



8th International Workshop on Crystal Growth Technology

Berlin/Germany · May 29–June 2, 2022

IWC GT-8

iwcgt-8.ikz-berlin.de

<mailto:iwcgt-8@ikz-berlin.de>

Sunday, 29 May 2022

04:00 pm Registration

(Front Desk, Conference area, Pentahotel Köpenick)

05:00 pm Welcome

06:30 pm Dinner

07:30 pm Get together

08:00 pm **Panel Discussion:** Crystal growth struggling with pandemic and war?

Panelists to be announced

Monday, 30 May 2022

08:50 am Welcome

09:00 am Is the Cold Crucible Adapted for Single Crystal Growth?

Kader Zaidat¹, Samah Alradi¹, Hamza Abouchi¹, Florin Baltaretu², Xuefeng Han¹, Mahmoud Alradi¹, Christian Garnier¹, Ghatfan Hasan¹, Roland Ernst¹, Abdeldjellil Nehari⁴, Kheirreddine Lebbou⁴, Abdellah Kharicha³

¹Univ. Grenoble Alpes, SIMAP, Grenoble, France; ²Technical University of Civil Engineering Bucharest, Romania; ³Christian-Doppler Laboratory for Metallurgical Applications of Magnetohydrodynamics, Leoben, Austria; ⁴Institut Lumière Matière, UMR5306 Université Lyon1-CNRS, Villeurbanne, France; kader.zaidat@simap.grenoble-inp.fr

09:50 am Growth Ridge Analysis - A Smart Tool to Investigate Cz Processes and Crystals

Christian Kranert^{1,2}, Thomas Jung², Georg Raming³, Alfred Miller³, Christian Reimann^{2,1}, Jochen Friedrich^{2,1}

¹Fraunhofer THM, Freiberg, Germany; ²Fraunhofer IISB, Erlangen, Germany; ³Siltronic AG, Burghausen, Germany; christian.kranert@iisb.fraunhofer.de

10:40 am Coffee break

11:10 am Growth of Silicon Crystals Using a Self-Crucible Concept

Robert Menzel, Kaspars Dadzis, Frank M. Kießling, Nikolai Lorenz-Meyer, Benedikt Faraji-Tajrishi, Angelina Nikiforova, Nikolay Abrosimov, Helge Riemann

Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany; robert.menzel@ikz-berlin.de

12:00 pm Break

12:30 pm Lunch

02:10 pm Venture Business in Photonics: A Long Road from Start-up to IPO, and Outlook

Yasunori Furukawa

Oxide Corporation, Yamanashi, Japan; furukawa@opt-oxide.com

03:00 pm Optimization of Crystal Growth and Material Parameters Through In-situ Energy-resolved Neutron Imaging (ONLINE)

Anton S. Tremsin¹, D. Perrodin², A. S. Losko³, S. C. Vogel³, A. M. Long³, T. Shinohara⁴, K. Oikawa⁴, J. J. Derby⁵, W. Kockelmann⁶, G. A. Bizarri², E. D. Bourret²

¹University of California at Berkeley, Berkeley, USA; ²Lawrence Berkeley National Laboratory, Berkeley, USA; ³Los Alamos National Laboratory, Los Alamos, USA; ⁴Japan Atomic Energy Agency, Ibarak, Japan; ⁵University of Minnesota, Minneapolis, USA; ⁶ISIS Facility, Rutherford Appleton Laboratory, Chilton, United Kingdom; astr@berkeley.edu

03:50 pm Coffee Break

04:30 pm Growth of Large Diameter Yttrium Aluminium Garnet Crystals by Czochralski Method

Jan Polák, Jan Havlíček, Karel Bartoš, Jindřich Houžvička

Crytur, spol. s r.o., Turnov, Czech Republic; jan.havlicek@crytur.cz

05:20 pm Challenges in the Growth of Large Size Scintillator Single Crystal

Shashwati Sen Yeram, B. Tiwari, M. Tyagi, S.G. Singh, D.G. Desai, M. Ghosh, S. Pitale, G.D. Patra, A.K. Singh

Bhabha Atomic Research Centre, Mumbai, India; shash@barc.gov.in

06:30 pm Dinner

07:30 pm **Poster Session** (Program see below)

Tuesday, 31 May 2022

08:50 am Welcome

09:00 am Formation of Secondary Phase Particles and the Interplay Mechanism with Extended Dislocations in CdZnTe Bulk Crystals (ONLINE)

Yadong Xu

Northwestern Polytechnical University, Xi'an, China; xyd220@nwpu.edu.cn

09:50 am Growth Specifics Of CdTe And Related Mixed Systems

Peter Rudolph

Crystal Technology Consulting, Schönefeld, Germany; rudolph@ctc-berlin.de

10:40 am Break

11:10 am Recent Topics of High Quality VAS-GaN Substrates for Realizing High Performance of Opto/electric Devices in Mass Production (ONLINE)

Yohei Otoki

Sumitomo Chemical SCIOCS, Hitachi, Japan; otokiy@sc.sumitomo-chem.co.jp

12:00 pm Break

12:30 pm Lunch

02:10 pm 3D Metamaterials – Rationally Designed Artificial Crystals

Martin Wegener

Karlsruhe Institute of Technology (KIT), Germany; martin.wegener@kit.edu

03:00 pm UV-C Transparent PVT AlN Substrates (ONLINE)

Rafael Dalmau, Samuel Kirby, Jeffrey Britt, Raoul Schlessler

HexaTech, Inc., Morrisville, United States of America; rdalmau@hexatechinc.com

03:50 pm Break

04:30 pm Properties of State-of-the-Art Laser Grade GaAs Substrates

Stefan Eichler

Freiberger Compound Materials, Freiberg, Germany; stefan.eichler@freiberger.com

05:20 pm Evolution of Silicon Carbide Substrate Production/Understanding and Managing Defects in Silicon Carbide

Santhanaraghavan Parthasarathy

ON Semiconductor, Phoenix, United States of America; raghavan@onsemi.com

06:30 pm Dinner

07:30 pm **Poster Session** (Program see below)

Wednesday, 1 June 2022

08:50 am Welcome

09:00 am Can Machine Learning Help Us Grow Advanced Crystals?

Natasha Dropka¹, Martin Holena²

¹Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany; ²Leibniz Institute for Catalysis (LIKAT), Rostock, Germany; natascha.dropka@ikz-berlin.de

09:50 am Big Data From Industrial Czochralski Silicon

Ludwig Stockmeier¹, Georg Raming²

¹Siltronic AG, Freiberg, Germany; ²Siltronic AG, Burghausen, Germany; ludwig.stockmeier@siltronic.com

10:40 am Break

11:10 am A short view on optical properties of CZ grown Germanium Crystals

Christian Hell

Hellma Material IV IR Optics, Eisenach, Germany; christian.hell@iv-ir-optics.com

12:00 pm Low Temperature Epitaxial Growth of Group IV Materials in View of Electrical Device Applications

Andriy Yakovitch Hikavyi, Roger Loo, Clement Porret, Gianluca Rengo, Erik Rosseel, Robert Langer

imec, Leuven, Belgium; Andriy.Hikavyi@imec.be

12:50 pm Lunch

02:00 pm Break (and Steering Committee Meeting)

03:50 pm **Boat Tour** "Müggelsee"

(Please come to the landing stage, see map)

06:15 pm **Workshop Dinner**, "Ratskeller Köpenick"

(We meet in the Hotel Lobby to walk there)

Thursday, 2 June 2022

08:50 am Welcome

09:00 am Crystal Growth R&D and Technology : For a more competitive European community

Patricia Jeandel

Crystal Innov, Villeurbanne, France; patricia.jeandel@crystalinnov.com

09:50 am Recent Progress in Silicon Crystal Growth Technology for Solar Industry

Zhixin Li

Linton Technologies Group, Dalian, China; lizx@lintonmachine.com

10:40 am Break

11:10 pm Tools for the Industrial Production of Defect Controlled Silicon Ingots

Andreas Mühe¹, Alexey Denisov¹, Frank Mosel¹, Tse Wei Lu², Feng Hou Kun²

¹PVA TePla AG, Wetztenberg, Germany; ²XuZhou Xinjing Semiconductor Technology Co. Ltd., China; andreas.muehe@pvatepla.com

12:00 pm Closing Ceremony

12:30 pm Lunch





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Poster Session

Posters are on display throughout Monday to Wednesday; all posters are presented Monday and Tuesday 07:30 pm-09:30 pm.

- P01 Luminescence Study Of Trivalent Erbium Ions Doped Into Fluoride Crystals Grown By Bridgman Method
Gabriel Buse, Marius Stef, Andrei Racu, Irina Nicoara, Daniel Vizman
West University of Timisoara, Romania; gabriel.buse@e-uvt.ro
- P02 Self-learning Crystal Growth Furnaces: Perspective for Artificial Intelligence Technologies
Kaspars Dadzis, Arved Enders-Seidlitz, Iason Tsiapkinis
Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany; kaspars.dadzis@ikz-berlin.de
- P03 Analysis of Bubble Engulfment During Melt Crystal Growth
Swanad Pawar, Jeffrey J. Derby
University of Minnesota, United States of America; derby@umn.edu
- P04 Analysis of Single-Crystal Diamond Growth Via HPHT
Scott S. Dossa¹, Ilya Ponomarev², Boris Feigelson³, Marc Hainke^{4,5}, Christian Kranert⁵, Jochen Friedrich⁵, Jeffrey J. Derby¹
¹University of Minnesota, United States of America; ²Euclid Beamlabs, LLC, United States of America; ³U.S. Naval Research Laboratory, United States of America; ⁴Ostbayerische Technische Hochschule, Amberg-Weiden, Germany; ⁵Fraunhofer IISB, Erlangen, Germany; doss0032@umn.edu
- P05 Solidification of the Large Diameter Uniform Sb doped Germanium Crystals
Michael Gonik¹, Florin Baltaretu²
¹CM "Photon"; ²Technical University of Civil Engineering, Bucharest, Romania; michael.a.gonik@gmail.com

P06 Crystal Growth of the Large-scale Semiconductor Crystals by the Modified Cz Method

Michael Gonik¹, Florin Baltaretu²

¹CM "Photon"; ²Technical University of Civil Engineering, Bucharest, Romania;
michael.a.gonik@gmail.com

P07 Revisiting the Growth of Large (Mg,Zr):SrGa₁₂O₁₉ Single Crystals: Core Formation and Its Impact on Structural Homogeneity Revealed by Correlative X-ray Imaging

Christo Gugushev¹, Carsten Richter¹, Mario Brützm¹, Kaspars Dadzis¹, Christian Hirsche², Thorsten M. Gesing^{3,4}, Michael Schulze¹, Albert Kwasniewski¹, Jürgen Schreuer², Darrell G. Schlom^{5,6,1}

¹Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany; ²Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Bochum, Germany; ³University of Bremen, Institute of Inorganic Chemistry and Crystallography, Bremen, Germany; ⁴MAPEX Center for Materials and Processes, Bremen, Germany; ⁵Department of Materials Science and Engineering, Cornell University, Ithaca, United States; ⁶Kavli Institute at Cornell for Nanoscale Science, Ithaca, United States; christo.gugushev@ikz-berlin.de

P08 Growth of high quality CdZnTe bulk crystals using the Vertical Gradient Freeze technique

Timotée Journot

CEA Leti, Grenoble, France; timotee.journot@cea.fr

P09 Measuring and Analysing the Growth Parameters of Silicon Cz-Crystals via High Precision Diameter Analysis Tool

Frank Zobel, Jonas Hörig, Felix Neduck, Roland Kunert, Peter Dold

Fraunhofer Center for Silicon Photovoltaics CSP, Halle, Germany;
frank.zobel@csp.fraunhofer.de

P10 Growth of 6N Purity Germanium Single Crystal Using Czochralski Technique

Giri Dhari Patra, S G Singh, M Ghosh, S Pitale, A Singh, S Sen, L M Pant

Bhabha Atomic Research Centre, Mumbai, India; gdpatra@barc.gov.in

P11 Crystal growth, Morphology, and Luminescence Properties of LuSAG:Tm Single Crystals

Jan Pejchal¹, Jan Havlíček^{1,2}, Jan Šulc³, Karel Nejezchleb², Helena Jelínková³

¹Institute of Physics AS CR, Prague, Czech Republic; ²Crytur, spol. s r.o., Turnov, Czech Republic; ³Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University, Prague, Czech Republic; jan.havlicek@crytur.cz

- P12 Numerical Study Of Dislocation Density Distribution In Silicon Crystals Under Different Temperature Conditions
Andrejs Sabanskis¹, Kaspars Dadzis², Lucas Vieira², Robert Menzel², Janis Virbulis¹
¹Institute of Numerical Modelling, University of Latvia, Riga, Latvia; ²Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany; andrejs.sabanskis@lu.lv
- P13 High Energy Computed Tomography as a Tool for Validation of Numerical Simulations of Ammonothermal Crystal Growth of GaN
Saskia Schimmel¹, Michael Salamon², Daisuke Tomida³, Tohru Ishiguro⁴, Yoshio Honda³, Shigefusa F. Chichibu^{3,4}, Hiroshi Amano³
¹Friedrich-Alexander-Universität Erlangen-Nürnberg, Crystals Growth Lab, Materials for Electronics and Energy Technology (i-MEET), Erlangen, Germany; ²Fraunhofer Institute for Integrated Circuits IIS, Division Development Center X-Ray Technology, Fürth, Germany; ³Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Japan; ⁴Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Sendai, Japan; saskia.schimmel@fau.de
- P14 Effect of Co-Doping in the Growth and Scintillation Performance of CeBr₃
Durgesh Singh Sisodiya, Shiv Govind Singh, Giri Dhari Patra, Shashwati Sen
Bhabha Atomic Research Centre, Mumbai, India; dsinghsisodiya1996@gmail.com
- P15 Growth, Structural and Optical Properties of Gd₂Ti₂O₇ Single Crystals
Suganya Murali¹, Ganesan K², Vijayakumar P², Amirdha Sher Gill³, Sarguna R², Edward Prabu A², Moorthybabu S¹, Ganesamoorthy S²
¹Crystal Growth Center, Anna University, Chennai, India; ²Materials Science Group, Indira Gandhi Center for Atomic Research, Kalpakkam, India; ³Sathyabama Institute of Science and Technology, Chennai, India; suganyatvmalai29@gmail.com
- P16 Investigations on n-Type Doping on OFZ Grown Beta-Gallium Oxide Single Crystals for Power Device Applications
Ananthu Vijayan V L, Kaza Venkata Akshita, Dhandapani Dhanabalan, Rajendran Hariharan, Sridharan Moorthy Babu
Crystal Growth Center, Anna University, Chennai, India; anugwri@gmail.com
- P17 Growth and Characterization of Tb₃Ga₅O₁₂ Single Crystals
Miki Watanabe^{1,2}, Takeshi Hayashi¹, Yutaka Anzai¹, Isao Tanaka²
¹Oxide Corporation, Yamanashi, Japan; ²University of Yamanashi, Japan; miki.watanabe@opt-oxide.com
- P18 In-band Pumped Ho:CALGO Crystal For Efficient High-power Laser Operation at 2.1 μm
Weichao Yao¹, Yicheng Wang¹, Christoph Liebold², Daniel Rytz², Volker Wesemann², Klaus Dupré², Daniel Dümichen², Tamara Berzen², Mark Peltz², Clara J. Saraceno¹

¹Ruhr-Universität Bochum, Germany; ²Electro-Optics Technology GmbH, Germany;
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P19 Solid-State Microwave Generators at 2.45 GHz for Microwave Plasma Assisted CVD and ALD Processes

Gerd Hartmut Hintz

TRUMPF HÜTTINGER, Germany; gerd.hintz@trumpf.com

P20 Advanced Modeling of Melt Turbulence, Impurities and Bubble Transport in Cz Silicon Crystal Growth

Vladimir Artemyev, Andrey Smirnov

Semiconductor Technology Research d.o.o., Beograd, Serbia;
vladimir.artemyev@str-soft.com

P21 Digital Defect Traceability across Sapphire Processing: Case Study on Micro-LED Chain

Ivan Orlov¹, Gourav Sen², Caroline Chèze¹, Frédéric Falise¹

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