INDIAN ASSOCIATION FOR CRYSTAL GROWTH

Since 1982

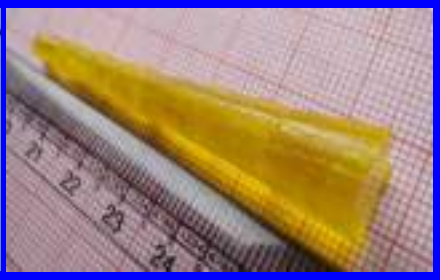
January 2016 | Issue 28

IACG NEWS LETTER

In this Issue

RECENTLY GROWN TECHNOLOGICALLY IMPORTANT SINGLE CRYSTALS

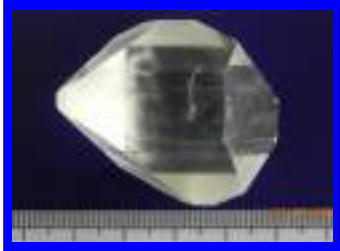
$LiBaF_3$-Prof.P.Ramasamy
SSN CE



Sodium p-Nitrphenol
Dr.Muthu Senthil Pandian, SSN RC

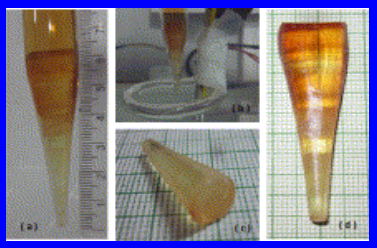
Lithium Niobate-
Dr.G.Bhagavannarayana, NPL

$DyMnO_3$-Dr.Suja Elizabeth, IISc



Paracetamol-Dr.K.Srinivasan
Bharathiyar University

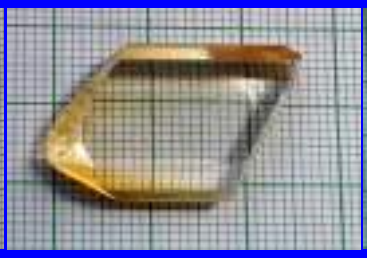
LLDP-Dr.R.Ramesh Babu
Bharathidasan University



M2A5B-Dr.R.Gopalakrishnan
Anna University

NaCl - Dr.Binay Kumar, University of Delhi

SR grown KDP Crystal
Dr.Sunil Verma, RRCAT

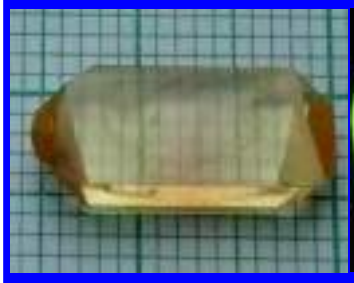


PYPHB-Dr.S.Bragadeeswaran
BIT-AnnaUniversity, Trichy

3PB-Dr.S.Kalainathan
VIT-Vellore

Bismuth Telluride
Dr.N.Vijayan, NPL

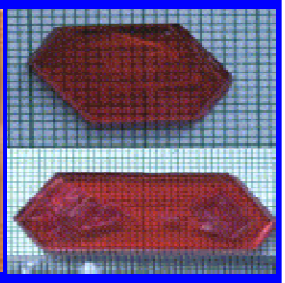
Lithium Iodate-
Dr.P.Rajesh, SSNCE



PS-Dr.R.Mohan Kumar
Presidency College

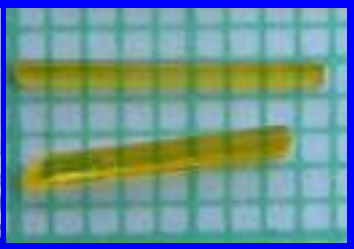
$Gd_3Ga_3Al_2O_{12}$:Ce under UV light-
Dr.S.C.Gadkari, BARC

DKDP-Dr.S.K.Sharma
RRCAT



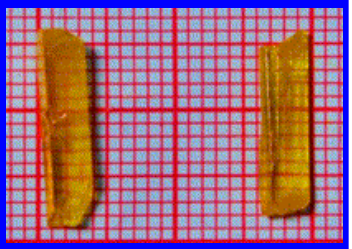
PCHP-Dr.S.P.Meenakshi -sundaram, Annamalai Univ

NPLi-Dr.S.Jerome Das
Loyola College



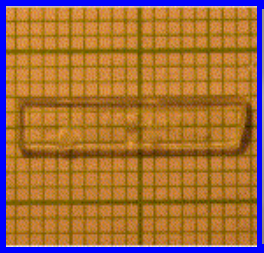
TMBC-Dr.S.M.Dharmaprakash
Mangalore University

1,3,5 Triphenylbenzene-
Dr.K.Sankaranarayanan, AU



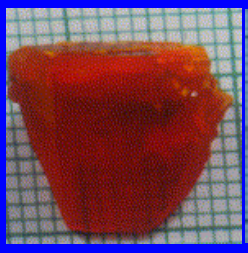
N,N-dimethylurea Picrate-
Dr.P.Selvarajan, ACAS

IIP-Dr.P.Murugakoothan
Pachaiyappa's College



L-LN-Dr.Tanusree Kar
IACS, Kolkatta

Ru-LN
Dr.B.Riscob, IPR



TSCPACd-
Dr.K.Ramamurthi, SRM

LTA -Dr. J. Madhavan
Loyola College

Editorial Message

It is a great pleasure for me to present you the TWENTY EIGHTH issue of IACG NEWS LETTER-2016. An enthusiastic note is that the number of the Crystal Growth members is increasing tremendously. To date we have about 350 Crystal Growth research active life members. The immense support and encouragement we have been receiving from the Indian Crystal Growth Community has given us enthusiasm to bring out the Twenty Eighth Issue of our IACG News Letter-2016. This newsletter makes aware of achievements and the new developments achieved by the Indian Crystal Growth community. The objectives of the association are to promote, encourage and develop the theory and practice of growth of Crystals, to organize Conferences, Seminars, Workshops, hands on training etc., in various parts of the country, to educate the people at various levels and offer a proper platform for reporting and discussing new developments in the field of Crystal Growth.

IACG has successfully organized NINETEEN Crystal Growth seminars, many of them with International Participation. All major Indian Crystal Growth laboratories and research institutions participate in the National Seminar on Crystal Growth (NSCG). The XIX NSCG-2015 provided a platform for the research community in Crystal Growth and characterizations to meet, discuss and share the latest advances in these fields. Three days of togetherness has developed a strong and healthy support between the experts in the field of Crystal Growth. Many novel and innovative ideas to reform the field of Crystal Growth and its applications and related areas, were evolved through the discussions and sharing between the distinguished professors and renowned scientists from the different parts of the country. Interaction with the eminent personalities has been a great motivation to the research scholars and post graduate students who participated in the conference. Discussions on student exchange programme with reputed institutions were initiated.

NSCG is held in different cities as annual event. This year it is being organized at BARC, Mumbai during 19-21st January 2016. The present "XX National Seminar on Crystal Growth-2016" is a major event for us involving several Senior and Young Scientists. This year the topics of symposium include: Growth of Single Crystals, Crystal Growth Equipment and Techniques, Modelling and Simulation for Crystal Growth and Properties, Characterization Techniques, Single Crystalline Films, Nano Crystals, Applications of Single Crystals, Devices based on Single Crystals and Their Societal Benefits. The participants range from budding researchers to eminent scientists and the NSCG forum provides a great opportunity for a two-way interaction between young researchers just starting to work in Crystal Growth and experienced scientists reviewing a particular topic or providing an in-depth study. The current seminar includes 20 Invited Lectures, 6 Young Crystal Grower Award presentations and more than 150 contributed papers as oral, poster and crystal display presentations from many National Laboratories, Universities and Research Institutes. To recognize the young researchers YOUNG CRYSTAL GROWER AWARD presentation is now introduced by IACG. The young researchers who are pursuing their career in the field of Crystal Growth and below 40 years of age are eligible to apply for this award.

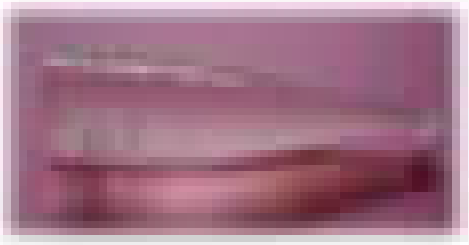
The 18th International Conference on Crystal Growth and Epitaxy (ICCGE-18) will be held during 7-12 August 2016 in Nagoya, Japan. The conference will provide sessions of the presentation and discussion regarding recent research and development activities in all aspects of crystal growth. The technical program will include both oral and poster sessions, as well as plenary and invited talks to provide a complete picture of the latest developments in Crystal Growth. Researchers who are playing active roles in frontiers of wide-ranging fields of crystal growth will give lectures on a wide array of topics ranging from instructive topics to the latest topics. Researchers will therefore have an opportunity to systematically learn about crystal growth from its fundamentals to its applications. (Web: http://www.iccge18.jp/)

Every effort has been made to bring to you the most of the news in a brief manner.

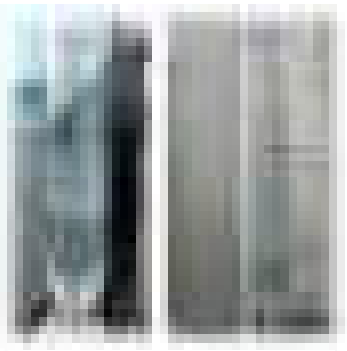
Dr. Muthu Senthil Pandian
Editor, Indian Association for Crystal Growth, News Letter, Issue-28

Sankaranarayanan - Ramasamy (SR) Method of Crystal Growth

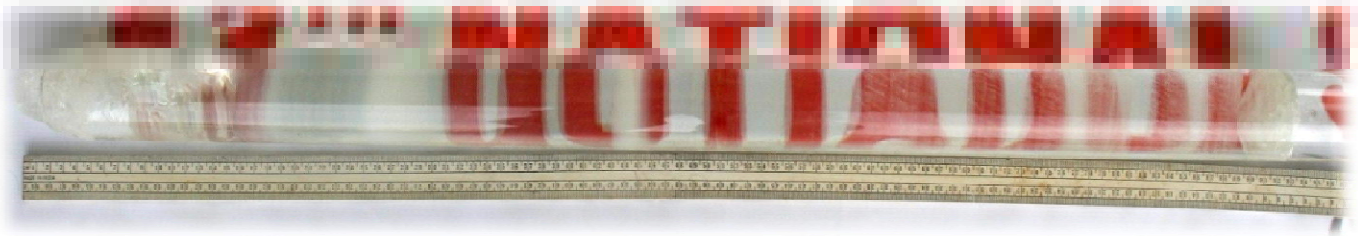
- ❑ **Sankaranarayanan-Ramasamy (SR) method** was discovered in the year 2005.
- ❑ **135 Papers** have so far appeared in International Peer Reviewed Journals.
- ❑ **32 Journals** have published SR method papers.
- ❑ **150 Researchers** published papers in SR method.
- ❑ **9 Projects** have been funded (BRNS, DST, AICTE, UGC, CSIR).
- ❑ Several laboratories in India and Abroad are growing crystals by SR method.
- ❑ **1350 mm length & 55 mm diameter** of BP crystal was grown by SR method.
- ❑ **Positive & Negative solubility material, High, moderate** and **low solubility materials** were all grown by SR method.



World's first unidirectional method grown crystal from solution - 2004
K. Sankaranarayanan et. al.



650 mm long unidirectional method grown crystal - 2008
M. Arivanandhan et. al.



1350 mm long unidirectional method grown Benzophenone crystal - 2012
Muthu Senthil Pandian, K. Boopathi et.al.

Most Cited Articles in SR method of Crystal Growth

No	Authors	Journal	Title	Citations
1	**K. Sankaranarayanan** **P. Ramasamy**	Journal of Crystal Growth, Vol.280, pp. 467-473, **2005**	Unidirectional seeded single crystal growth from solution of benzophenone	**92**
2	**Muthu Senthil Pandian** **N. Balamurugan** **V. Ganesh** **K. Kishan Rao** **P. Ramasamy**	Materials Letters, Vol.62, pp. 3830-3832, **2008**	Growth of TGS single crystal by conventional and SR method and its analysis on the basis of mechnical, thermal, optical and etching studies	**45**
3	**N. Balamurugan** **P. Ramasamy**	Crystal Growth and Design, Vol.6, pp. 1642-1644, **2006**	Investigations of the growth rate formula and bulk laser damage threshold KDP crystal growth from aqueous solution by the Sankaranarayanan-Ramasamy (SR) method	**36**

CHARACTERIZATION FACILITIES: AVAILABILITY

FTIR, UV, Conductivity, Dielectric

Prof. P. Ramasamy, President-IACG
Dean (Research)
SSN College of Engineering
Chennai-603 110, Tamilnadu
Email: ramasamyp@ssn.edu.in

High Resolution X-ray Diffraction

Prof. K. K. Maurya, Principal Scientist
Crystal Growth and Crystallography
Section, National Physical Laboratory
New Delhi-110 012,
Email: kkmaurya@nplindia.org

P-E Hysteresis and d_{33} coefficient

Prof. Binay Kumar
Crystal Lab, Department of Physics and
Astro Physics, University of Delhi,
New Delhi-110 007,
Email: bkumar@physics.du.ac.in

Single Crystal X-ray Diffraction

Prof. Rajni Kant
Department of Physics
University of Jammu
Jammu-180006
Email: rkant.ju@gmail.com

Laser Damage Threshold

Prof. S. Kalainathan, Deputy Director
Centre for Crystal Growth
VIT University
Vellore-632 014, Tamilnadu
Email: kalainathan@yahoo.com

Vickers Microhardness

Dr. R. Gopalakrishnan, Associate
Professor, Crystal Research Laboratory,
Department of Physics, Anna University,
Chennai-600 025, Tamilnadu
Email: krgkrishnan@annauniv.edu

Chemical Etching

Dr. S. Brahadeeswaran
Head, Department of Physics
BIT-Anna University
Trichy-620 024
Email: sbrag67@yahoo.com

Optical Imaging and Birefringence

Dr. Sunil Verma, Scientific Officer-G,
Laser Materials Development Devices
and Division, RRCAT,
Indore-452 013, Madhya Pradesh,
Email: sverma1118@gmail.com

Dielectrics and Hall Effect

Dr. R. Ramesh Babu, Assistant
Professor, Department of Physics,
Bharathidasan University,
Tiruchirappalli-620 024, Tamilnadu,
Email: rampap2k@yahoo.co.in

Refractive Index

Prof. D. Rajan Babu
School of Advanced Sciences
VIT University
Vellore-632 014, Tamilnadu
Email: drajanbabu@vit.ac.in

Photo Luminescence (PL)

Dr. U. Madhusoodanan, Scientist-E,
Radiation Safety Division, Indira Gandhi
Centre for Advanced Research,
Kalpakkam-603 102, Tamilnadu,
Email: ums@igcar.gov.in

Second Harmonic Generation

Prof. P. Ramamurthi, Director
National Centre for Ultrafast Process
University of Madras
Taramani Campus, Chennai
Email: murthy@unom.ac.in

Recipients of Indian Association for Crystal Growth (IACG)
"Prof. P. RAMASAMY National Award for Crystal Growth"

Year	Recipient(s)
2000	**Dr. P. Santhana Raghavan**, *Managing Director* GT Solar Corporation Limited, USA. **Dr. G. Dhanaraj**, *Scientist* Department of Materials Sciences and Engineering, Stony Brook University, USA .
2002	**Prof. R. Dhanasekaran**, *Emeritus Professor* Crystal Growth Centre, Anna University, Chennai.
2003	**Prof. M. Ichimura**, *Head* Dept. of Electrical & Electronic Engineering, Nagoya Institute of Technology, Japan.
2004	**Prof. K. Sankaranarayanan**, *Professor* Department of Physics, Alagappa University, Karaikudi.
2005	**Dr. R. Gopalakrishnan**, *Associate Professor* Crystal Research Laboratory, Department of Physics, Anna University, Chennai.
2006	**Prof. C. K. Mahadevan**, *Professor* Physics Research Centre, Department of Physics, S.T. Hindu College, Nagercoil.
2007	**Dr. N. Vijayan**, *Senior Scientist* X-ray analysis & Crystal Growth Section, National Physical Laboratory, New Delhi.
2008	**Prof. S. Moorthy Babu**, *Head, Centre for Nanoscience and Technology* Crystal Growth Centre, Anna University, Chennai.
2009	**Prof. K. Ramamurthi**, *Head* Department of Physics, Bharathidasan University, Trichirappalli. **Dr. S. Ganesa Moorthy**, Scientific Officer-F Laser Materials Development Devices & Division, RRCAT, Indore.
2010	**Prof. G. Bhagavannarayana**, *Chief Scientist & Head* Crystal Growth & X-ray analysis sec., NPL, New Delhi. **Prof. S. Kalainathan**, *Deputy Director* Centre for Crystal Growth, VIT University, Vellore.
2012	**Dr. S. C. Gadkari**, *Outstanding Scientist and Head* Crystal Technology Section, Technical Physics Division, Bhabha Atomic Research Centre, Trombay, Mumbai-400085
2015	**Prof. K. Byrappa**, *Vice-Chancellor* Mangalore University, Karnataka. **Dr. A. K. Karnal**, *Scientific Officer-G* Laser Materials Development Devices & Division, Raja Rammana Centre for Advanced Technology (RRCAT), Indore.

Crystal Growth Seminars organized by Indian Association for Crystal Growth (IACG)

No	Name of the Programme	Place	Period
1	1st National Seminar on Crystal Growth **(NSCG-1982)**	Crystal Growth Centre Anna University, Chennai-600 025	4-6 October **1982**
2	2nd National Seminar on Crystal Growth **(II NSCG-1983)**	Crystal Growth Centre Anna University, Chennai-600 025	27-30 August **1983**
3	3rd National Seminar on Crystal growth **(III NSCG-1987)**	Crystal Growth Centre Anna University, Chennai-600 025	16-19 February **1987**
4	4th National Seminar on Crystal Growth **(IV NSCG-1989)**	University of Mysore Mysore, Karnataka-570 005	3-6 August **1989**
5	5th National Seminar on Crystal Growth **(V NSCG-1993)**	Crystal Growth Centre Anna University, Chennai-600 025	18-20 November **1993**
6	6th National Seminar on Crystal Growth **(VI NSCG-1995)**	Crystal Growth Centre Anna University, Chennai-600 025	12-15 February **1995**
7	7th National Seminar on Crystal Growth **(VII NSCG-1997)**	Department of Physics Alagappa University, Karaikudi-630003	6-8 January **1997**
8	8th National Seminar on Crystal Growth **(VIII NSCG-1999)**	Crystal Growth Centre Anna University, Chennai-600 025	3-5 February **1999**
9	9th National Seminar on Crystal Growth **(IX NSCG-2003)**	Crystal Growth Centre Anna University, Chennai-600 025	24-26 February **2003**
10	10th National Seminar on Crystal Growth **(X NSCG-2005)**	Department of Physics Kongu Engineering College Erode-638 052	27-29 January **2005**
11	11th National Seminar on Crystal Growth **(XI NSCG-2006)**	Centre for Crystal Growth SSN CE, Chennai-603 110	7-9 December **2006**
12	12th National Seminar on Crystal Growth **(XII NSCG-2007)**	Centre for Crystal Growth SSN CE, Chennai-603 110	21-23 December **2007**
13	13th National Seminar on Crystal Growth **(XIII NSCG-2009)**	Centre for Crystal Growth SSN CE, Chennai-603 110	27-29 January **2009**
14	14th National Seminar on Crystal Growth **(XIV NSCG-2010)**	Centre for Crystal Growth VIT University, Vellore-632 014	10-12 March **2010**
15	15th National Seminar on Crystal Growth **(XV NSCG-2011)**	PSN College of Engineering Tirunelveli-627 152	23-25 February **2011**
16	16th National Seminar on Crystal Growth **(XVI NSCG-2012)**	Department of Physics Aditanar College of Arts & Science Tiruchendur-628 216	19-21 January **2012**
17	17th National Seminar on Crystal Growth **(XVII NSCG-2013)**	Department of Physics Anna University Chennai-600 025	9-11 January **2013**
18	18th National Seminar on Crystal Growth **(XVIII NSCG-2014)**	Centre for Crystal Growth SSN College of Engineering Chennai-603 110	24-26 February **2014**
19	19th National Seminar on Crystal Growth **(XIX NSCG-2015)**	Centre for Crystal Growth VIT University Vellore-632 014	12-14 March **2015**
20	20th National Seminar on Crystal Growth **(XX NSCG-2016)**	Bhabha Atomic Research Centre (BARC) Mumbai-400094	19-21 January **2016**

Crystal Growers get Best Paper Awards in DAE-SSPS

Dr. M. MAGESH
Post Doctoral Fellow, SSN CE
58th DAE SSPS-2013
Thapar University, Punjab
17-21 December 2013

Dr. K. BOOPATHI
Post Doctoral Fellow, SSN CE
59th DAE SSPS-2014
VIT University, Tamilnadu
16-20 December 2014

Dr. K. ARAVINTH
Research Scientist, SSN RC
60th DAE SSPS-2015
Amity University, Noida
21-25 December 2015

Dr.Binay Kumar, Crystal Lab, University of Delhi received the Crystal Growth project in **DRDO.**

Title: Flux growth of Pb $(Mg_{1/3}Nb_{2/3})O_3$-$PbTiO_3$ (PMNT) single crystals for piezoelectric and pyroelectric applications

Duration: 2015-2018

Dr.P.Selvarajan, Associate Professor, Department of Physics, Aditanar College of Arts and Science, Tiruchendur received the **"Outstanding Reviewer Award"** in Journal of Crystal Growth and Materials Science and Engineering B.

Dr. Sir. C. V. Raman Memorial Endowment Lecture

Department of Physics, National College, Tiruchirappalli conducted a Dr.Sir.C.V.Raman Memorial Lecture on 12th November 2015. **Dr.R.Chitamabram**, Principal Scientific Advisor to Government of India delivered the special lecture on Materials Science. **Dr.A.T.Ravichandran** introduced the Chief Guest. Around 60 staff members, 150 research scholars are participated in this lecture. **Dr. S.Pari**, proposed the vote of thanks.

Prof. Rajnikant
Department of Physics
University of Jammu
Jammu

Professor Rajni Kant has been nominated as a member to the IUCr-INSA National Committee on Crystallography for a period of four years, starting from January 1st 2016-December 31st 2019. The National Committee is headed by Prof. Shekhar Mande and other members of the committee are Prof. G.R.Desiraju (IISc Bangalore), Prof. Y.S.Tyagi (BARC), Prof. D. Pandey (BHU Varanasi), Prof. Punit Kour (AIIMS New Delhi), Prof. B. Gopal (IISc Bangalore).

Professor Rajni Kant has been appointed as Editor-in-Chief, Open Journal of Inorganic Chemistry, published by Science Research Publishing (USA), for a period of Two years starting from June 2015. The impact factor of the journal is 0.976.

Best Innovative Researcher Award-2015: Awarded to **Dr.N. Vijayan**, Senior Scientist, CSIR-NPL, New Delhi for his outstanding contribution to Crystal Growth and Characterization by Noorul Islam University (Deemed University), Kumaran Koil, Nagercoil, Tamil Nadu. This carries Citation, Plaque and Cash Award.

Dr. Muthu Senthil Pandian delivering product presentation in Workshop on Light Emitting Devices and Materials, Department of Physics, Govt. College, Rajamundry, AP during 20th November 2015

Prof. K.K.Bamzai, Crystal Growth & Materials Research Laboratory, Department of Physics & Electronics, University of Jammu, received 2015 prestigious Materials Research Society of India (MRSI) award from Dr.G.Sundararajan, President of MRSI Society during 26th Annual General Meeting (AGM) held at University of Rajasthan, Jaipur from 9-11 February 2015. Prof. K.K.Bamzai received **MRSI Medal-2015** for his work on the preparation & characterization of rare earth oxide materials prepared in the form of single crystal, ceramic and nanoparticles.

Dr.Muthu Senthil Pandian presenting Crystal display in Two Day Workshop on Physics in Engineering organized by **Dr.M.Mahendran**, Dept. of Physics, Thigarajar College of Engg. On 5-6 November 2015

Prof.S.Kalainathan and **Prof. Mihir J. Joshi** and his Ph.D. students in the Crystal Growth Lab, Physics Department, Saurashtra University, Rajkot

DST-FIST Facilities in Department of Physics M.D.T. Hindu College Tirunelveli

Dr. K. BALASUBRAMANIAN
Associate Professor
Department of Physics
The M.D.T Hindu College
Pettai , Tirunelveli-627010, Tamilnadu
E-mail: drkbmdt@gmail.com

Shimadzu make

FTIR Spectrometer and

UV-Visible NIR Spectrophotometer

A proposal was submitted to Department of Science and Technology, New Delhi under DST-FIST scheme by **Dr. K. Balasubramanian** from the Department of Physics, The M.D.T Hindu College, Tirunelveli. The proposal was shortlisted by the expert committee constituted by DST and on behalf of the M.D.T Hindu College Dr. K. Balasubramanian made a presentation to the expert committee at Institute of Chemical Technology (ICT), Mumbai. The Department is recommended for financial assistance to purchase Equipments (FTIR, UV-Visible Spectrophotometer and Vickers Microhardness setup), setting up departmental computer lab, departmental library, and renovation of teaching labs under this scheme. Under this scheme, Seventy lakhs (Rs.70,00,000/-) is sanctioned as the total amount and Fifty lakhs (Rs.59,50,000/-) is released as the first installment under this scheme from DST. First installment is utilized for the purchase of Shimadzu make FTIR spectrophotometer, Shimadzu make UV-Visible spectrophotometer and Mitutoyo make Vickers microhardness setup. Shimadzu make FTIR spectrophotometer is a single beam optical system with TGS detector with temperature control system. The accuracy of the FTIR spectrophotometer is ± 0.125 cm^{-1}. The samples with low transmittance and thin film sample can also be measured. The light sources of the Shimadzu make UV-Visible spectrophotometer are 20W Halogen lamp, Deuterium lamp built in light source position with automatic adjustment mechanism. The detector of the UV-Visible spectrophotometer is silicon photodiode. The wavelength range is 190 to 1100 nm. The transmission and absorption of the crystal and powder samples can be measured. The installations of all the purchased equipments are in progress.

R.Subramani@Raja, SSN CE received ***Best Oral Presentation Award*** in XIX National Seminar on Crystal Growth, VIT University, Vellore during 12-14 March 2015

Mr.V.Sivasubramani , SSN CE receiving certificate from **Prof.D.Shanthi** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

International Conference / Laboratory Visit

Prof.A.K.Barua, M.Srinivasan & Prof.P.Ramasamy participated in PVSEC-25 & GPVC-2015 held from 15-20th November 2015 at Busan Exhibition and ***Convention Center in Korea***

Prof.S.Kalainathan, VIT, Vellore delivering invited lecturer in ***University of Tokyo, Japan*** during June 2015

Prof. S. Kalainthan, VIT University, Vellore visited Prof. Akira YAMADA lab at ***University of Tokyo, Japan*** during May-June 2015

Prof. R. Ezhil Vizhi, School of Advanced Sciences, VIT University, Vellore presented nine papers in the 20th American Conference on Crystal Growth and Epitaxy (ACCGE-20), held jointly with the 17th U.S. Biennial Workshop on Organometallic Vapor Phase Epitaxy (OMVPE-17) sponsored by the American Association for Crystal Growth (AACG), which was held at the Big Sky Resort in ***Big Sky, Montana, USA,*** during August 2-7, 2015.

Our Researchers in Foreign Laboratories

Dr. G. Anandha Babu
JSPS Fellow
Graduate School of Engineering
Nagoya University, Japan

Dr. M. Magesh
Post Doctoral Fellow
Optical Single Crystals Group
NIMS, Japan

Dr. G. Senthil Murugan
Post Doctoral Fellow
Centre for Condensed Matter Sciences
National Taiwan University, Taiwan

CRYSTAL RELATED DISCOVERIES

YEAR	INVENTOR	INVENTION
1556	Agricola	Production of various salts
1611	Kepler	Structure of snow crystals
1665	Hooke	Structure of Crystals
1669	Bartholinus	Birefringence of calcite crystals
1690	Huygens	Structural interpretation of Birefringence
1795	Lowitz	Supersaturation and crystallization of salt solutions
1815	Weiss	Crystal systems
1822	Mitscherlich	Polymorphism
1824	Seeber	Lattice structure of crystals
1830	Hessel	Crystal classes
1837	Gaudin	Ruby from high temperature solution
1839	Miller	Miller Indices
1849	Bravais	Lattice types and crystal forms
1851	Durocher	Vapor growth of sulphide crystals
1865	Gernez	Reciprocal pairs of salts
1865	Marangoni	Liquid surface phenomena
1872	De Coppet	Spontaneous nucleation
1878	Gibbs	Heterogeneous phase equilibrium
1880	Hannay	Man made diamonds

YEAR	INVENTOR (S)	INVENTION
1885	Curie	Minimum surface energy of growth forms
1891	Federov	Space groups
1893	Ostwald	Metastable region of supersaturation
1898	Tammann	Measurements of nucleation and growth rates
1900	Ostwald	Dependence of solubility on particle size
1904	Nernst, Brunner	Diffusion layer on a crystal surface
1905	Spezia	Hydrothermal synthesis of quartz
1912	Laue, Friedrich	X-ray diffraction by crystals
1913	Bragg	X-ray structure analysis
1922	Volmer	Adsorption and surface diffusion processes
1926	Volmer, Weber	Thermodynamic theory of nucleation
1927	Kossel	Half crystal position
1928	Stranski	Detachment energy
1935	Becker, Doring	Kinetic theory of nucleation
1937	Donnay	Morphological aspect
1949	Burton, Cabrera, Frank	Spiral growth (BCF theory)
1953	Rutter, Chalmers	Constitutional supercooling
1953	Burton, Prism	Effective distribution coefficient
1955	Hartmann	PBC Vectors

Reference : R.S.Feigelson, 50 Years Progress in Crystal Growth, Elsevier, Netherlands, 2004

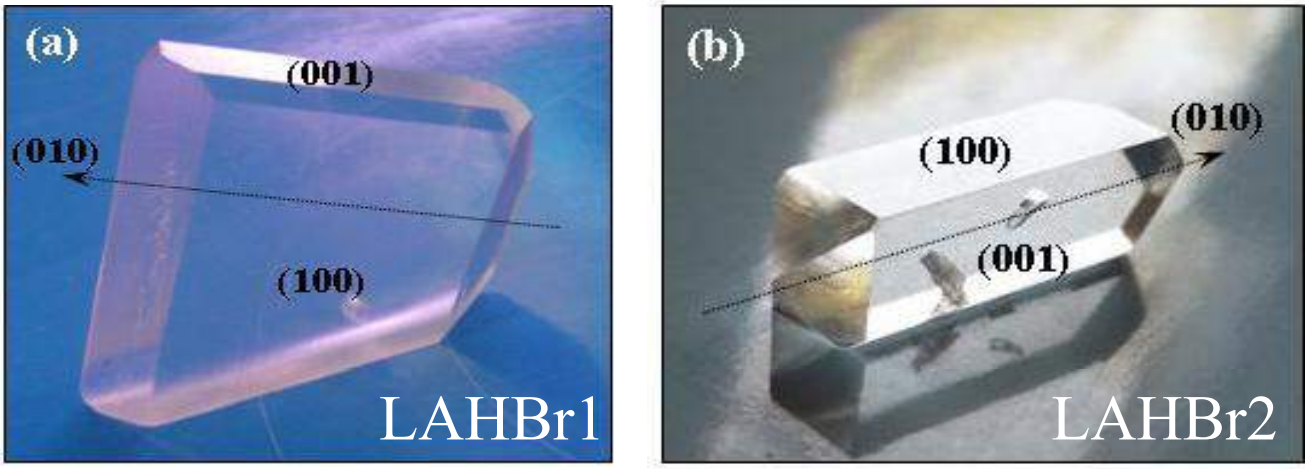
INVENTION OF CRYSTAL GROWTH METHODS

Year	Method	Inventor(s)	Original aim
1851	**Hydrothermal**	**De Senarmont**	Growth of low temperature polymorphs of refractory materials [SiO_2, α-Quartz]
1902	**Verneuil**	**A.V.L. Verneuil**	Growth of crystals without crucible [Ruby, Sapphire]
1917	**Czochralski**	**Czochralski**	Investigations on the rate of crystallization of metals
1924	**Bridgman**	**Obereimov, Schubnikov**	Growth of metal crystals [Bi, Sn, Zn, Mg, Al, Cu]
1925		**Bridgman**	Growth of metal crystals [W, Sb, Bi, Te, Zn, Sn]
1925		**Stober**	Growth of $NaNO_3$, Bi and Zn crystals
1936		**Stockbarger**	Growth of alkali halide crystals [KBr, LiF]
1916	**Nacken-Kyropoulos**	**Nacken**	Growth of Salol and benzophenone crystals
1926		**Kyropoulos**	Growth of alkali halide crystals
1926	**Gel growth**	**Liesegang**	Controlled diffusion and the growth process is free from convection [Hippuric acid, PbI_2, $PbCl_2$]
1928	**Zone melting in crucible**	**Kapitza**	Purification and crystal growth of Bi
1952		**Pfann**	Purification of Ge
1953	**Floating zone**	**Keck, Golay**	Purification of Si
1954		**Emeis**	Purification of Si
1969	**Petrov crystallization**	**T.G. Petrov**	Growth of relatively high solubility materials [Rochellesalt, KDP, ADP]
1970	**Skull melting**	**Aleksandrov, Osiko, Tatarinstev**	Growth of high melting point materials [Zirconium oxide]
1971	**Robertson**	**D.S. Robertson**	Growth of crystals from aqueous solution by the Bridgman technique [TGS, $MgSo_4$]
1975	**Flux growth**	**Elwell and Scheel**	Growth of crystals grown from different fluxes [KTP]
2005	**Unidirectional solution-crystallization**	**K.Sankaranar-ayanan, P.Ramasamy**	Good quality bulk organic, inorganic and semiorganic single crystals along a specific orientation [KDP, ADP, LAP, ZTS, TGS, L-LMHCl, GPI etc.,]

Novel work done in Crystal Growth

Effect of pH on the morphology, mechanical and optical properties of L-arginine monohydrobromide monohydrate (LAHBr) single crystals

The morphology of LAHBr1 crystal grown from solution with pH 7.2 is effectively modified from the crystal grown from solution with pH 1.8 (Fig. 1a). The morphology of LAHBr1 crystal grown from solution pH 7.2 is matches with the reported morphology. But LAHBr2 crystal grown from solution with pH 1.8 is different with restricted growth along '*c*' axis. Due to this restricted growth, the (110), (-110), (011) and (0-11) faces were nearly equal and establishes a pyramidal shape at one end of the crystal and the length of two faces at the other end is reduced (Fig. 1b). Thus the influence on the growth morphology is due to the drastic change in pH of the solution. The Br^- ion interaction with solvent and LAHBr molecules are different along different directions of the growing crystal. Hence, the growth rate along different directions is influenced by the increase in Br^- when HBr acid concentration increases in the solution prepared from 1:3 molar ratio (pH 1.8).



The grown crystals are shown in Fig. a and Fig. b and their dimensions are 47 x 42 x 8 mm^3 (LAHBr1) and 23 x 7 x 6 mm^3 (LAHBr2). Growth period of LAHBr1 was 60 days and that of LAHBr2 was 45 days.

LAHBr1 is approximately 2 times harder than that of LAHBr2 and the optical transmittance along the ⟨010⟩ direction) is low for LAHBr1 crystal when compared to that of LAHBr2. On the other hand, the measured refractive index n_y of LAHBr1 is higher than that of LAHBr2 crystal. The reason for the above three results may be attributed to the strong interaction of hydrogen bonds. The changes in solution pH affect the adsorption of LAHBr molecules at the LAHBr crystal sites. Hence, it affects the interaction and bonding of each LAHBr molecule that adsorb on the LAHBr crystal sites inside the solution. These changes along the ⟨010⟩ direction might be the reason for decreased Hv and refractive index and increased optical transmittance of LAHBr2 single crystal.

Dr. R. Ramesh Babu
Assistant Professor
Crystal Growth and Thin Film Laboratory
Department of Physics
Bharathidasan University
Thiruchirappalli-620 024
Tamilnadu, INDIA
Email: rampap2k@yahoo.co.in

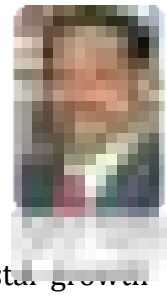
Reference

[1] K. Sangeetha, R. Ramesh Babu, K. Ramamurthi, Bull. Mater. Sci., 38, 5 (2015) 1419–1422.

Growth of <001> oriented cylindrical shape DKDP crystal by solute-feed based unidirectional growth technique and its characterization

S. K. Sharma*, Sunil Verma, Yeshpal Singh, K. S. Bartwal, P. K. Gupta

Laser Materials Development Devices and Division,
Raja Ramanna Centre for Advanced Technology, Indore-452 013, MP



[illegible]al shape modification techniques are an important area of research in crystal growth because of the advantage of getting higher yield of the crystal for device applications. Recently authors have reported two novel techniques in this direction. First, the *"flat-top technique"* [1] was developed to increase the usable volume of the crystal by truncating the pyramidal portion of the crystal and second, the *"solute-feed based unidirectional growth technique"* to obtain cylindrical shape crystals oriented in a specific direction without the need of evaporation and the supersaturation is maintained throughout the growth run by continuously feeding the solute through a semi-permeable membrane. Since the second technique does not require evaporation, which is commonly adopted in solution growth, thus it provides the unique advantage in case of solvents which are hazardous in nature or where the solvents are not easily available due to their strategic importance, such as heavy water. As an applicability of this technique, the authors report unidirectional growth of a technologically important crystal namely, potassium dideuterium phosphate (DKDP) by this technique using heavy water as solvent. DKDP chemical was synthesised using phosphorous penta-oxide, potassium carbonate and heavy water (99% deuteration) and used for crystal growth. Fig. 1(a) shows the 80 mm long DKDP single crystal grown along <001> crystallographic direction using solute feeding method. The crystal was grown from point seed at a rate of ~ 2 mm/day along <001> axis without any nucleation. The grown crystal was cut to obtain (001) plate from the middle portion, shown as inset in Fig. 1(b), and subsequently characterized for optical quality using spectrophotometer and optical interferometer. Fig. 1(b) shows transmission spectrum for the 2 mm thick (001) plate showing ~ 91% transmittance without accounting for Fresnel reflection losses. Fig. 1(c) show birefringence interferogram in converging beam of light (conoscopy). The high transmittance and distortion free fringes in the interferogram show that the grown crystal has very good quality, indicating that *solute-feed based unidirectional technique* is a useful method of growing good optical quality crystals.

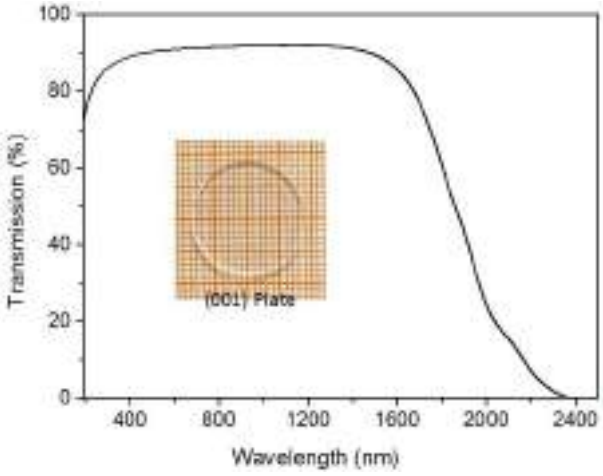


***Fig 1**. Unidirectional grown DKDP crystal, dia. 19mm, length 81 mm*

***Fig 2.** Transmission spectrum for a ~2 mm thick (001) plates shown in inset*

***Fig 3.** Conoscopy image of the (001) plate*

Reference

[1] S. K. Sharma**,** Sunil Verma, Yeshpal Singh, K. S. Bartwal, Cryst. Engg. Communi. 15 (2013) 9995.

Development of Single Crystals and Devices based on crystals for Nuclear Industry

S.C.Gadkari

Technical Physics Division, Bhabha Atomic Research Centre, Trombay, Mumbai-400085

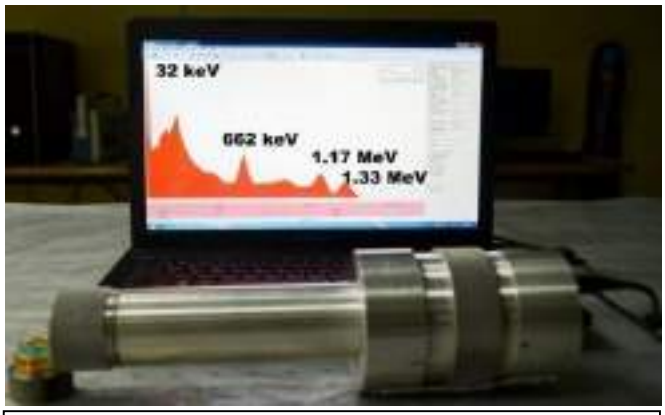
Under the XII-Plan, single crystals of technologically important materials are being grown in the *Crystal Technology Section* of the Technical Physics Division, BARC. Advanced scintillators like, $Gd_3Ga_3Al_2O_{12}$:Ce, $YAlO_3$:Ce, Lu_2SiO_5:Ce, etc have been grown from melts at about 2000°C using the Czochralski technique. These crystals find applications as scintillators for nuclear radiation detection and gamma-ray spectroscopy. Single crystals of cerium doped $Li_6Y(BO_3)_3$ and silver doped $Li_2B_4O_7$ have been developed use in detection and measurement of neutrons. Optical, thermo-luminescence, photo-luminescence and scintillation properties of these crystals have been investigated with a view to develop devices useful in nuclear industry. Crystal growth equipment are designed and developed to grow conventional scintillator crystals like CsI:Tl and NaI:Tl up to 50 mm diameter and 75 mm length. The technology is available for transfer to industry for the commercial production.

Some of the recently grown crystals of oxide scintillators

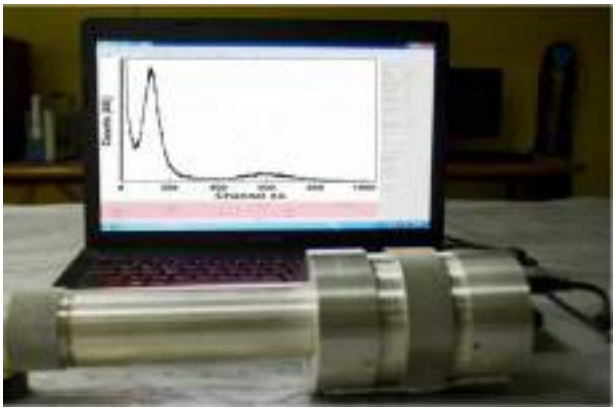
***Fig 1**. Modified Bridgman systems developed for industrial production of CsI:Tl and NaI:Tl scintillator crystals*

Development of single crystals based devices:

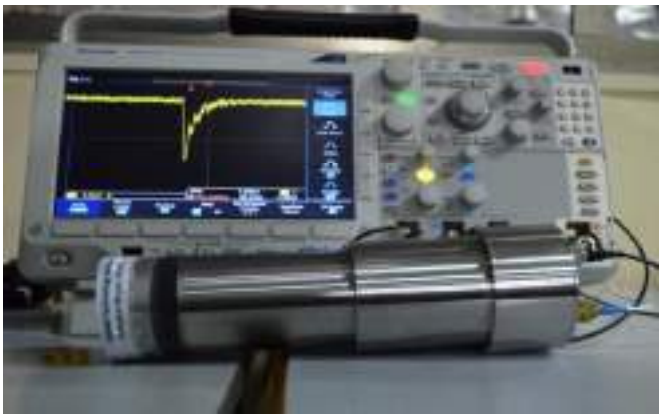
Scintillator crystals based different types of devices have been developed for (1) gamma-ray spectroscopy (2) to detect thermal neutrons (3) to record the temporal profiles of flash X-ray sources, (4) to monitor spatial profiles of X-ray beams and (5) to record X-ray radiographs of small items up to 100 mm × 100 mm area. USB based portable set-ups have been developed using the grown crystals.



A portable gamma-ray spectrometer has been developed that uses power from a USB port of a laptop. Scintillator crystals like CsI:Tl, $Gd_3(Ga_3Al_2)O_{12}$:Ce, BGO, etc. have been used with the set-up

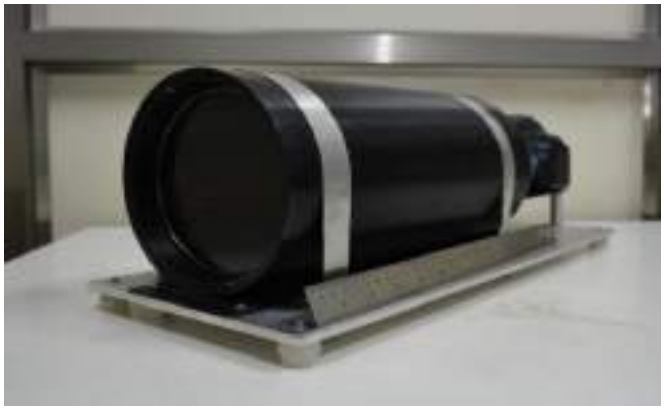


A portable neutron detector has been developed using a $Li_6Y(BO_3)_3$:Ce single crystal

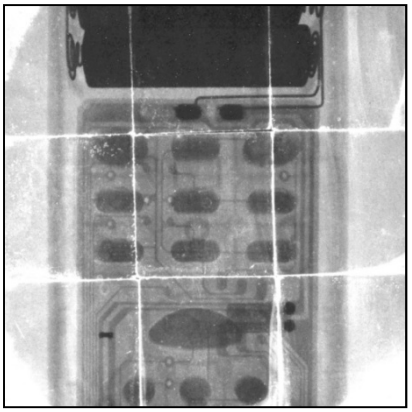


A device to record temporal profiles of flash X-ray sources. Time profiles down to 20 ns have been recorded successfully

A device based on GGAG:Ce crystal and a CCD to record spatial profiles of X-ray beam. The photograph shows the image of an X-ray beam having 2 mm diameter



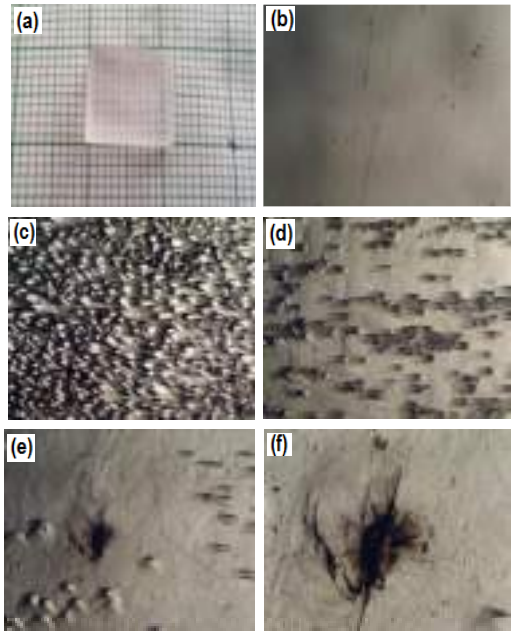
An X-ray camera developed based on CsI:Tl crystals and a CCD to record X-ray radiographs



The image of an AC remote control showing internal components, PCB tracks, etc.

Design and Construction of Shock Tube and its applications in Single Crystals

Any sudden release of energy like explosion or volcanic eruptions (within few μs) will invariably result in the formation of shock waves since they are one of the effective mechanism of energy dissipation observed in nature. A shock tube is a device that is used to generate shock waves of predetermined strength in a controlled manner. When shock waves propagate through the crystalline solids, it can make structural and mechanical changes and followed by changes its optical, electrical and thermal properties. In the present work we have constructed a shock tube to explore the possible applications of shock waves. The instrument consists of three major parts viz., driver section, diaphragm and driven section.



Shock Damage Threshold

The shock waves are made to hit on a well polished surface of a crystal (L-Tartaric acid crystal, a nonlinear optical material) which is placed at the end of driven section. The surface of the crystal is analyzed by etching studies using an optical microscope (at 40X) after etch shock. Fig. 4 shows the crystal surface before and after the application of shock wave. Well arranged etch pattern is observed on the crystal surface before shock wave hit the crystal surface. When the shock counts are increased the etch pattern become irregular and number of pits are decreased and finally at 17th shock, the crystal got cracked. We define, qualitatively, this number (17) as Shock Damage Threshold (SDT) of this crystal. We are in the processes of formulating a mathematical equation to expresses SDT quantitatively.

Surface of the crystal (a) Cut and polished L-Tartaric acid crystal, (b) Microscopic view of the surface of the crystal (c) Etch pattern of the surface before shock applied (d) Etch pattern after the 5th shock (e) Etch pattern after 17th shock (f) Enlarged view of the crack

Dr. S.A. Britto Dhas
Assistant Professor
Department of Physics
Sacred Heart College
Tirupattur
Vellore-635601
Tamilnadu, INDIA
Email: britto25@gmail.com

Photograph of constructed Shock Tube

Summary:

A shock tube was successfully constructed at low cost and 2.7 Mach number shock wave is generated. The effect of shock wave on the surface of the crystal was analyzed and the shock damage threshold of L-Tartaric acid was determined. The effect of shock waves on thermal properties of the crystal is in progresses.

References

[1] G. Jagadeesh, K. Takayama, *J. Indian Inst. Sci.*, 82 (2002) 49-57.
[2] C.S. Kumar, T. Takayamand, K.P.J. Reddy, 'Shock waves made Simple', *Wiley*, 2014.
[3] K.P.J. Reddy, N. Sharath, *Current Science*, 104 (2013) 172-176.

CONFERENCE HIGHLIGHTS

XIX National Seminar on Crystal Growth (XIX-NSCG-2015)
March 12-14, 2015 (Sponsored by IACG, DST, BRNS)

Centre for Crystal Growth, VIT University, Vellore-632014, Tamilnadu

"XIX National Seminar on Crystal Growth (NSCG-2015)" was held during 12-14th March 2015 at Centre for Crystal Growth, VIT University, Vellore, Tamilnadu in Association with Indian Association for Crystal Growth. The convener, **Prof.S.Kalainathan** and his team members of the Centre successfully organized the XIX-NSCG. Inaugural address was delivered by Prof. P. Ramasamy, President, IACG. The nicely arranged inaugural function concluded with vote of thanks by **Prof.S.Kalainathan**. There were 35 invited talks and 155 contributed papers. More than 200 participants from all over India participated and presented papers in this conference. The scientific deliberations at the seminar is covered a wide range of topics in Crystal Growth in the form of invited talks and contributory papers. Accepted contributory papers are presented as Oral and Poster presentation. The conference covered various aspects of crystal growth and also focused on the synthesis and characterization to a great extent. As the crystal growth is an interdisciplinary subject of research, it was conducted with the aim of making this seminar as a common platform for the Researcher Scholars and the students working in different areas of research to meet and discuss on the recent trends in the various advanced fields of research.

The participants of the seminar witnessed the presentation on crystal growth and fabrication of devices for various applications. Thus the seminar became the source for learning and enriching the knowledge of the participants in the field of crystal growth and related areas. In this seminar participants presented research papers in the growth of piezoelectric, dielectric, ferroelectric, acoustoptic and nonlinear optical crystals. Many papers reported the growth of crystals employing the novel Sankaranarayanan-Ramasamy (SR) unidirectional growth technique. Further growth of a variety of organic, inorganic and semi-organic and pure and doped single crystals was reported in this seminar. Experimental techniques on solution growth technique, float zone technique, Bridgeman method, Czochralski method and conventional and unidirectional solution growth methods were employed to grow a wide variety of crystals exhibiting a wide range of properties.

Thus, the scientist and researchers from various national laboratories, universities and research centers of our country foreign country were participated in the above seminar and discussed on the growth of single crystals from various techniques. The students participated from various education and research institutes interacted with the experts working in the areas of crystal growth, thin films and material science and enriched their knowledge in these areas. The seminar as a whole motivated and guided the participants to carry out their research in their respective fields and to produce many novel results. Thus the XIX-NSCG successfully ended by fulfilling the aim for which the seminar was organized.

Dr. K. Sethuraman
Assistant Professor
School of Physics, Madurai Kamaraj University, Madurai-625021, Tamilnadu

CONFERENCE HIGHLIGHTS

UGC & BRNS Sponsored Workshop on Preparation, Characterization of Crystalline Materials and Their Applications (WPCCMA – 2015) November 26-27, 2015

Department of Physics, Anna University, Chennai-600025

The "UGC & BRNS Sponsored Workshop on Preparation, Characterization of Crystalline Materials and Their Applications'' held at Department of Physics, Anna University, Chennai during November 26-27, 2015, proved to be a huge success. In attendance were over 125 participants, 15 invited speakers, members of scientific advisory committee and local organizing committee. The vision and ultimate aim of this workshop is to bring the scientists working on cutting edge technology of various fields and young minds (Researchers and Students) together to discuss the new ideas, innovation and make the roadmap to prepare new efficient materials to societal and day to -day applications. This workshop organized in two days to cover many important topics and exciting applications. The main areas adopted by this workshop are Dye sensitized solar cells, optical crystalline materials and growth methods, graphene based nanoassemblies for environmental cleaning applications, simulation and modeling of piezoelectric crystalline materials, preparation of self-collapsing gels, metal ferroelectric insulator silicon capacitors for nonvolatile applications, optoelectronic materials and devices and unidirectional crystals from solution and melt for technological applications. The listed topics were elaborately presented by Scientists and Professors with fruitful discussions along with question sessions for young minds.

Dr.K.Chinnakali, HOD Physics, Anna University, welcomed the gathering. In the inaugural address, Dr. P. Narayanasamy, Dean, CEG Campus, mentioned the role of crystalline materials in science and technology and lauded the efforts of Convenor of this workshop **Dr.R.Gopalakrishnan**, Associate Professor, Department of Physics, Anna University and his research group. Prof. P. Ramasamy, President-IACG delivered the felicitation address. In his address he highlighted the importance of crystalline materials and contribution of scientists to promote high quality research for the benefit of mankind and welfare of the society.

The participants interacted enthusiastically with scientists and raised many questions which paved the way to more interesting and fruitful outcomes to the participants. The two day lectures gave idea to explore the materials for possible applications, thrust areas of ongoing science and technology research, production of highly efficient new materials to accelerate multidimensional applications. Definitely, this workshop will make the students, research scholars and participants move forward towards effective scientific research and make them to be innovators, producers of new findings for benefits of the world and modern society. Speaking at the valedictory function, Dr. K Shanthi, Chairperson, Science and Humanities, congratulated the participants for successfully completing the workshop and appealed them to apply their knowledge in their research and writing career. She assured that Convenor of this workshop and Department of Physics, Anna University, Chennai will organize similar programmes on various fields of science and technology to enhance high quality research. Speaking on the occasion, **Dr. R Gopalakrishnan** delivered his vote of thanks to sponsors of this UGC and BRNS, members of local organising committee and scientific advisory committee and invited speakers for their whole hearted support and contribution, participants, research scholars and student of this department. He highlighted and mentioned that the participants are privileged to have attended the well structured training workshop with the best faculty. He believes that outcome of the workshop should reflect in the scientific output of the organizations and institutions from where the participants came, in the coming years. Finally, the participation certificate was distributed to all the participants of the workshop.

N. Elavarasu
CSIR-Senior Research Fellow
Department of Physics, Anna University, Chennai-600025, Tamilnadu

CONFERENCE HIGHLIGHTS

National Workshop on Crystal Growth, Thin Films and Solar Cells (WCTS-2015), September 4, 2015

PG and Department of Physics, National College, Trichy-620 001, Tamilnadu

PG and Research Department of Physics, National College (Autonomous) conducted a One day National Workshop on Crystal Growth, Thin Films and Solar Cells (WCTS - 2015) on 4th September 2015. In the Inaugural function, **Dr. S. Pari**, Head of the Physics Department welcomed the gathering. **Dr. A. T. Ravichandran**, Convener of WCTS-2015 proposed the theme of the workshop. Dr. K.Anbarasu, Principal inaugurated the Workshop. Dr. Muthu Senthil Pandian, Research Scientist, SSN Research Center, SSN Institution, Chennai and Dr. K. Jeyadheepan, Associate Professor-Research, Department of ECE, SASTRA University, Thanjavur delivered special address. Dr.S.Ravi, Associate Professor of Physics, delivered the Vote of thanks.

Dr.Muthu Senthil Pandian delivered two lectures. First he explained the fundamentals of Crystal Growth, various methods of characterizing the grown crystals and their applications in the field of science and technology. In his second talk, he described the method of fabricating Dye Sensitized Solar Cells (DSSC) and discussed their applications in day-to-day life. He displayed many technologically important nonlinear optical (NLO) and ferroelectric single crystals grown by conventional slow evaporation solution technique and Sankaranarayanan-Ramasamy (SR) methods and different segments of dye sensitized solar cells (DSSC) such as different TiO_2 materials synthesised by Hydrothermal and Sol-Gel technique, Quantum dots deposited by SILAR and chemical bath deposition (CBD) method, different laboratorial synthesised organic dyes, solid-polymer electrolytes in gel and thin film form and finally Pt based materials for cathode. The participants interacted with the resource person and got their clarifications.

One separate session is allotted to visit the National College Instrumentation Facility to have hands on experience to know about sophisticated characterization instruments such as Scanning Electron Microscope (SEM) with EDAX, Flow Cytometer, High Performance Liquid Chromatography, Gas Chromatography and Mass Spectrometry, Atomic Absorption Spectroscopy (AAS), Fourier Transform Infra Red (FTIR) Spectrometer, Fluorescence Spectrophotometer and Vickers Microhardness tester.

Dr.K.Jeyadheepan, Associate Professor-Research, SASTRA University, Thanjavur described the various fabrication processes involved in various Thin Films coating and its applications. He also explained various softwares related to the studies of thin films. More than 150 students and 25 Staff members from 20 colleges in an around Tiruchirappalli actively participated in this workshop. Thus the WCTS-2015 successfully ended by fulfilling the aim for which the seminar was organized.

Dr. P. Ramesh Kumar
Assistant Professor
Department of Physics, Periyar E.V.R. College, Trichy-620023, Tamilnadu

CONFERENCE HIGHLIGHTS

National Conference on Advanced Functional Materials (NCAFM-2015)
May 8-9, 2015

Department of Physics, SRM University, Vadapalani Campus, Chennai-26, Tamilnadu

The National conference on Advanced Functional Materials (NCAFM-2015) was organized by the Department of Physics, SRM University, Vadapalani Campus during 8th and 9th May 2015. The conference was sponsored by Department of Science and Technology-Science and Engineering Research Board (DST-SERB), New Delhi.

The inaugural function started with welcome address by Dr.K.Duraivelu, Dean (E&T). Dr.K.Ramachandran, HOD, Department of Physics and Convener of NCAFM 2015 presented the overview of the conference. Dr. S. Ganesan, Registrar, Anna University was the chief guest for the inaugural function. Prof. P. Ramasamy, Dean (Research), SSN College of Engineering and Dr.C.P.Reghunadhan Nair, Scientist-H and Group Director, Vikram Sarabhai Space Centre, Trivandrum were the guests of honors. Dr.C.Muthamizhchevan, Director (E&T) presided over the inaugural function and delivered the presidential address. After lighting the lamp by the dignitaries and few delegates, the conference souvenir was released by Dr.S.Ganesan, Registrar, Anna University. Dr.S.Ganesan inspired the young researchers and Faculty members with his encouraging and motivated speech on the development of Nanotechnology center in Anna University with the involvement and passion of Prof.P.Ramamsamy.

Dr. K. Jagannathan, the organizing secretary of NCAFM-2015 delivered the vote of thanks. The eminent professors and scientists from leading research institutes like Anna University, Chennai, IGCAR, Kalpakkam, National Physical Laboratory, New Delhi, C-MET, GoI, Indian Oil Corporation, ISRO, Central Universities participated to deliver an invited lecture. More than 200 delegates from various institutions were participated in the conference and presented their paper.

Finally, the conference was successfully concluded with a valedictory function presided by **Dr.K.Ramachandran**, Convener, NCAFM-2015. Few oral and poster presentations were selected for the Best Oral/Poster award and the concerned research scholars were felicitated with mementoes.

Dr. R. Ramesh Babu
Assistant Professor, Crystal Growth and Thin Film Laboratory
Department of Physics, Bharathidasan University, Thiruchirappalli-620 024, Tamilnadu

CONFERENCE HIGHLIGHTS

National Conference on Microscopy & Advances in Material Sciences (NCMAMS - 2015), March 2-4, 2015

Crystal Growth & Materials Research Lab, University of Jammu, Jammu-180006

Crystal Growth & Material Research (CGMR) Laboratory of the Department of Physics & Electronics, University of Jammu organizes a three day conference entitled, "National Conference on Microscopy & Advances in Material Sciences" (NCMAMS - 2015) from 2-4, March 2015 in association with Electron Microscopy Society of India (EMSI) – North Zone Chapter and the UGC – SAP programme under the Convenership of **Prof.K.K.Bamzai**. The conference was inaugurated by Dr. K. Muraleedharan, Director DRDO (Technical), Delhi & President Electron Microscope Society of India, who was Chief Guest of the inaugural function. Those present during the inaugural ceremony were Vice Chancellor, University of Jammu, Prof. R. D. Sharma, Prof. R.P.Tondon, President Electron Microscope Society of India, North Zone Chapter as the Guest of Honour, Prof. Vikram Kumar, ex. Director of NPL, Delhi as a special guest, Head, Department of Physics & Electronics, University of Jammu, Prof. Vivek Kumar Gupta, Prof. K.K. Bamzai, Convener of the conference and Dr. Deepa Singh, organizing secretary of the Conference.

Prof. K.K. Bamzai, Convener of the conference welcomed and introduced the gathering the theme of the conference and the national personalities participating in it. Experts from the field of microscopy and material sciences were part of the conference. Abstract book was released during the inauguration of the conference. The plenary lecture was delivered by Dr. K.Muraleedharan. Other scientist who delivered the invited lectrure during the three day of the conference was: Prof. Thamizhavel of Tata Institute of Fundamental Research TIFR-Mumbai, Prof. M.J.Joshi, Saurashtra University, Rajkot, Dr. Chandra Prakash, Solid State Physical Laboratory (SSPL) New Delhi, Dr. P.S.Alegaonkar, Defence Institute of Advanced Technology (DIAT), Prof. B.K. Das, Gauhati University, Guwahati, Prof. D. Mohan, GJUST, Hisar, Haryana, Dr. Pankaj Poddar, CSIR-National Chemical Lab Pune, Prof. Vinay Gupta, University of Delhi, Delhi and others.

On first and second day, the invited talk was followed by poster presentation by the young minds working for their Ph.D degree. During the evening session on the first day Prof. P.N. Kotru, Emeritus Professor of Department of Physics was facilitated by Convener of the conference and their past Ph.D. students. This was followed by cultural event organized by the Jammu & Kashmir Academy of Art Culture & Languages, Jammu to give a glimpse of Jammu & Kashmir culture to the delegates and guests.

Dr. R.A. Vishwakarma, Director, Indian Institute of Integrative Medicine (IIIM), Jammu was the Chief Guest for the valedictory function who also gave best poster presentation awards.

About 75 posters were presented in the poster session conducted during the conference. In order to appreciate the young researchers for their enthusiastic participation and presentation, a team of eminent scientist evaluated their presentations. The BEST POSTER AWARD was given during the valedictory function by Chief Guest which was given to "Flexible Solar Cells Based on P3HT: PCBM Bulk Hetero Junction" by Vishal Sharma et. al., of Delhi University. Two Consolation Prizes was also given to the presenters; the first consolation prize goes to "Bipolar Resistive Switching in Graphene Oxide Based Thin Films Devices" by Puja Sani, of Delhi University and second prize goes to "Influence of Crystallite Size on Acetone Sensing Properties of ZNO Nanomaterials" by Naveen et. al. Kuvempu University, Shimoga Karnataka.

During the whole three day conference there were about thirteen (13) invited talks (IT), 08 oral presentations (OP) and about 75 poster presentations. About 150 delegates from all over India came and participated in this conference.

Prof.K.K. Bamzai
Professor & In-charge
Crystal Growth and Materials Research Laboratory, University of Jammu, Jammu-180006

FORTH-COMING EVENTS

- **18th International Conference on Crystal Growth and Epitaxy (ICCGE-18)**
  7-12 August 2016, Nagoya Congress Center, Nagoya, Japan
  Web: http://www.iccge18.jp/isscg16/

- **49th Course High-pressure Crystallography: Status Artis and Emerging Opportunities**
  27 May - 5 June 2016, University of Florence, Italy
  Web: http://crystalerice.org/2016/

- **DST-SERC School on Lasers and Nonlinear Optics, 22 March - 11 April 2016**
  Department of Physics, Pondicherry University, Puducherry-605 014, India
  Web: http://www.pondiuni.edu.in/departments/physics/conferences/

- **International Conference on Advances in Functional Materials (AFM-2016)**
  8-11 August 2016, Jeju Island, South Korea
  Web: http://afm2016.functionalmaterials.org/

- **International Conference on Advanced Materials and Technology (ICMAT), 26-28 May 2016, Sri Jayachamarajendra College of Engineering, Mysuru-570006, Karnataka,India.**
  Web: http://sjcemysore.org/Admin/fileupload/icmat.pdf

- **International Conference on Recent Advances in Analytical Sciences (RAAS-2016)**
  7-9 April 2016, Department of Chemistry, IIT (BHU), Varanasi-221005, India
  Web: http://www.iitbhu.ac.in/raas_2016/

- **4th National Conference on Hierarchically Structured Materials (NCHSM-2016)**
  4-5 March 2016, Department of Physics, SRM University, Ramapuram Campus, Chennai-600 089, Tamilnadu Web: http://www.srmuniv.ac.in/ramapuram/

- **National Conference on Advances in Applied Physics and Materials Science (NCAAPMS-2016) 29-30 January 2016, Department of Physics, Hindustan University, Chennai-603103, Tamilnadu Web:** https://hindustanuniv.ac.in/

- **National Conference on Advances in Materials Science and Nonlinear Science (AMSN-2016), 23-24 February 2016, Department of Physics, B.S.Abdur Rahman University, Chennai-600048, Tamilnadu Web:** http://www.bsauniv.ac.in/

- **Second International Conference on Recent Trends in Materials (ICRTM-2016), 22-23 January 2016, Department of Physics, Devanga Arts College, Aruppukottai-626101, Tamilnadu Web:** www.devangaartscollege.com

- **National Conference on Recent Trends in Physics & Materials Research, 4-5 February 2016, Research Centre of Physics, Jayaraj Annapackiam College for Women (Autonomous), Periyakulam, Theni District, Tamilnadu**
  Web: www.annejac.com

- **National Conference on Contemporary Research in Advanced Materials Science**
  4-5 February 2016, Karpaga Vinayaga College of Engineering and Technology, Padalam-603308, Kanchipuram, Tamilnadu Web: www.kveg.in

SOME OF THE CRYSTAL GROWTH RESEARCH GROUPS

The team at the **Crystal Technology Section, Technical Physics Division**, BARC, Mumbai

Prof.K.K.Bamzai and his Crystal Growth Group in Department of Physics, University of Jammu, Jammu

Dr.R.Mohan Kumar and his Ph.D students,
Department of Physics, Presidency College, Chennai

Dr.J.Madhavan and his Research Students,
Department of Physics, Loyola College, Chennai

LIST OF CRYSTAL GROWTH RELATED JOURNALS WITH IMPACT FACTOR – JANUARY 2016

Journal Name	IF
Advanced Functional Materials	**11.8**
Advanced Optical Materials	**10.88**
Applied Surface Science	**2.711**
Applied Physics A : Materials Science and Processing	**1.704**
Bulletin of Materials Science	**1.017**
Chinese Science Bulletin	**1.579**
Crystal Growth and Design	**4.891**
Crystal Engineering Communication	**4.034**
Crystal Research and Technology	**0.935**
Current Applied Physics	**2.212**
Ferroelectrics	**0.469**
Japanese Journal of Applied Physics	**1.127**
Journal of Crystal Growth	**1.698**
Journal of Applied Crystallography	**3.984**
Journal of Alloys and Compounds	**2.999**
Journal of Physics and Chemistry of Solids	**1.853**
Journal of Physics D: Applied Physics	**2.721**
Journal of Solid State Chemistry	**2.133**
Journal of Physics: Condensed Matter	**2.346**
Journal of Materials Chemistry	**6.101**
Journal of Materials Science and Technology	**1.909**
Journal of Materials Science: Materials in Electronics	**1.569**

Journal Name	IF
Journal of Thermal Analysis and Calorimetry	**2.042**
Materials Letters	**2.489**
Materials Chemistry and Physics	**2.259**
Materials Research and Bulletin	**2.288**
Materials Research Innovations	**0.830**
Materials Science and Engineering A	**2.567**
Materials Characterizations	**1.845**
New Journal of Chemistry	**3.086**
Optical Materials	**1.981**
Optics Communications	**1.449**
Optics and Laser Technology	**1. 647**
Optik- International Journal for Light and Electron Optics	**0.677**
Progress in Crystal Growth and Characterization of Materials	**3.579**
Physica B:Condensed Matter	**1.319**
Science of Advanced Materials	**2.598**
Solid State Communications	**1.897**
Solid State Science	**1.839**
Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy	**2.353**
Surface Science Letters	**1.925**
Synthetic Metals	**2.252**
Nuclear Instruments and Methods in Physics Research Section: B	**1.124**
The European Physical Journal of Applied Physics	**0.789**

FELLOWSHIPS AVAILABLE IN INDIA

- **DAE - Dr. K. S. Krishnan Research Associateship (KSKRA)**
  Stipend: Rs.26000 per month + Benefits **Web:** http://www.barc.ernet.in/

- **UGC – Dr. S. Kothari Post Doctoral Fellowship**
  Stipend: Rs.34100 p.m. to 46500 p.m. and contingency per annum of Rs.100000 **Web:** http://www.ugc.ac.in/

- **Jawaharlal Nehru Memorial fellowship (JNMF)** **Stipend:** The fellowship is tenable for two years and carries a monthly stipend of Rs.1,00,000/-. contingencies 75, 000 p.a . **Web:** http://www.jnmf.in/fabout.html

- **Prime Minister's Fellowship Scheme for Doctoral Research** **Stipend:** Rs.8.7 Lakh per annum for a maximum period of four years. **Web:** http://primeministerfellowshipscheme.in/Home.aspx

- **UGC - Rajiv Gandhi National Fellowship (RGNF) for SC/ST candidates**
  Stipend: Rs.16000 p.m. +HRA for initial 2 years. Rs.18000 p.m. for remaining tenure.
  Contegency-16000-25000 /-p.a/. **Web:** http://www.ugc.ac.in/rgnf/

- **CSIR-Nehru Science Post Doctoral Research Fellowship**
  Stipend: Rs.35000 +HRA per month and Rs.3.0 lakh contingency per annum. **Web:** www.csirhrdg.res.in

- **DST - Ramanujan Fellowships** **Stipend:** Rs.75,000 per month and Rs.5.00 lakh contingency per annum.
  Web: http://www.dst.gov.in/scientific-programme/nsti/ramanujan fellowship.pdf

- **DST – JC Bose National Fellowships** **Stipend:** Rs.25,000 per month in addition to regular income.
  Web: http://www.dst.gov.in/scientific-programme/nsti/jc bose fellowship.pdf

- **SERC – Swarnajayanti Fellowships**
  Stipend: Rs.25000 per month in addition to regular income. **Web:** http://www.dst.gov.in/scientific-programmes/scientific-engineering-research

- **UGC-Post Doctoral Fellowship for Women Candidates** **Stipend:** Rs.25000 pm for first 2 years and Rs.30000 pm for next 2 years and Rs.50000 p.a. for contingency. **Web:** http://www.ugc.ac.in/pdfw/

- **CSIR-Senior Research Fellowship** **Stipend:** Rs.28,000 per month for initial 3 years and Rs.20,000 contingency per annum. **Web:** www.csirhrdg.res.in

- **Maulana Azad National Fellowship for Minority Students** **Stipend:** Rs.25000 pm for 2 years and Rs.28000 pm for remaining two years and Rs.25000 contingency. **Web:** http://www.ugc.ac.in/

- **Raman Charpak Fellowship** Consolidated Fellowship of Euros 1300 per month including accommodation charges plus Social Security charges to be paid in France for the Indian students through Campus France.
  Web: http://www.inde.campusfrance.org/en/news/charpak-scholarship-awardees-20132014

- **National Solar Science Fellowship Programme** Each selected Fellow will receive a total annual grant of upto 32.00 lakhs comprising emolument of up to 12 lakhs (ii) contingencies of upto 5 lakhs and (iii) research grant of upto 15.00 lakhs **Web:** www.mnre.gov.in

- **DST-Empowerment and Equity Opportunities for Excellence in Science for SC/ST candidates**
  Web: http://www.serb.gov.in/home.php

- **UGC-Post Doctoral Fellowship for SC/ST canditates Stipend:** Rs.25000 per month (first 2 years) and Rs.30000 per month (next 3 years) **Web:** http://www.ugc.ac.in/pdfss/

- **DST-Jawaharlal Nehru Science Fellowship** **Stipend:** US$100,000 for 12 months and offers flexibility to avail it over a total period of three years in any part duration/year. **Web:** www.dst.gov.in

- **DST-Bhaskara Advanced Solar Energy Fellowship programme** **Stipend:** Minimum 3 months and upto 12 months. **Web:** http://indousstf.org/base-program/index.html

PAST CONFERENCES/SEMINARS/WORKSHOPS

The release of Abstract book in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Prof. Vikram Kumar, NPL, New Delhi addressing the audience during the inauguration ceremony in NCMAMS-15, Department of Physics, University of Jammu from 2-4 March 2015

The Pro-Vice Chancellor handing over the Memento to **Prof.Fumio Hamada** in XIX National Seminar on Crystal Growth, VIT University, Vellore during 12-14 March 2015

Dr.P.Murugakoothan delivering Keynote Address in National Conference on Advanced Materials and Solar Energy, Dept. of Physics, KPR Institute of Technology, Coimbatore during 28th October 2015

Dr.R.Ramesh Babu delivering Invited Talk in NCAFM-2015 organized by Department of Physics, SRM University, Vadapalani Campus during 8-9 May 2015

Dr.Muthu Senthil Pandian delivering Invited Lecture in Workshop on Physics in Engineering, Dept. of Physics, Thigarajar College of Engg. during 5-6 November 2015

Inauguration of National Seminar on "Trends in Crystal Physics-TCP2015" held at Madras Christian College (Autonomous), Chennai during 13th February 2015

Inauguration of One Day Conference on Recent Trends in Advanced Materials Science (RAMS-2015) held at PG & Research Department of Physics, Periyar EVR College, Tiruchirappalli during 11th February 2015

The Convenor handing over the Memento to **Dr.R.Ramesh Babu** in State level Seminar on Exploration of Nanomaterials in Department of Physics, Sri S. Ramasamy Naidu Memorial College, Sattur during 29 September 2015

Dr.K.V.R.Murthy, President-LSI handing over the Memento to the Invited Speaker in Workshop on Light Emitting Devices and Materials, Department of Physics, Govt. College, Rajamundry during 20th November 2015

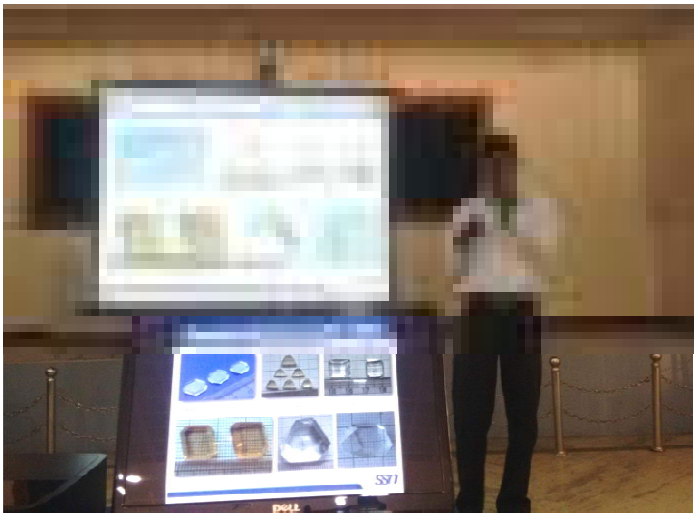
The chair person handing over the Memento to **Dr.R.Sivakumar** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Dr.S.Ganesamoorthy from IGCAR delivering Invited Lecture in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Warm welcome of **Prof.S.Kalainathan**, VIT University, Vellore by **Prof. Hiren H. Joshi**, HOD, Physics Dept. Saurashtra University, Rajkot and **Prof. Mihir J. Joshi**

The Convenor **Dr.R.Gopalakrishnan** handing over the Memento to the speaker in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Dr.S. Brahadeeswaran is delivering Invited Lecture in Crystal Growth in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015



Dr.Muthu Senthil Pandian delivering Invited Lecture in National Workshop on Crystal Growth, Thin Films and Solar Cells, Dept. of Physics, National College, Trichy during 4th September 2015

Dr.R.Ramesh Babu delivering Invited Talk in Physics of bulk and Nanomaterials and Devices organized by Department of Physics, BIT-Anna University, Trichy during 20th March 2015

Prof.S.Moorthy Babu delivered Guest Lecture in Department of Physics, Valliammai Engineering College, Chennai during 8th April 2015

The Convenor **Dr.R.Gopalakrishnan** handing over the Memento to the **Dr.M.Chitra** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Mr.P.Aravinth Kumar, SSN CE receiving certificate from **Prof.D.Shanthi** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Dr.S.Pari handing over the Memento to **Dr.Muthu Senthil Pandian** in National Workshop on Crystal Growth, Thin Films and Solar Cells, Department of Physics, National College, Trichy during 4th September 2015

Department of Physics faculties, The American College, Madurai organized One Day National Seminar Recent Trends in Energy Materials and Technologies during 14th August 2015

National Seminar on New Engineering Materials and their Applications in Department of Physics, Valliammai Engineering College, Chennai during 27th April 2015

Dr.K.Sivakumar and **Dr.M.Mahendran** with the members of Workshop on Physics in Engineering in Department of Physics, Thigarajar College of Engineering during 5-6 November 2015

The Convenor **Dr.R.Gopalakrishnan** handing over the Memento to the **Dr.Radha Perumal Ramasamy** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Dr.R.Gopalakrishnan distributing certificates to the participant as chief guest in National Seminar on Trends in Crystal Physics-TCP2015 held at Madras Christian College, Chennai on 13th February 2015

The release of Abstract Book in Workshop on Light Emitting Devices and Materials, Department of Physics, Government College, Rajamundry, AP organized by **Dr.K.Ramachandra Rao** during 20th November 2015

Prof.S.Moorthy Babu handing over the Memento to **Prof.C.Sanjeeviraja** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Resource Persons and Participants in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

The Convenor **Dr.S.Ananth** delivering about the Department Research activities in National Conference on Advanced Materials and Solar Energy, Dept. of Physics, KPR Institute of Technology, Coimbatore on 28th October 2015

Prof.P.Ramasamy delivering Inaugural address in One Day Conference on Recent Trends in Advanced Materials Science (RAMS-2015) held at PG & Research Department of Physics, Periyar EVR College, Trichy on 11th February 2015

Prof.P.Narayanasamy, Prof.P.Ramasamy and the Convenor **Dr.R.Gopalakrishnan** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

The Convenor **Dr.R.Gopalakrishnan** chairing the session for **Dr.C.Sanjeeviraja** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

The Principal handing over the Memento to **Dr.Muthu Senthil Pandian** in National Conference on Advanced Materials and Solar Energy, Dept. of Physics, KPR Institute of Technology, Coimbatore during 28th October 2015

Dr.R.Ramesh Babu delivering Invited Talk in Seminar on Exploration of Nanomaterials held at Department of Physics, Sri S. Ramasamy Naidu Memorial College, Sattur during 29th September 2015

Dr.P.Mani, BIT-Anna University receiving certificate from **Prof.D.Shanthi** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

The release of Abstract Book in National conference on Advanced Functional Materials (NCAFM-2015) organized by Department of Physics, SRM University, Vadapalani Campus during 8-9 May 2015

Invited Speakers and other Participants in National Conference on Advanced Materials Science-2015 organized by Department of Physics, Jerusalem College of Engineering, Chennai during 22th July 2015

The release of Abstract Book in Workshop on Physics in Engineering organized by **Dr.M.Mahendran** in Department of Physics, Thigarajar College of Engineering during 5-6 November 2015

Prof. K.K.Bamzai with his group members during poster session of 26th AGM of MRSI at University of Rajasthan, Jaipur from February 9-11, 2015.

Mr.Rm.Jauhar, Pachaiyappa's College receiving certificate from **Prof.D.Shanthi** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Prof.P.Ramasamy delivering Inaugural Address in National Conference on Emerging Trends in Materials and Methods, Dept. of Physics, KSR College of Arts and Science for Women, Namakkal during 7th October 2015

The Convenor **Dr.R.Gopalakrishnan** delivering Vote of Thanks in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Prof. P.N.Kotru with some of his Ph.D. students after the fecilation ceremony in NCMAMS-2015, Department of Physics, University of Jammu from 2-4 March 2015

Dr.Muthu Senthil Pandian delivering Special Lecture in Workshop on Light Emitting Devices and Materials, Department of Physics, Government College, Rajamundry, AP during 20th November 2015

Dignitaries sitting on the dais during the Inauguration function in National Conference on Microscopy & Advances in Material Sciences, Department of Physics, University of Jammu from 2-4 March 2015

Dr.P.Selvarajan delivering Invited Lecture in National Conference on Recent Trends and Advances in Physics organized at Department of Physics, MDT Hindu College, Tirunelveli during February 19-20, 2015

Dr.P.Murugakoothan delivering Invited Lecture in National Conference on Advanced Materials and Solar Energy, Dept. of Physics, KPR Institute of Technology, Coimbatore during 28th October 2015

Principal presenting shawl to **Prof.K.Ramamurthi** in One Day Conference on Recent Trends in Advanced Materials Science (RAMS-2015) held at PG & Research Department of Physics, Periyar EVR College, Tiruchirappalli during 11th February 2015

The release of Abstract Book in National Conference on Emerging Trends in Materials and Methods, Dept. of Physics, KSR College of Arts and Science for Women, Namakkal during 7th October 2015

The release of Abstract Book in National Conference on Advanced Materials Science-2015 organized by Department of Physics, Jerusalem College of Engineering, Chennai during 22th July 2015

During the inaugural function in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Dr.R.Mohan Kumar delivered guest Lecture in Department of Physics, Valliammai Engineering College, SRM Nagar, Chennai during 5th March 2015

The Pro-Vice Chancellor handing over the Memento to **Prof.K.Byrappa** in XIX National Seminar on Crystal Growth, VIT University, Vellore during 12-14 March 2015

HONORS/AWARDS

The Pro-Vice Chancellor handing over the Memento to **Prof.P.Ramasamy** in XIX National Seminar on Crystal Growth, VIT University, Vellore during 12-14 March 2015

The Convenor **Dr.R.Gopalakrishnan** handing over the Memento to **Prof.P.Ramasamy** in WPCCMA-2015 held at Department of Physics, Anna University, Chennai during 26-27 November 2015

Principal presenting shawl to **Prof.P.Ramasamy** in one Day Conference on Recent Trends in Advanced Materials Science in PG & Research Department of Physics, Periyar EVR College, Trichy during 11th February 2015

The founder **Dr.K.S.Rangasamy** handing over the Memento to **Prof.P.Ramasamy** in NCETMM-2015, Dept. of Physics, KSR College of Arts and Science for Women, Namakkal during 7th October 2015

Prof.C.Sanjeeviraja handing over the Memento to **Dr.R.Gopalakrishnan** in WPCCMA-2015 held at Department of Physics, Anna Univ., Chennai during 26-27 Nov., 2015

The Principal handing over the Memento to **Dr.P.Murugakoothan** in NCAMSE-2015, Dept. of Physics, KPR Institute of Tech. Coimbatore during 28th October 2015

INDIAN ASSOCIATION FOR CRYSTAL GROWTH

Centre for Crystal Growth, SSN College of Engineering,
Chennai-603 110, Tamilnadu, INDIA

Prof. P. Ramasamy
Dean (Research), SSN CE
President

Dr. R. Gopalakrishnan
Anna University, Chennai
Treasurer

Dr. Muthu Senthil Pandian
Research Scientist, SSN RC
Editor-IACG News Letter

IACG "PROF.P.RAMASAMY NATIONAL AWARD FOR CRYSTAL GROWTH"

Norms for the Award

1. **Any Indian Scientist who has contributed to the field of crystal growth is eligible for the award.**
2. **Any foreign scientist who has contributed to the development of crystal growth activities in India is eligible for the award.**
3. **Individual or Institution/Laboratory can be considered for the award.**
4. **Preference will be given to the crystal growth research carried out in India.**
5. **The research works carried out in the preceding five years of the year of award to be considered primarily for the award.**
6. **There is no age limit.**
7. **Self nomination/Nomination by the member of IACG/Nomination by an Institution can be accepted.**
8. **Scientist/Institution awarded once will be eligible for this award again only after five years from the date of previous award.**
9. **Award will be given once in two years, initially. Any more donation from any donor under same title is to be additive to the sum already donated and the award can be given annually.**
10. **The President, IACG may take the advice of the committee constituted by him for the purpose of selecting suitable awardee (s) and the decision of the President will be final.**

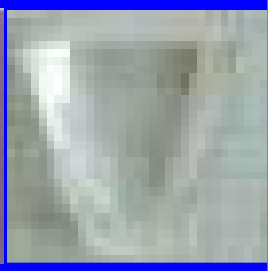
SANKARANARAYANAN-RAMASAMY (SR) METHOD GROWN CRYSTALS

Sodium Sulfanilate Dihydrate
P.Ramasamy, SSNCE

LCH-Dr.Sunil Verma, RRCAT

L-LLDN-
Dr.R.Ramesh Babu, BU

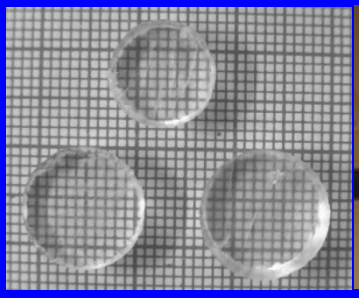
BP-Dr.K.Sankaranarayanan
Alagappa University



ADP-Dr.P.Rajesh
SSNCE

Diglycine Zinc Chloride Dihydrate-
Dr.Muthu Senthil Pandian, SSNRC

LPCCM-
Dr.G.Bhagavannarayana, NPL



BTCA-Prof.K.Kishan Rao
Kakatiya Univ, Warangal

Benzophenone-
Dr.M.Arivanandhan, Anna Univ.

Ammonium Dihydrogen Phosphite
-Dr.K.Sethuraman, MKU

Benzil – Dr.R.Gopalakrishnan
Dept. of Physics, Anna University, Chennai

L-Threonine - Dr.S.Jerome Das
Loyola College, Chennai

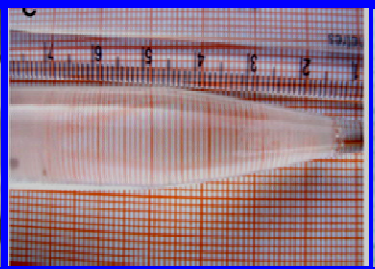
UGPI-Dr.S.Kalainathan
VIT, Vellore

LAM- Dr.C.Urit Chareon-In
Thailand

LTA-Dr.P.Ramesh Kumar
Periyar EVR College

HA-Dr.N.Vijayan
NPL, New Delhi

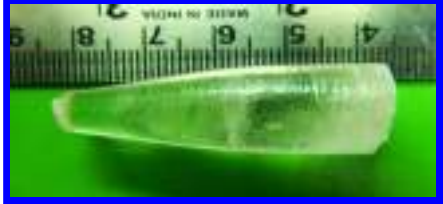
Mixed $NaCl_{0.98}Br_{0.02}O_3$-
Jingran Su et. al, China



SrLM-Dr.A.Senthil et. al,
SRM University

$NiSO_4$-Dr.H.Rezagholipour
Diazji, Iran

(010) Face TGS – Dr.K.B.R.Varma
et. al, IISc, Bangalore



Zn-Mn- Dr.K.Ramachandra Rao
Government College, Rajamundry

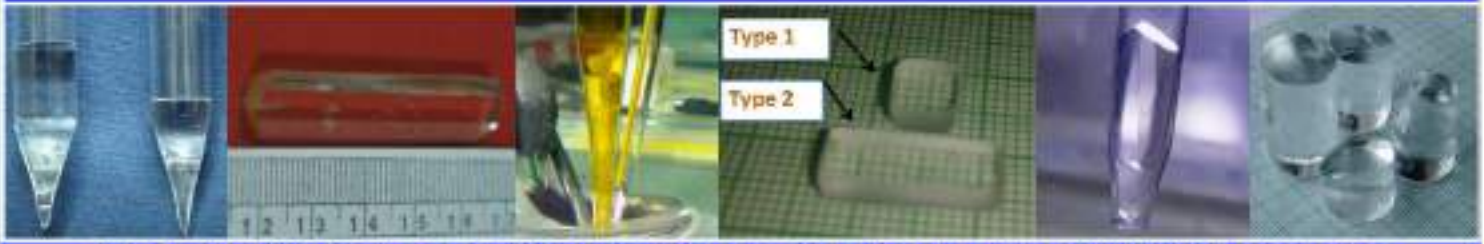
LAP - Dr.B.Riscob
IPR, Gujarat

L. Jayanthi, Dr. N. Prabhavathi
Sri Sarada College for Women, Salem

The release of IACG News Letter-2015, Issue-27 in XIX National Seminar on Crystal Growth (NSCG-2015) held at Centre for Crystal Growth, School of Advanced Sciences, VIT University, Vellore during March 12-14, 2015

Prof.K.Byrappa, Vice-Chancellor, Mangalore University receiving "IACG-Prof.P.Ramasamy National Award for Crystal Growth" at *XIX NSCG helad at VIT University, Vellore during March 12-14, 2015*

Dr.A.K.Karnal, Scientific Officer-G, LMDDD, RRCAT, Indore receiving "IACG-Prof.P.Ramasamy National Award for Crystal Growth" at *XIX NSCG helad at VIT University, Vellore during March 12-14, 2015*



Published by IACG, Centre for Crystal Growth, SSN College of Engineering, Chennai 603 110, Tamilnadu, INDIA

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