18th International Conference on Metalorganic Vapor Phase Epitaxy (ICMOVPE XVIII)
July 10-15, 2016

ICMOVPE XVIII Organization

CONFERENCE CHAIR
Robert Biefeld, Sandia National Laboratories

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Christine Wang, MIT Lincoln Laboratory

PUBLICATION
Thomas Kuech, University of Wisconsin-Madison

SPONSORSHIP
Russell Dupuis, Georgia Institute of Technology

EXHIBITS
Raj Bhat, Corning, USA

LOCAL ARRANGEMENTS
David Bour, Avogy, Inc.

ICMOVPE XVIII Objectives and Scope

This conference is eighteenth in a biennial conference series that, since 1981, has become the premier international conference devoted to advancing the knowledge of the MOVPE growth materials and the corresponding improvement in MOVPE-grown devices. The first ICMOVPE conference was held in 1981 in Ajaccio, Corsica, France. Beginning in 1983, the conference has been held every two years at a site that rotates between Europe, Asia, and North America. Recent past conferences have been in Lake Tahoe CA, USA (2010), Busan, Korea (2012) and Lausanne, Switzerland (2014).

The ICMOVPE-XVIII Program Committee has arranged for many excellent invited speakers who agreed to present their latest work at this conference. The excellent leadoff Plenary Talk was given by Dr. Drew Nelson, the founder and CEO of IQE Inc., a world-leader in commercial production of custom epitaxial wafers grown by MOVPE. The other Invited speakers covered a wide range of important topics related to the growth of advanced MOVPE materials growth and device structures. These materials play a significant role in the current a future electronic, optoelectronic, and energy saving systems to be developed in the USA and the world.

Plenary speaker	**Affiliation**	**Title**
Shuji Nakamura	University of CA Santa Barbara	Invention of the Blue LED and Future of Solid State Lighting
Drew Nelson	IQE PLC	The Impact of MOVPE on the World
Ignacio Rey-Stolle	Technical University of Madrid	MOVPE and III-V Photovoltaics: Perspectives, Challenges and Potential for the Electricity Market
Joshua Robinson	Pennsylvania State University	Epitaxy in the World of 2D
Wolfgang Stolz	Philipps-Universitat Marburg	Material Challenges in the MOVPE of III/V-Semiconductors Integrated on (001) Si-Substrate

The ICMOVPE-XVIII conference created meaningful opportunities for intellectual challenge, networking opportunities, and intellectual stimulation for graduate students, Post-Doctoral Fellows and all attendees. This technical and social program further provided many opportunities for communication, brainstorming, and transfer of information as well as the development of collaborations across many institutions and companies. We had a significant number of members of underrepresented groups in STEM attending this conference. We also are publishing the proceedings of this conference with the Journal of Crystal Growth, a journal which receives wide electronic distribution in many academic institutions world-wide, making the technical information presented at ICMOVPE-XVIII have a much broader impact than would otherwise be possible. We actively solicited papers describing the latest work in the technical areas shown below.

ICMOVPE XVIII Symposium Topics

- Fundamental Studies and Modeling of Epitaxial Processes
- Wide-Bandgap Group-III Nitride Materials and Devices (AlN, GaN, InN, BN, etc.)
- III-V Semiconductors and Devices (Arsenides, Phosphides, Antimonides and Dilute Nitrides)
- Narrow Bandgap Materials and Devices (InAs, Antimonides, Bismides)
- II-VI Materials and Devices (CdTe, ZnO, ZnSe, ZnS, MCT, etc.)
- Semiconducting Oxides and Epitaxial Dielectrics (TCO, Ga2O3, SnO2, etc.)
- Epitaxy of 2D Materials and van der Waal Heterostructures
- Heteroepitaxy of Mismatched Alloys and III-V’s on Si
- Growth of Nanowires, Nanostructures and Low-dimensional Structures (Dots, Wires and Quantum Wells)
- Patterned Growth and Selective Area Epitaxy
- Atomic Layer Deposition and Epitaxy
- Pseudo-substrates and Epitaxial Lift-off Processes
- In Situ Monitoring, Process Control and Reactor Modeling

ICMOVPE XVIII Organizers and International Advisory Committee

The ICMOVPE XVIII was organized by the Materials Research Society (MRS). The technical portion of the conference was organized by a team of US-based experts in the field (listed above) and the choice of Plenary and Invited speakers was based upon inputs from the International Advisory Committee composed of active MOVPE researchers from all over the world as shown below in the table. Also shown below is the ICMOVPE-XVIII Program Committee.

ICMOVPE XVIII International Advisory Committee

1 Hiroshi Amano, Nagoya University, Japan
2 Rajaram Bhat, Consultant
3 Jean Decobert, III-V Lab, Thales Research, France
4 Steve DenBaars, University of California, Santa Barbara, USA
5 Russell Dupuis, Georgia Institute of Technology, USA
6 Eduard Hulicius, Institute of Physics, Czech Republic
7 Stuart Irvine, Glyndwr University, UK
8 Eli Kapon, École Polytechnique Fédérale de Lausanne, Switzerland
9 Thomas F. Kuech, University of Wisconsin-Madison, USA
10 Tien-Chang Lu, National Chiao Tung University, Taiwan
11 Nigel Mason, Consultant, UK
12 Abdallah Ougazzaden, Georgia Tech, USA and CNRS, France
13 Seong-Ju Park, Gwangju Institute of Science & Technology, Korea
14 Alok Rudra, École Polytechnique Fédérale de Lausanne, Switzerland
15 Ferdinand Scholz, Ulm University, Germany
16 Wolfgang Stolz, Phillips University of Marburg, Germany
17 Jerry Stringfellow, University of Utah, USA
18 Masakazu Sugiyama, University of Tokyo, Japan
19 Christine Wang, MIT Lincoln Lab, USA
20 Hui Yang, Suzhou Institute of Nano-Tech and Nano-Bionics, China

ICMOVPE XVIII Program Committee

	Last Name	Name	Affiliation	Country
Co-Chair	Allerman	Andrew Allerman	Sandia National Laboratories	USA
Co-Chair	Wang	Christine Wang	MIT Lincoln Laboratory	USA
Americas				
1	Pitts	Oliver Pitts	National Research Council	Canada
2	Springthorpe	Tony Springthorpe	NRC	Canada
3	Watkins	Simon Watkins	Simon Fraser University	Canada
4	Bhat	Rajaram Bhat	Corning	USA
5	Caneau	Catherine Caneau	Corning	USA
6	Cederberg	Jeff Cederberg	Sandia National Laboratories	USA
7	Geisz	John Geisz	NREL	USA

8	Mawst	Luke Mawst	University of Wisconsin Madison	USA
9	Redwing	Joan Redwing	Penn. State University	USA
10	Tansu	Nelson Tansu	Lehigh University	USA
11	Sitar	Zlatko Sitar	North Carolina State University	USA

Europe

1	Decobert	Jean Decobert	III-V Lab	France
2	Hardtdegen	Hilde Hardtdegen	Forschungszentrum Jülich	Germany
3	Kneissl	Michael Kneissl	Technische Universität Berlin	Germany
5	Volz	Kerstin Volz	Philipps-University Marburg	Germany
6	Weyers	Markus Weyers	Ferdinand-Braun-Institute	Germany
7	Lundin	Wsevolod Lundin	Ioffe Physical-Technical Institute	Russia
8	Irvine	Stuart Irvine	Glyndŵr University	UK
9	Grandjean	Nicolas Grandjean	EPFL	Switzerland
10	Kunert	Bernadette	IMEC	
11	Hannapel	Thomas Hannapel	Hahn Meitner Institute	Germany

Asia/Australia

1	Bhattacharya	Arnab Bhattacharya	Tata Institute of Fundamental Research	India
2	Tan	Hoe Tan	Australian National University	Australia
3	Sugiyama	Masakazu Sugiyama	University Tokyo	Japan
4	Lau	Kei May Lau	Hongkong UST	Hong Kong
5	Miyake	Hideto Miyake	Mie University	Japan
6	Yang	C.C. (Chih-Chung) Yang	National Taiwan University	Taiwan
7	Tomioka	Katsuhiro Tomioka	Hokkaido University	Japan
8	Chang	Shoou-Jinn Chang	National Cheng Kung University	Taiwan
9	Nam	Ok-Hyun Nam	Korea Polytechnic University	Korea
10	Xu	Xiangang Xu	Shandong University	China

Activities and Registration

The ICMOVPE-XVIII program had fourteen regular sessions and two poster sessions over four days. The total number of USA attendees was 90 and the total registration was 223.

Registration Category	Registration Number
Registration - Pre-Reg Regular	136
Registration - Onsite Regular	16
Registration - Pre-Reg Student	51
Registration - Onsite Student	5
Registration - Exhibitors	15
Total	223

ICMOVPE XVIII Sponsors and Exhibitors

ICMOVPE XVIII had significant financial support from Agnitron, Alliance MOCVD, Laytech, Taiyo Nippon Sanso/Matheson, and Umicore, Sandia National Laboratories, the US Army Research Office, the DoE Office of Basic Energy Sciences, and the National Science Foundation.

We were fortunate to have the additional on-site support of nineteen commercial vendors of equipment and services related to III-N materials and devices who arranged to have a booth at ICMOVPE XVIII to display and demonstrate their products. These companies are listed below.

Advanced Furnace Technology Ltd.
MOVPE Susceptor Cleaning and Graphite Purification
advancedfurnacetechnology.com

Agnitron Technology, Inc.
Custom R&D MOCVD Equipment; Imperium-MOCVD Control Software; Refurbished and Upgraded Legacy MOCVD Equipment
www.agnitron.com

AIXTRON SE
MOCVD, PECVD, CVD, OVPD, PVPD and ALD Deposition Equipment
www.aixtron.com

AkzoNobel High Purity Metalorganics
High Purity Metalorganics
www.akzonobel.com/hpmo

Alliance MOCVD, LLC
Parts; Service; Upgrade/Refurbishment; System Sales; Process Development
www.alliancemocvd.com

CS Clean Solutions
Dry Scrubber; Chemisorption System; Hydride Abatement; Plasma PFC Destruction; Emergency Release Scrubber
www.cscleansystems-usa.com

Dockweiler Chemicals GmbH
TBAs; TBP; TMGa; TMIn; TMAl; Full Range of Dopants; 2D Materials
www.dockchemicals.com

DOWA International Corporation
GaAs Substrates; High Purity Metals
www.dowa.co.jp/index_e.html

EMD Performance Materials
High-tech Materials
www.emd-performance-materials.com

Evans Analytical Group
Analytical Services
www.eag.com

k-Space Associates, Inc.
In situ and Ex situ Metrology Tools for Epitaxy
www.k-space.com

KITEC GmbH
Non-contact Sheet Resistance Measurement Tools
kitec-resistance-measurement.com

LayTec
Compound Semiconductor Process Monitoring Instrumentation
www.laytec.de

Semiconductor Technology Research, STR Group
Software Products: SimuLED, SimuLAMP, CVDSim, Virtual Reactor
www.str-soft.com/contact

Structured Materials Industries, Inc.
CVD, MOCVD, PECVD and ALD Systems and Components; Deposition Services; Electronic Materials; Contract Research
www.structuredmaterials.com

Taiyo Nippon Sanso/MATHESON
MOCVD; HVPE; Cleaning; Annealing; AsH3, PH3, NH3 Specialty Gases; Purifier; Abatement
www.mocvd.jp

Umicore AG & Co. KG
Sustainable Metals; Organometallic Chemistry; Direct Vapor; Trimethylgallium; Triethylgallium; Trimethylaluminum; Trimethylindium
www.chemistry.umicore.com

Wafer Technology Ltd.
III-V Substrates: GaAs, InP, GaSb, InSb, InAs
www.wafertech.co.uk

WEP
Electrochemical Capacitance-Voltage (ECV) Profiler
www.wepcontrol.com

Registration Fees

The ICMOVPE XVIII registration fees where: Regular-$1,100 and Student-$850

Attendance and Program

The ICMOVPE XVIII conference program consisted of 26 sessions (including the Industrial Rump session. The technical program contained 96 posters and 111 oral presentations including 7 in the Rump session.

Support for Student and Post-Doctoral Attendees

ICMOVPE XVIII had a total of 216 presentations and of these; there were 70 Student oral or poster presentations. The funds we obtained for student support from the **Department of Energy** were distributed among the registered students and Post Docs to supplement the full cost of registration of $1,100 each for regular registration to the reduced rate of at $850 each for graduate students and Post Docs.

ICMOVPE XVIII program may be viewed here: http://www.mrs.org/icmovpe-xviii