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On the cover: 2-inch bulk SCoRA GaN crystal, produced at Soraa. See the profile on page 16 for additional information.

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**Photonic Science**

**Scientific Detector Systems**

Complete X-ray Laue camera system replaces Polaroid film

Digital Laue detectors – an alternative to high sensitivity films for both laboratories and synchrotrons looking to carry out systematic bulk crystal orientation and micro crystal characterization.

The cameras allow unique back scattered geometry with collection time varying from near real time to a few minutes, depending on source, detector and crystal conditions. Automated sample rotation, combined with slitless acquisition brings simpler and more flexible data collection routines.

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An existing Laue set up can be upgraded with luminary solution including beam delivery, i.e. X-ray source, collimators, goniometer/sample holder up to system installation/Integration. Very high resolution detectors allowing strain analysis studies are available on demand.

Contact:
Daniel BRAU Sales & Marketing Director - Photonic Science Limited
Tel.: +33 (0) 4 76 93 57 20  Fax: +33 (0) 4 76 93 57 22

Images courtesy SPL, Heidelberg
Ichiro Sunagawa died of pneumonia on December 20th, 2012 at the age of 88. The mourning ceremony was held in Tokyo on the 24th of December and the funeral was on the 25th of December. The chief mourner was his eldest son Jun.

Professor Ichiro Sunagawa spent his career actively interested in understanding how crystals grow, and why they exhibit elaborately varied morphology, perfection, and homogeneity. He graduated from Tohoku University in 1947 and received a DSc degree from Hokkaido University in 1957 for his thesis ‘Morphological variations in pyrite’.

He served for 23 years as a mineralogist in the Geological Survey of Japan and for 17 years as a Professor of Mineralogy at Tohoku University. From 1989 to 2007 he served as Principal of the Yamanashi Institute of Gemology and Jewelry Arts. In 1991 he was head of the organizing committee of the 9th International Conference on Crystal Growth for its meeting in Japan.

His initial research work was on understanding the origins of habit variations in natural minerals, such as pyrite, chalcopyrite, and calcite. This motivated him to investigate the surface microtopographs of the crystal faces of minerals like hematite, diamond, and clays formed under a variety of geological conditions. This led to a deeper understanding of the morphologies of complex systems based on crystal growth mechanisms at the atomic level.

This approach opened new windows in Earth and Planetary Sciences and also in gemology, where he provided the basic concepts for identifying natural from synthetic gemstones. He published many scientific papers and books on crystal growth, mineralogy, gemology, and diamonds.

-with contributions from Dirk and Yumiko Ehrentraut and 50 years Progress in Crystal Growth
Each year the AACG offers $10,000 in scholarship money to a US member or members of the AACG who are working in the field of crystal growth. This program was established in 2003 to assist qualified men and women working in the field of crystal growth to continue their education towards a technical degree. The money for these scholarships comes from the Olsen Foundation, of Princeton, NJ. A scholarship board of the AACG oversees the selection of applicants.

This year the scholarship award winners are Ryan France and Sam Taylor.

Ryan France received his MS degree from Boston University in 2006. He has worked for 5 years as a scientist at NREL, where he is performing heteroepitaxy of III-V materials by MOVPE and MBE.

While working at NREL, Ryan will be continuing his education in crystal growth fundamentals. He has completed his first semester towards a PhD in Materials Science at Colorado School of Mines.

Sam Taylor graduated from Lehigh University with a BS in Materials Science in 2009. He has worked for 2 ½ years as an R&D Engineer at TRS Technologies where he does crystal quality testing, failure analysis, and crystal growth of relaxor-based ferroelectric materials. He is in his first semester of graduate studies at Penn State, working towards a master’s degree. The scholarship will allow Sam to continue as a part-time student while working at TRS Technologies.

For an application form, contact Shoshana Nash at aaacg@comcast.net. For more information visit www.crystalgrowth.org

Sam Taylor is a R&D Engineer at TRS Technologies while he works towards his master’s degree at Penn State.

Ryan France at NREL where he performs heteroepitaxy of III-V Materials by MOVPE and MBE.
Upcoming Events

July 7-12, 2013  
Gordon Conference on Thin Film and Crystal Growth Mechanisms  
Biddeford, ME  

July 21-26, 2013  
19th American Conference on Crystal Growth and Epitaxy  
Keystone, CO  
http://www.crystalgrowth.org/ConferenceLanding.html

July 21-26, 2013  
International Conference on Defects in Semiconductors  
Bologna, Italy  
http://www.icds2013.eu/

August 11-16, 2013  
International Conference on Crystal Growth and Epitaxy  
Warsaw, Poland

August 25-30, 2013  
International Conference on Nitride Semiconductors  
Washington, DC  
http://www.mrs.org/icns-10/

August 25-29, 2013  
SPIE Optics and Photonics 2013  
San Diego, CA  
http://www.spie.org/op2/

September 29-October 2, 2013  
International Conference on Silicon Carbide and Related Materials 2013  
Miyazaki, Japan  
http://icserm2013.org/

Please submit conference information to the editor for inclusion in future issues.

This humorous depiction of enantiomorphs was drawn by Bob Laudise to describe the difference between left and right-handed quartz. Thank you to Vince Fratello for sharing this cartoon.
Who will train the next generation of crystal growers?

Contributed by Frank Bruni

Crystal Technology - the synthetic crystal and epilayer production including crystal machining and required design and construction of equipment - forms the foundation of the modern electronics revolution and underpins all aspects of global commerce, communication, energy production and medical technology. It is fundamental to the advances in electricity production, transport and storage that will be critical to improving energy technologies to reduce the impact of energy on global climate change.

At the invitation of Dr. Hans Scheel (www.hans-scheel.ch), a group of experienced technologists in this field from Europe, Asia and the United States convened for a week-long meeting in Poulithra, Arcadia, Greece in May 2012.

The purpose of this meeting was to discuss the need for education and training of the future engineers and scientists who will form the first generation of specifically-trained crystal technologists. Having the basic knowledge of crystal materials technology (CMT) will enable CMT engineers to consult and collaborate with leading specialists of related scientific fields.

The goal of the meeting was to generate a white paper outlining the need for this training regimen as well as to include recommended training courses at both undergraduate and graduate levels. This white paper will be circulated to leaders of industry, government and academia with the goal of promoting this specialized training in universities and engineering schools.

Among those present, in addition to Dr. Scheel, were Dr. Alexey Borodin, EZAN Chernogolovka, Russian Academy of Sciences, Prof. Thierry Duffar, Professeur à l’Université de Grenoble, France, Dr. Frank Bruni, Consultant, California, USA, Prof. Klaus Jacobs, GaN Project Berlin, Germany, Prof. Koichi Kakimoto, Institute of Applied Mechanics, Kyushu University, Japan, Prof. Georg Roth, Institut für Kristallographie, RWTH Aachen, Germany, Prof. Yasuhisa Sano, Dept. of Precision Engineering, Osaka University, Japan, Prof. Brian Tanner, Durham University and Kromek Company, UK, Prof. David Witter, Anaxtal Inc., South Carolina, USA and Prof. Kazuto Yamauchi, Dept. of Precision Engineering, Osaka University, Japan.

The meeting was held at the Smyros Resort, located near the winter home of Dr. Scheel and Regula Hauser Scheel on the Aegean shore. Hans and Regula organized tours of historical archeological sites that were conducted in between technical sessions, presentations and discussions.

Locations visited included Olympia, Epidaurus, Mycenae and Athens. A companion program ran in parallel with the technical sessions and enabled the wives in attendance to see additional sites of interest.

All costs of the conference including meals, housing and excursions (other than travel to Greece) were subsidized by Dr. Scheel using retained revenues from prior workshops on crystal growth and technology. In this way the proceeds of the previous workshops could be dedicated specifically to the advancement of crystal technologist education.
Dr. Bruni (with his wife) returned to Greece in March of 2013 to work with Dr. Scheel on completing the white paper. The finished document can be found at: https://files.secureserver.net/0ficEZc7s9vyn (use sapphire for the password) or through links on the site www.frankbruni.com.
Interview with David Witter

Contributed by David Bliss

During his career as a crystal grower and inventor, David Witter contributed to many research and development projects in semiconductor, optical, and magnetic materials. Over the years, he became an expert at designing control systems for crystal growing equipment. He met with David Bliss recently to talk about his experiences.

DB: How did you get started in crystal growth?

DW: When I started my freshman year at NC State University I got a job as a technician in the Engineering Research Department growing crystals of sapphire and magnesium aluminate spinel using a plasma torch following the work of Tom Reed of MIT. After seven years in Ceramic Engineering at NC State, I took my first job at the new Union Carbide Crystal Products (UCC) plant in San Diego, CA in 1968 working for G. A. Keig and Fedia Charvat. My education has always benefited from a kind of informal apprenticeship system.

DB: Who did you work with in the early days?

DW: In San Diego at UCC I met Ralph Hutcheson; he grew the first ruby laser crystal for Ted Maiman’s laser. Ralph started Scientific Materials later in Bozeman, MT. Ted worked for the UCC sister company “KORAD” in Santa Monica, CA. We had several meeting with them concerning our YAG and ruby laser components over lunch at the Ball restaurant in Santa Monica.

After four years at UCC, I left San Diego and went to work at the Allied Chemical Corporation in Morristown, NJ where Jack Gillman (dislocations in LiF) was the director. I worked for Bob Linares and M. Alton Gilleo, both formerly of Bell Labs. Then, four years later, Allied moved the group to Charlotte, NC so I interviewed and found better opportunities were available at Lawrence Livermore National Laboratory, Texas Instruments (TI), Motorola and Airtron.

I moved to TI Central Research in Dallas in 1976 to work for Morton Jones and Roland Johnson on GGG for lasers and magnetic bubble memories. I was sharing an office with Frank Bruni for six months before he left TI for the new Allied Chemical plant in Charlotte.

DB: How did you get to know Gordon Teal and Jack Kilby?

DW: Gordon Teal came to TI from Bell Labs to be the first VP of Research in 1952. He had invented the Teal-Little crystal growth process that later became known as Czochralski growth. Mort Jones had been one of his first crystal growers at TI.

In 1990, several of the crystal growth professionals at TI started the Texas Section of the AACG. I was installed as president. The first meeting was held at Taffy’s Restaurant. I was able to get Jack Kilby to come and speak to us when I told him that Gordon Teal was coming to the meeting. It was a great evening and Gordon brought reprints of his first germanium and silicon crystal growth publications.

Jack arrived at the meeting after getting off of a plane from Japan just in time to say how significant Gordon’s work was to the invention of the integrated circuit. Gordon passed away in 2001 and Jack in 2003.

As an Industry Professor at Texas A&M University, I was asked to represent TI at a faculty senate meeting to recommend Jack Kilby for an Honorary Doctorate. I remember stepping outside the building with Jack during the deliberation so that he could smoke several cigarettes. He added the TAMU Doctorate to the many honorary doctorates that he already had from other Universities.

Later I worked for Jules Levine on the Kilby invention of a solar array based on single crystal silicon spheres. My patented process for crystal growth of the spheres went into production many years later at ATS Spherical Solar, but there
were continuing bonding problems between silicon and aluminum and the company withdrew its IPO.

DB: How did you manage the transition from GGG to silicon?

DW: TI had a policy of promoting transfers with a Job Opportunities Bulletin that came out every Monday. It was not necessary to leave TI in order to gain experience with other projects. After the market for bubble memory burst in 1980 (due to the success of CMOS and the Winchester hard disk technology), I worked on VLSI silicon and grew the first 125 mm silicon crystals at TI in the research building. I found the IDEA program at TI very useful for starting new projects and in 1983 I became a Senior Member of Technical Staff because of my successful IDEA project. That project resulted in the deployment of my automatic crystal growth control system using video from the recently invented charge-coupled device (CCD) cameras that were much more linear and sensitive than vidicon tubes.

DB: Did you also work on compound semiconductors?

DW: In 1988 two people, a Senior Member of Technical Staff and a TI Fellow, left a big hole in the TI crystal growth effort of mercury cadmium telluride (MCT) by resigning in the same month. I was requisitioned to manage the Defense Advanced Research Project Agency (DARPA) project for the Traveling Heater Method (THM) growth of MCT for cooled focal plane arrays (Javelin Missile). Later it was decided that the 90 day long THM process was too expensive and too difficult for development of a reproducible product, and all 25 stations were shut down. A decision was made to use Liquid Phase Epitaxy (LPE) (a four hour process). After that, I worked on the horizontal Bridgman growth of cadmium zinc telluride for substrates for LPE of MCT.

DB: Did you work on developing crystal growth equipment or processing equipment?

DW: In 1976 when I first joined TI Jerry Alford, formerly of UCC and Allied, called me to see if I could help him find an application for his Ford Aerospace laser inspection technology developed for textiles. I put him in touch with Joe Ayres in Sherman, TX and the whole wafer inspection technology was born. My last years at TI before retiring in 1998 were in the silicon materials department which merged with MEMC in 1994, leading to the construction of a $450M 200mm silicon crystal growth factory. I was the materials manager for the critical supplies used in silicon crystal growth. Polysilicon, quartz crucibles, graphite heaters, graphite fiber insulation and boron quality were my responsibility. Every polished wafer was scanned for defects on the commercial laser inspection stations that had resulted from my earlier response to Jerry Alford. Correlation of the scanned defects with critical material lots and parts used in the growth furnaces identified problems and kept the yields high.

DB: After retirement, did you continue working?

DW: Yes, I became Director of Engineering at Northrop Grumman SYNOPTICS in 2000 after I retired from TI and I also started consulting as ANAXTAL. At SYNOPTICS, I emphasized process automation. Weight control systems for Czochralski growth were substantially improved using a rotary contactor with a transduced digital signal instead of the low voltage analog signal of the load cell. Since SYNOPTICS is the merged Litton Airtron and Allied Chemical facility that I did not move to in 1976, I felt as though I was returning from a 24 year sabbatical at TI.

DB: How do you think the US crystal growth community can sustain itself, given the migration of crystal growth technology to lower-cost countries?

DW: The US has outsourced and off-shored much of our materials manufacturing in the last 20 years. Therefore, our crystal growth technology has suffered tremendously. Only a few companies survive as “National Treasures” and even some of them have gone offshore for their crystalline product manufacturing. We need to think smarter and use...
our knowledge more effectively. The National Research Council has made some recommendations in Report #12640 of September 2009 entitled Frontiers of Crystalline Matter: From Discovery to Growth. Four of the five recommendations relate to the education of the next generation of crystal growth engineers and scientists. This education should be done before the rest of us experienced crystal growers are gone. Some details of my attempt to follow the advice of the NRC are presented in my blog “crystallinematerialsnetwork.blogspot.com”. The link to the NRC Report is also available there.

DB: Can you give an example of how we can leverage our knowledge to do smarter production?

DW: Consider the silicon solar industry that is now on its back and going bankrupt as Asian companies are coming in to buy up the failed company resources. We need to use a smarter and more energy efficient approach to silicon crystal growth. The solar industry has followed the semiconductor industry into the trap of a very energy intensive “polysilicon” synthesis and remelting process. The resulting oxygen precipitation defects are beneficial for electronic grade wafers, gettering impurities during device processing. However, in solar wafers oxygen precipitates act as recombination centers, killing the lifetime. The oxygen comes from the dissolution of the quartz crucible during remelting and crystal growth. We need a new paradigm that avoids remelting – a “disruptive technology” that will save about fifty percent of the energy used in the present manufacturing process. In 1987, I collaborated with Mohendra Bawa on US patent 4,710,260 “Deposition of silicon above its melting point”. This patent was never reduced to practice because the containment method was unfeasible. I have recently invented a new containment material and method based on a nitrogen economy instead of oxygen. My provisional patent in March of 2009 was followed by a non-provisional patent application in March of 2010 which should issue in 2013. With appropriate investors and partners, ANAXTAL silicon technology will enable direct melt transfer from a silane feedstock source to the silicon crystal growth process and save the energy now lost due to the lack of vertical integration.
Photographs portraying scientific, technical, or artistic aspects of crystals, crystal growth, or characterization are solicited. The photos will be displayed each day as a slide show in addition to being displayed in a prominent location at the meeting.

**Submissions will be voted on by conference attendees, who will be asked to judge entries placed in the following 3 categories:**

1) Natural untouched micrographs or photographs

2) Photographs including digital manipulation (and computational simulations)

3) Student microscopist/photographer

**Judging and Awards**

At the ballot box, the images and associated text will be displayed for viewing and judging purposes. Winners will be announced during the Banquet and Awards Ceremony.

First-place entries will receive an award and a prize of $150. If a student wins best entry in the other categories, they are only eligible for one prize. Winning photos will be published in the AACG newsletter.

**Contest Rules**

1) The contest is open to all registered meeting attendees.

2) Contestants are allowed to submit one entry per category.

3) Entries must be submitted by email as a high resolution JPEG with a maximum size of 10MB.

4) Please do not put text on the photo unless it is part of the image.

5) In a separate text or Word file, please include the title, name(s), and affiliation(s) along with a description of the technical significance of the entry, and/or the artistry that it represents (50 words or less). Identify the appropriate category for judging (untouched micrograph or digitally modified). Student entries should be clearly noted.

Entries should be submitted by email to the photo contest organizer, Candace Lynch, by **July 5, 2013**. Please direct any questions or comments to the organizer:

**Candace Lynch, Inrad Optics**
**Phone:** 201-767-1910
**Email:** candace.lynch@gmail.com
Soraa is a vertically-integrated solid state lighting company, with manufacturing capabilities at the wafer, device, and lamp level and development activities in bulk GaN crystals.

Soraa was founded in 2008 by Professors Shuji Nakamura, Steve DenBaars, and Jim Speck, world-leading pioneers in nitride based materials and devices, to commercialize GaN-on-GaN™ light emitting diodes (LEDs). In 2012, Soraa introduced the world’s first LED MR16 retrofit lamps with light quality superior to halogen and efficiency superior to compact fluorescent. Soraa’s full spectrum GaN on GaN LED lamps have superior color rendering and beam characteristics compared to lamps using LEDs created from non-native substrates.

Soraa was founded in 2008 by Professors Shuji Nakamura, Steve DenBaars, and Jim Speck, world-leading pioneers in nitride based materials and devices, to commercialize GaN-on-GaN™ light emitting diodes (LEDs). In 2012, Soraa introduced the world’s first LED MR16 retrofit lamps with light quality superior to halogen and efficiency superior to compact fluorescent. Soraa’s full spectrum GaN on GaN LED lamps have superior color rendering and beam characteristics compared to lamps using LEDs created from non-native substrates.

Beginning in 2008, Soraa initiated an in-house research and development effort to develop low cost, high quality bulk GaN substrates, with support from a number of U.S. government agencies. Soraa’s novel approach, called SCoRA (Scalable Compact Rapid Ammonothermal), differs from conventional ammonothermal methods in that the high pressure apparatus is internally rather than externally heated, is cheaper and more scalable than superalloy autoclaves, and enables growth rates of up to 1 mm per day.

Soraa’s bulk crystal growth team includes: Dr. Mark D’Evelyn, who joined Soraa in 2008 following 15 years at GE Global Research, where he and his colleagues worked on CVD and high pressure crystal growth of diamond, GaN growth by a not-so-scalable high pressure ammonothermal method, growth of radiation-detector crystals and solar-grade silicon, and various other electronic materials and ceramics; Dr. Dirk Ehrentraut, who has broad experience in bulk crystal growth of GaN, ZnO, doped spinel, $\text{ABO}_4^-$, $\text{A}_2\text{B}_5\text{O}_{12}$, $\text{GaPO}_4^-$, and various thin-film materials, served as an Associate Professor at Tohoku University, and joined Soraa in 2011; and Dr. Hak Do Yoo, who has broad manufacturing and research experience with silicon and gallium arsenide, served as President of Silicon Technologies for SunPower Corp., and joined Soraa in 2012.

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Soraa is headquartered in Fremont, California, where it manufactures its GaN on GaN LEDs in the company’s state-of-the-art facility.

At the LightFair International conference in late April 2013, Soraa introduced several second-generation LED MR16 products, including 65W and 75W halogen-equivalent lamps.

Soraa’s LEDs are fabricated on bulk GaN substrates synthesized by hydride vapor phase epitaxy (HVPE) and purchased from leading manufacturers. These substrates are significantly more expensive than the sapphire wafers used by most other LED manufacturers and there is obviously a strong desire to reduce costs.
Recent Government Contracts Awarded

NSF SBIR Phase I 2013
“Low Cost Scalable Manufacturing of Patterned Sapphire Substrates (PSS) for High Efficiency LEDs”
Sinmat, Inc. - Gainesville, FL

NSF SBIR Phase I 2013
“Coilable Single Crystal Fibers of Doped YAG for High Power Laser Applications”
Shasta Crystals Inc. - Anderson, CA

NSF SBIR Phase II 2013
“Epitaxially Grown GaSb Thin Films on GaAs Substrates For Near-Field Conversion of Heat to Electricity”
MTPV LLC - Boston, MA

DOE SBIR Phase I 2013
“Monitoring and Control of Chemical Composition of In-GaN Layers During MOCVD”
Accustrata, Inc. - College Park, MD

DOE STTR Phase I 2013
“1200V/ 50A AlGaN-GaN-Si MOS-FETs and Schottky Rectifier”
Alameda Applied Sciences Corporation - San Leandro, CA

DOE SBIR Phase I 2013
“FLAAT Growth Technology for Low Cost Thick High Quality GaN on 8” sapphire”
Kyma Technologies - Raleigh, NC

DOE SBIR Phase I 2013
“Low Cost High Reproducibility Method for GaN Seed Production”
Kyma Technologies - Raleigh, NC

DOE SBIR Phase I 2013
“High Temperature (300°C) Silicon Carbide (SiC)-Based Integrated Gate Drivers for Wide Bandgap Power Devices”
Arkansas Power Electronics International, Inc. - Fayetteville, AR

DOE SBIR Phase II 2013
“Thin DIAMOND Time-of-Flight Detectors”
Applied Diamond Inc. - Wilmington, MA

DOD Navy SBIR Phase I 2012
“High Power Vertical Gallium Nitride (GaN) Transistors on Native GaN Substrates for Power Switching Applications”
Avogy Inc. - San Jose, CA

DOD Navy STTR Phase I 2012
“High-Power Semiconductor Laser in the 3.0- to 3.5-μm Spectral Range”
sdPhotonics LLC - Oviedo, FL

DOD Navy SBIR Phase I 2012
“Cost-Effective Technologies for Fabrication of Piezo Crystal Vector Velocity Sensors”
TRS Ceramics Inc. - State College, PA

DOD Army STTR Phase I 2012
“HOVPE Growth of High Quality AlGaN on AlN Substrates”
Structured Materials Industries - Piscataway, NJ

DOD Army STTR Phase I 2012
“High-Quality AlGaN Epitaxial Films on GaN and AlN Substrates”
Adroit Materials - Raleigh, NC

DOD Army STTR Phase I 2012
“High Quality, Low Cost, and High Purity AlGaN Epitaxy with Reduced Surface Dislocation Density”
Kyma Technologies, Inc. - Raleigh, NC

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The AACG newsletter is the most effective medium for reaching the American crystal growth community.

Contact the AACG Administrator at aacg@comcast.net for more information.

Visit our website at www.crystalgrowth.org
Coherent – East Hanover, NJ

CACG is seeking candidates to fill a position in our manufacturing growth department. Responsibilities will include but not limited to assisting production crystal growth.

Previous experience in high temperature bulk crystal growth techniques is desired. An educational background in ceramics, chemistry, or physics is desired.

The candidate must be able to function within a team environment; communicate, collaborate and interact with manufacturing operations and R&D alike. Training will be provided. Any technical degree from Associates to BA or BS in a relevant discipline. Must be able to work flexible hours.

Please apply on the www.Cohherent.com website, job#3608

Cree – Durham, NC

We currently have the need for a Senior Process Development Engineer to support our Materials group located at our headquarter facility in Durham, NC.

Materials Business is looking for a high potential, resourceful, hands-on, problem solving development engineer with a good understanding of the materials behavior and capacity to quickly grasp and resolve technical challenges. A well-built background in semiconductor manufacturing with strong leadership skills is necessary to enable successful execution of both new process development and improvement of existing processes in a fast paced manufacturing environment.

The successful candidate will maintain a regular interface with Cree’s suppliers on quality issues and resolution, working with procurement and quality control teams.

http://autohire.careershop.com/cree

Equipment Available

- (2) Czochralski Crystal Growers
- Very lightly used (8-10 runs each)
- Configured for silicon growth
- Automated control system
- 150 kg lift capacity
- Furnace ID: 1000 mm
- Pull chamber ID: 310 mm
- Pull chamber height: 2500 mm
- Includes (2) 22” graphite hot zones
- Complete systems

Contact: Bob Stevenson
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Crystal IS- Albany, New York

Crystal IS is looking to hire a Senior Crystal Growth Engineer at its’ Albany, NY Corporate Headquarters. This is a new role that will have a tremendous opportunity to impact the growth and success of Crystal IS. We are looking for an experienced professional to lead the process development, process improvement, and integration of our core AIN bulk growth technology and assume responsible for process (and quality) transfer from R&D to production.

We are looking to identify and hire an inventive hands-on leader focused on achieving results. The qualified candidate will be a self-motivated team player who can lead technology and people.

From a technology perspective we require demonstrated experience generating new ideas that result in IP and leading problem solving and new technology implementation initiatives. From a people leadership perspective you should be able to demonstrate past successes leading, mentoring and developing staff.

http://www.cisuvc.com/about/careers

Current job openings are listed on the AACG website, along with additional details regarding the jobs posted above. If you would like to advertise an open position in the newsletter or on the website, please contact aacg@comcast.net.
19th American Conference on Crystal Growth and Epitaxy (ACCGE-19) and 16th U.S. Biennial Workshop on Organometallic Vapor Phase Epitaxy (OMVPE-16)

July 21st to July 26th, 2013
Keystone, Colorado, USA

Important Dates:
Late Registration Begins: 6/15/2013
‘Late News’ and Poster Abstract Submission Ends: 06/15/2013
Hotel Reservation Deadline: 7/1/2013

ACCGE-19 provides a forum for the presentation and discussion of recent research and development activities in all aspects of epitaxial thin film and bulk crystal growth; sessions will integrate fundamentals, experimental and industrial growth processes, characterization and applications.

The OMVPE-16 workshop continues a tradition, started at Cornell in 1983, of bringing together specialists in the OMVPE field from industry, academia and government laboratories in an informal atmosphere and scenic surroundings. The workshop is an excellent opportunity to present and discuss new results in the OMVPE field. It also provides a venue for newcomers to the field to familiarize themselves with OMVPE science and technology.

Focused sessions on:
- Detector Materials: Scintillators and Semiconductors
- Two-dimensional Electronic materials
- Non-linear Optic and Laser Host materials Fundamentals, Theory, and Modeling
- Crystal Growth
- III-Nitride and other wide bandgap crystals
- Nanocrystals, Quantum dots and Nanowires
- And other topics

Conference and registration information: http://crystalgrowth.us/accge19/index.php