth-orientation	Komura Subaru , Kento Kawakami, Yoshihiro Yamamoto, Nagoya University; Akira Kusaba, Kyushu University; Katsunori Yoshimatsu, Naoya Okamoto, Nagoya University; Yoshihiro Kangawa, Koichi Kakimoto, Kyushu University; Kenji Shiraishi, Nagoya University
3	0:20	14:50	Modeling the Composition of Ternary Vapor-liquid-solid Grown III-V Nanowires	Jonas Johansson , Lund University; Masoomeh Ghasemi, Persian Gulf University
4	0:20	15:10	The Dual Role of the Gold Droplet in Growth of InAs NWs on a (001) InAs Surface	Jung-hyun Kang, Weizmann Institute of Science; Filip Krizek, Niels Bohr Institute; Magdalena Zaluska-Kotur, Institute of Physics Polish Academy of Science; Peter Krogstrup, Niels Bohr Institute; Perla Kacman, Institute of Physics Polish Academy of Science; Haim Beidenkopf, Hadas Shtrikman , Weizmann Institute of Science

total 1:30

15:30 **Coffee Break**

**Session 8: Tuesday Oct 23
VAPOR-PHASE GROWTH 2 (Chair: xxx)**

Order	Time (minutes)		Title	Authors
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1	0:30	16:00	Optimization of Total Resolved Shear Stress in AlN Single Crystals Homoepitaxially Grown by Physical Vapor Transport Process (Invited)	Q.K. Wang, J.L. Huang, Z.H. Wang, G.D. He, D. Lei, <u>L. Wu</u> , Shanghai University
2	0:20	16:30	Atomistic Simulations of the Edge Dislocation Mobility in Wurtzite AlN by Molecular Dynamics Method	<u>Y.T. Zhao</u> , R.G. Yu, X.Y. Wang, Z.H. Wang, Q.K. Wang, L. Wu, Shanghai University
3	0:20	16:50	Modeling the Effect of TaC-coated Crucible on PVT SiC Single Crystal Growth	<u>Alex Galvukov</u> , STR US, Inc.; Wei Fan, Hao Qu, Momentive Performance Materials Inc.; Won-Jae Lee, Dong-Eui University
total	1:10			
		17:10	Session 9: Monday Oct 22 POSTERS (Chair: xxx)	
Order			Title	Authors
1		17:10	The Formation Mechanism of Ring-Like Distributed Stacking Faults in CZ Silicon Crystal	<u>Takao Abe</u> , Toru Takahashi, Shin-Etsu Handotai; Koun Shirai, Osaka University
2		17:10	Observations of the Point Defect Distributions in Si-CZ Crystals Detached from the Melt During Growth Used the Rapid Cooling and the Slow Cooling Heat Shields	<u>Takao Abe</u> , Toru Takahashi, Shin-Etsu Handotai; Koun Shirai, Osaka University
3		17:10	Effect of numerical parameters on prediction of the melt flow prediction and impurity transport within a simplified and real Cz Si crystal growth process geometry with effect of transverse magnetic fields	Svetlana Demina, <u>Andrey Smirnov</u> , Vladimir Kalaev, STR Group - Soft Impact, Ltd.; Gundars Ratnieks, Lev Kadinski, Andreas Sattler, Siltronic AG
4		17:10	Effect of Rotation on the Thermal-solutal Capillary-bouyancy Flow During Czochralski Growth of Ge1-XsiXSingle Crystal	Ting Shen, Jia-Jia Yu, Li Zhang, <u>You-Rong Li</u> , Chongqing University
5		17:10	A lumped-parameter model for oxygen transport in Czochralski crystal growth	<u>Kerry Wang</u> , University of Minnesota; Jochen Friedrich, Thomas Jung, Jan Seebeck, Fraunhofer Institute for Integrated Systems and Devices Technology; Jeffrey J. Derby, University of Minnesota
6		17:10	Phase-field Modeling of Polyhedral Microstructure Formation	<u>Takuya Uehara</u> , Yamagata University
7		17:10	The Dual Role of the Gold Droplet in Growth of InAs NWs on a (001) InAs Surface	Jung-hyun Kang, Weizmann Institute of Science; Filip Krizek, Niels Bohr Institute; Magdalena Zaluska-Kotur, Institute of Physics Polish Academy of Science; Peter Krogstrup, Niels Bohr Institute; Perla Kacman, Institute of Physics Polish Academy of Science; Haim Beidenkopf, <u>Hadas Shtrikman</u> , Weizmann Institute of Science
8		17:10	Characteristic of (ZrxHf1-x)N Thin Films Deposited by High Power Impulse Magnetron Sputtering with Different Target Power	<u>Yu-Wei Lin</u> , Hung-Pin Chen, Chao-Te Lee, Wei-Chun Chen, Instrument Technology Research Center, National Applied Research Laboratories
9		17:10	Analysis through simulation of an inverted vertical gradient freeze method for cadmium zinc telluride	<u>John J. Roerig</u> , Jeffrey J. Derby, University of Minnesota
10		17:10	Characteristic of Crack-free GaN Films Grown on Si(111) Substrate by RF-MOMBE with AlN and AlInN Buffer Layers	<u>Wei-Chun Chen</u> , Chao-Te Lee, Hung-Pin Chen, Yu-Wei Lin, Instrument Technology Research Center, National Applied Research Laboratories,
11		17:10	First Principles and Thermodynamic Studies on GaN MOVPE Processes	<u>Y.Okawachi</u> , K.Chokawa, M.Araidai, Nagoya University; Y.Kangawa, K.Kakimoto, Kenji Shiraishi, Kyushu University

12	17:10	Methodology for Multiphysics Flow Simulation in GaN MOVPE Using Thermodynamic Analysis and First Principles Calculations for GaN Deposition	K. Kawakami , S. Komura, Y. Yamamoto, Nagoya University; A. Kusaba, Kyushu University; K. Yoshimatsu, N. Okamoto, Nagoya University; Y. Kangawa, K. Kakimoto, Kyushu University; K. Shiraishi, Nagoya University
13	17:10	Numerical Analysis of Three-dimensional Marangoni Convection During SiC Crystal Growth by the RF-TSSG Method	Lei WANG , Takashi HORIUCHI, Atsushi SEKIMOTO, Yasunori OKANO, Osaka University; Toru UJIHARA, Nagoya University; Sadik DOST, University of Victoria
14	17:10	Influences of Cone-tube Design on AlN PVT Growth Through Global Heat and Mass Transfer modeling and Simulations	G.D. He , Q.K. Wang, J.L. Huang, Y.T. Zhao, Z.H. Wang, L. Wu, Shanghai University
15	17:10	Model-based Control for Bridgman Growth of Scintillator Crystals	Swanand Pawar , Jeffrey J. Derby, University of Minnesota
16	17:10	Numerical Study of Induction Heating in an Edge-defined Film-fed Growth System for Beta-Ga2O3 Crystal	Zaoyang Li , Manting Su, Chengcheng Le, Ruilin Li, Xi'an Jiaotong University; Wenxiang Mu, Zhitai Jia, Shandong University; Lijun Liu, Xi'an Jiaotong University
17	17:10	Modeling the Optical Floating Zone Crystal Growth System for Materials Discovery	S. Dossa , University of Minnesota; J. Mitchell, Argonne National Laboratory; J. Derby, University of Minnesota
18	17:10	Origin and Dynamics of Bubble Engulfment in Sapphire Crystal Growth	Chung-Hsuang Hunag , Linmin Wang , Jeffrey J. Derby, University of Minnesota
19	17:10	TRAMP-CRYSMOD, Internet Platform Providing Expertise in Numerical Simulation of Crystal Growth Processes	Thierry Duffar , K. Zaidat, University of Grenoble Alpes; J. Seebeck, Fraunhofer IISB; W. Miller, Leibniz Institute for Crystal Growth (IKZ); S. Krukowski, Warasaw University of Technology
20	17:10	Numerical Modelling for Epitaxy of Wide Bandgap Semiconductors	J. Seebeck , B. Kallinger, E. Meissner, C. Schröter, J. Friedrich, Fraunhofer IISB
21	17:10	Structuring of Organic Solvents at Solid Interfaces and Ramifications for Antimalarial Adsorption on Beta-hematin Crystals	Katy N. Olafson, Lakshmanji Verma , R. John Clark, Peter G. Vekilov, Jeremy C. Palmer, University of Houston
22	17:10	Heat transfer model of the SUBSA furnace	V. Riabov , A. G. Ostrogorsky, Illinois Institute of Technology; M. P. Volz, NASA Marshall Space Flight Center; A. Croell, University of Alabama in Huntsville
23	17:10	Interface control by rotating submerged heater/baffle in vertical Bridgman Configuration	V. Riabov, A. G. Ostrogorsky , Illinois Institute of Technology; N. Dropka, Leibniz Institute for Crystal Growth (IKZ)
24	17:10	Influence of Crucible Shape on AlN Crystal Growth Uniformity by Physical Vapor Transport Process	Q.K. Wang , G.D. He, Z.H. Wang, J.L. Huang, D. Lei, L. Wu, Shanghai University

**Session 10: Wednesday Oct 24
PV SILICON (Chair: xxx)**

Order	Time (minutes)	Title	Authors
1	0:30	8:00 Phase Field Modeling of Grain Boundary Interaction and Evolution During Directional Solidification of Multi-crystalline Silicon (Invited)	T. Jain, H.K. Lin, J.W. Jhang, C.W. Lan , National Taiwan University
2	0:30	8:30 Modeling and simulation of silicon melt flow under the influence of heater-generating magnetic field during directional solidification process (Invited)	Zaoyang Li, Yue Shao, Lijun Liu , Xi'an Jiaotong University
3	0:20	9:00 Numerical Analysis on 3D Behavior of Floating Zone (FZ) for Silicon Crystal Growth	Xue-Feng Han , Xin Liu, Satoshi Nakano, Hirofumi Harada, Yoshiji Miyamura, Koichi Kakimoto, Kyushu University
4	0:20	9:20 Crucible-free Growth of Mono-si Using Large-area Seeding	Robert Menzel , Hans-Joachim Rost, Frank M. Kießling, Leibniz-Institute for Crystal Growth; Lamine Sylla, Thomas Richter, SolarWorld Innovations GmbH

5	0:20	9:40	Application of the Kyropoulos Method to the Silicon for PV Applications	A. Nouri, G. Chichignoud, Y. Delannoy, <u>Kaidat Zaidat</u> , University of Grenoble Alpes
total	2:00			

10:00 **Coffee Break**

Session 11: Wednesday Oct 24

MELT GROWTH 2 (Chair: xxx)

Order	Time (minutes)		Title	Authors
1	0:30	10:30	Tuning the Sapphire EFG Process to the Growth of Al ₂ O ₃ /Yag/ZrO ₂ :Y Eutectic (Invited)	<u>T.Duffar</u> , Universite Grenoble - Alpes INP; L.Carroz, Paris Institute of Nanosciences
2	0:20	11:00	Analysis of scintillator crystal growth via neutron imaging and computational modeling	<u>J. Derby</u> , C. Zhang, J. Seebeck, University of Minnesota; A. Tremsin, University of California at Berkeley; D. Perrodin, G. Bizarri, E. Bourret, Lawrence Berkeley National Laboratory; S. Vogel, Los Alamos National Laboratory
3	0:20	11:20	Numerical Modeling of β -Ga ₂ O ₃ Crystal Growth by Czochralski Method to Investigate the Spiral Formation of Crystal	<u>Masaya Iizuka</u> , Yuji Mukaiyama, STR Japan K.K. /Japan; Vladimir Artemyev, Andrey Smirnov, Vladimir Kalaev, STR Group - Soft Impact /Russia
4	0:20	11:40	Effect of Surface Heat Dissipation on Thermocapillary Convection of Moderate Prandtl Number Fluid in a Shallow Annular Pool	<u>Li Zhang</u> , You-Rong Li, Chongqing University
total	1:10			