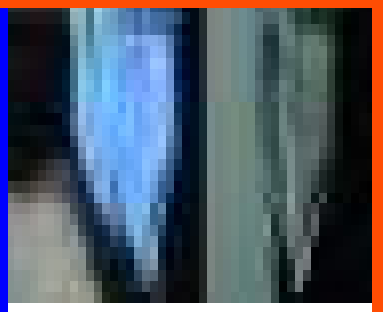
INDIAN ASSOCIATION FOR CRYSTAL GROWTH

March 2017 | Issue 29

Since 1982

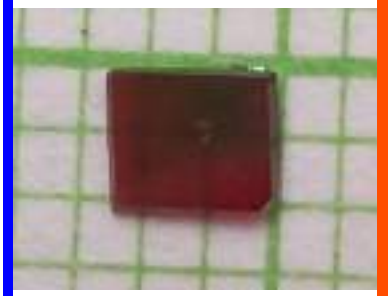
IACG NEWS LETTER

In this Issue



LiI:Eu in normal light & under UV illumination-Dr.S.C.Gadkari, BARC

SR-SHG oriented KDP crystal
Dr.S.K.Sharma, RRCAT



DAST - Dr.S.Brahadeeswaran
BIT-Anna University

Pure & Doped Halide crystals
Dr.Binay Kumar, Univ. of Delhi

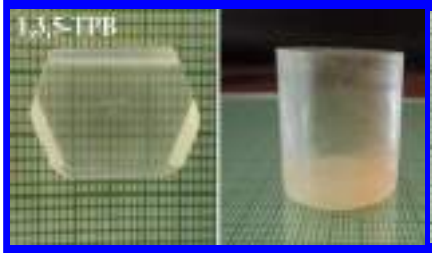
RECENTLY GROWN TECHNOLOGICALLY IMPORTANT SINGLE CRYSTALS

$CdGa_2Se_4$-P.Vijayakumar, Dr.P.Ramasamy, SSNCE

Fe doped Lithium Niobate - Dr.G.Bhagavannarayana, IIIT-RK

SR-Urea doped TGS-Above T_c Dr.Sunil Verma, RRCAT

3PB-Dr.S.Kalainathan VIT, Vellore

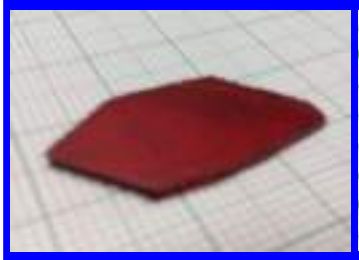


1,3,5 TPB-Dr.K.Sankaranarayanan Alagappa University

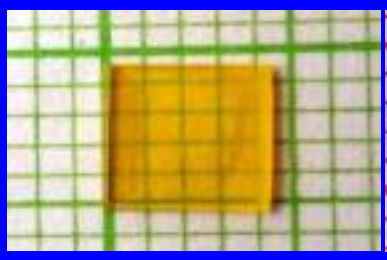
LLDP-Dr.R.Ramesh Babu Bharathidasan University

α-Polymorph-Dr.K.Srinivasan Bharathiyar University

Benzil - Dr.S.A.Martin Britto Dhas, Sacred Heart



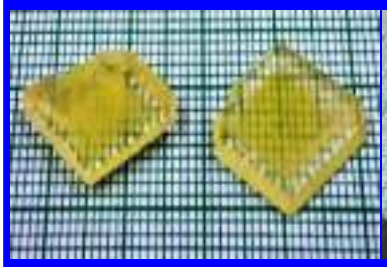
LGS-Dr. P. Suresh Kumar Velammal Engg. College



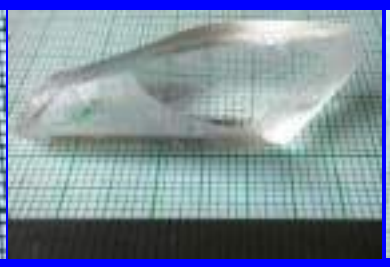
BNA-Dr.S.Bragadeeswaran BIT-AnnaUniversity

DPGF-Dr.K.Sethuraman MK University

LS - A.Silambarasan Dr.P.Rajesh, SSNCE

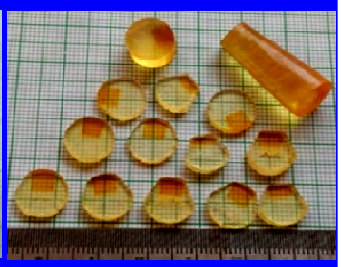


4MPNP-Dr.R.Mohan Kumar Presidency College



BGHPM-Dr.P.Murugakoothan Pachaiyappa's College

Eu:$LiKB_4O_7$ - Dr.R.Arun Kumar, PSG Tech



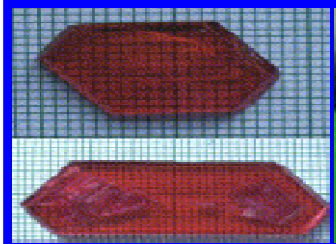
2A5NPD - V.Sivasubramani, Muthu Senthil Pandian, SSN

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

LAPP-Dr.N.VIjayan NPL

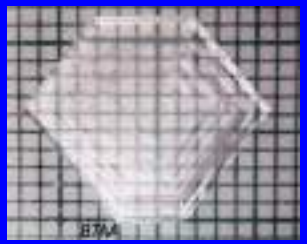
LGHCl - L.Jayanthi, N.Prabavathi Sri Sarada College for Women

β-Aniline Picrate- Dr.P.Selvarajan, ACAS



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

Zn-SA- Dr.K.Ramachandra Rao Govt. Arts College, Rajamundry



BTAA -Dr.Hussaini, Milliya Arts College, Maharastra

Pure and doped KDP - Dr.K.Rewatkar, Nagpur

Editorial Message

It is a great pleasure for me to present you the TWENTY NINTH issue of IACG NEWS LETTER-2017. An enthusiastic note is that the number of the Crystal Growth members is increasing tremendously. To date we have about 480 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 Ninth Issue of our IACG News Letter-2017. 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. I am happy to note that the number of sanctioned Crystal Growth Projects from national funding agencies are increasing drastically. This year alone 17 Crystal Growth projects have been sanctioned for about **3.5 crore** to our IACG members from DST, SERB, BRNS, CSIR and UGC. 76 Ph.D. theses have been submitted/completed in Crystal Growth during 2015-2016. Several Crystal Growth researchers have got fellowship to work in various reputed National and International research laboratories and universities. 2 Patents have been filed by **Prof.S.Brahadeeswarn** and **Prof.K.Sankaranarayanan**. Many of our researchers have got Young Scientist Award, Young Crystal Grower Award, Best Innovation Award, Best Crystal Display Award and Best Paper Presentation Awards for their outstanding work in Crystal Growth. MOU between Sacred Heart College and SSN Research Centre was signed.

IACG has successfully organized TWENTY 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 & Applications (NSCGA). XX NSCGA-2016 is organized at Technical Physics Division, BARC, Mumbai during 19-21st January 2016. Several eminent scientists in India and few scientists from abroad participated and delivered their lecture in this event. The XX NSCGA-2016 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. 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. To recognize the young researchers YOUNG CRYSTAL GROWER AWARD presentation is introduced by IACG. **Dr.Radha Perumal Ramasamy**, Anna University and **Dr.Mohit Tyagi**, BARC received this Award.

NSCGA is held in different cities as annual event. This year it is being organized at National College, Tiruchirappalli during 6-8th March 2017. The present "XXI National Seminar on Crystal Growth & Applications-2017" 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 NSCGA 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. To recognize Dr.R.Gopalakrishnan's research contribution, **"Dr.R.Gopalakrishnan National Award for Best Thesis in Crystal Growth"** is introduced by IACG. The young researchers who submitted thesis in the field of Crystal Growth within the previous one year period are eligible to apply for this award. The current seminar includes 40 Invited Lectures, 18 Dr.RG Best Thesis Award presentations, 12 Best Crystal Display Award presentations and more than 250 contributed papers as Oral and Poster presentations from many National Laboratories, Universities and Research Institutes.

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 (IACG), News Letter

Sankaranarayanan - Ramasamy (SR) Method of Crystal Growth

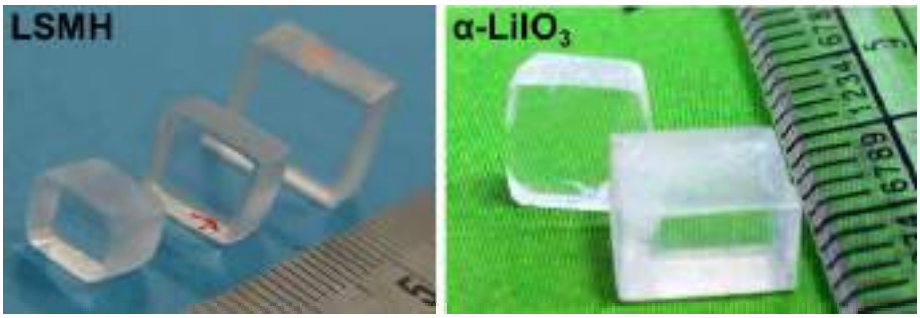
Fabrication of Optical Element from Inversely Soluble Lithium Sulfate Monohydrate and α-$LiIO_3$ Single Crystals for SHG Applications

A. Silambarasan, P. Rajesh, P. Ramasamy, A.K.Karnal[1], R.Bhatt[1], Indranil Bhaumik[1], P. K. Gupta[1]

SSN Research Centre, Department of Physics, SSN College of Engineering, Chennai-603110, TN

[1] *Crystal Growth Laboratory, LMDDD, Raja Ramanna Centre for Advanced Technology, Indore-452013*

In the trend for the development of single crystals for second harmonic generation (SHG), Lithium sulfate monohydrate (LSMH) and α-$LiIO_3$ will undoubtedly attract more attention because of its good nonlinear optical coefficient and broad transparency range. In this work, optical quality single crystals of inversely soluble LSMH and α-$LiIO_3$ were grown by seed rotation technique in order to posses bulky prismatic morphology and the significant optical characteristic features of LSMH and α-$LiIO_3$ are analyzed. Bulk size LSMH single crystals were successfully grown along the polar axis by modified Sankaranarayanan - Ramasamy (SR) method. Type 1 and Type 2 phase matching elements were prepared and experimentally analysed. A systematic investigation on crystal growth has been attempted to optimize α- $LiIO_3$ crystal and finally the optical elements of α-$LiIO_3$ are fabricated.



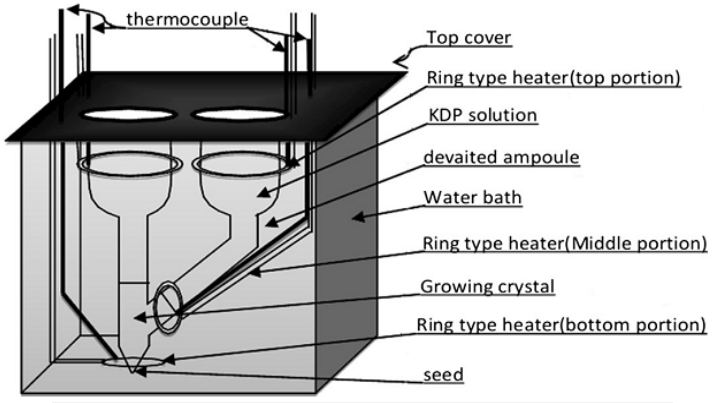
The fabricated SHG elements of LSMH and α- $LiIO_3$ single crystals

Growth of KDP single crystal in Second Harmonic direction by modified Sankaranarayanan–Ramasamy (SR) method

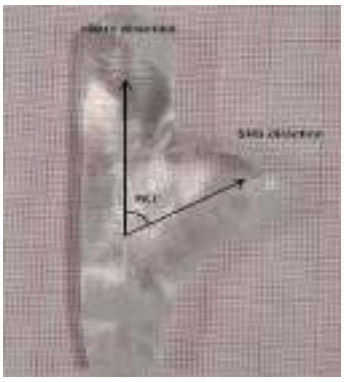
F. Barati, Hamid Rezagholipour Dizaji*

Crystal Growth Lab, Faculty of Physics, Semnan University, Semnan-35131-19111, Islamic Republic of Iran

KDP single crystal was successfully grown in SHD in aqueous solution by modified SR method. This is the first time that KDP crystal is directly grown in this direction. The grown KDP crystal in SHD when subjected to Nd:YAG laser (1064 nm) produced green laser light (532 nm). This test clearly confirmed that the modified SR apparatus introduced in the present work is capable of growing KDP crystal in Second Harmonic Direction (SHD).



Experimental setup of modified SR method



SHG directed grown KDP

Cut & polished wafer

Growth of KDP crystal along phase matching direction using solute-feed Unidirectional growth technique

S. K. Sharma*, Sunil Verma, Yeshpal Singh, K. S. Bartwal, A. K. Karnal
Crystal Growth Laboratory (CGL), Laser Materials Section, RRCAT, Indore-452013, M.P.

Recently flat-top growth technique [1] and solute-feed based unidirectional growth technique [2] have been reported for shape modification of crystals grown from solution. The solute feed based unidirectional growth technique was used for <001> oriented KDP and DKDP crystals [2-3] which is particularly useful for fabrication of Pockels elements with almost 100% usable yield. In this report unidirectional growth of KDP crystal along type-II phase matching direction for Nd: YAG laser using solute-feed based unidirectional growth technique is presented. This has resulted in considerable enhancement of the usable device purpose yield of KDP crystal for fabrication of SHG elements. A cone shape KDP crystal of length 100 mm and diameter upto 55 mm was grown from a point seed prepared along type-II phase matching direction as shown in Fig 1(a). Every plate normal to the axis of the cylindrical crystal is a SHG device element. One such element is shown in Fig. 1(b).

The grown crystal was characterized for optical transmittance, birefringence homogeneity, SHG efficiency and laser induced damage threshold studies showing quality comparable to that grown by conventional platform based techniques [4]. The crystalline quality and defects structure were assessed by high resolution X-ray diffraction (HRXRD), X-ray topography and chemical etching techniques [4].

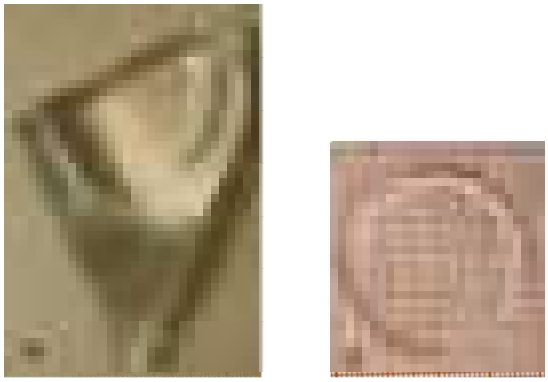


Fig. 1 (a) KDP crystal grown using solute-feed based Unidirectional technique directly along type-II phase matching direction, (b) type-II SHG element prepared from the crystal.

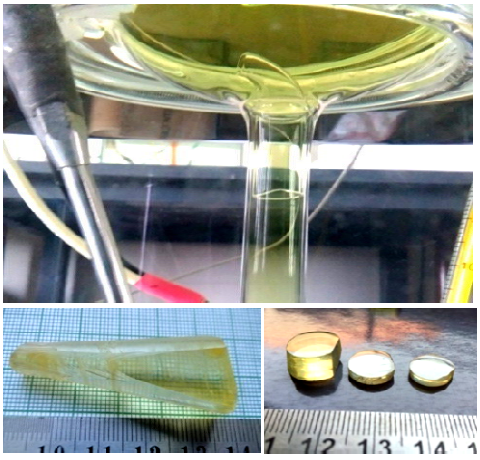
References

[1] S. K. Sharma et.al, Cryst. Eng. Comm. 15, 2013, 9995-96.
[2] S. K. Sharma et.al, NLS-22, January 8-11, 2014, Manipal University, Karnataka.
[3] S. K. Sharma et.al, NLS-23, December 3-6, 2014, S. V. University, Tirupathi.
[4] S. K. Sharma, et.al, NLS-24, December 2-5, 2015, RRCAT, Indore.

Directional growth of organic nonlinear optical (NLO) 2-amino-5-nitropyridine (2A5NP) derivative single crystals by modified SR method

V. Sivasubramani*, P. Karuppasamy, Muthu Senthil Pandian, P. Ramasamy
SSN Research Centre, SSN Institutions, Chennai-603110, Tamilnadu

The modified SR method was employed to grow unidirectional, bulk size 2A5NP derivative single crystals. The spurious nucleation was formed at the U-shaped top portion due to attaining supersaturation of the solution. After several days, small size crystals are nucleated at top portion and it falls on the growing crystal. In order to avoid this problem, we introduced slow cooling SR method with modified glass ampoule. The unidirectional growth of 2A5NPP was performed at various cooling rates. The ampoule was designed with an inner L-bend, which controls spontaneous nucleation on the top wall of the ampoule and prevents spurious nucleation. Several 2A5NP derivative crystals were successfully grown in this method.



CHARACTERIZATION FACILITIES: AVAILABILITY

Single Crystal XRD Facility in MG University

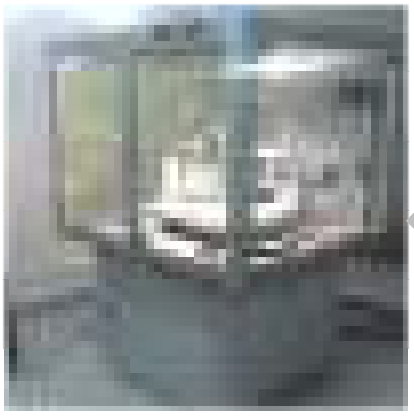
Prof. C. Sudarsanakumar
Professor, School of Pure and Applied Physics
Mahatma Gandhi University, Kottyam-686560, Kerala
Mobile: +91-9447141561
Email: scxrdmgu@yahoo.com

The School of Pure & Applied Physics of M G University is now equipped with a most modern Single Crystal X-Ray Diffractometer Facility from Bruker-AXS. The **D8 QUEST** is the one which we recently installed; a compact solution designed for single wavelength experiments that feature the revolutionary PHOTON-100 CMOS detector and a space filling 4-circle Kappa goniometer with APEX III software suites. They offer single crystal data collection & structure solution on payment basis, they charge 2500 INR/- for data collection and 1000 INR/- for structure solution & refinement up to publication level. They welcome everyone to use the facility.

Single Crystal XRD Facility in University of Jammu

Prof. Rajni Kant
Professor, Post-Graduate Department of Physics, University of Jammu, Jammu Tawi-180006 (J&K State)
Mobile: +91-9419194375; Tel/Fax [O]: +91 191 243 2051
Email: rkant.ju@gmail.com

The University of Jammu has created a Single Crystal X-ray Diffraction with a Charge Coupled Device Camera as a National Facility at University of Jammu. This facility has been sanctioned to Prof.Rajni Kant under a Mega DST Research Project. Professor Rajni Kant, as coordinator of this facility, invites all materials scientists, including crystallographers and crystal growers to make use of this facility for crystal data collection and structure solution of small molecules.



DST- Single Crystal XRD with CCD as a National Facility at University of Jammu

Goniometer Set-up for the DST-XRD National Facility

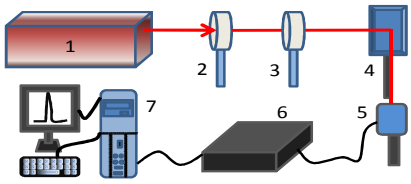
DST-FIST Facilities in M.D.T. Hindu College, Tirunelveli

1. Vickers Microhardness Tester
2. UV-Vis NIR Spectrophotometer
3. Fourier Transform Infrared Spectrum (FTIR)

Contact: Dr. K. Balasubramanian
Department of Physics
The M.D.T Hindu College
Tirunelveli-627010, Tamilnadu
Mobile: +91- 9942888801
E-mail: drkbmdt@gmail.com

Powder SHG Facility in Baba Amravati University

In the setup, a Q-switched Nd:YAG laser (Spiltlight compact-400, Innolas, Germany) with fundamental wavelength of 1064 nm, pulse rate 10 Hz, pulse diameter 6 mm and variable pulse energy is used. A laser beam of 1064 nm wavelength is passed through iris diaphragm to remove flash lamp component around laser beam then passed through 1064 nm interference filter to remove other component present with laser beam. The laser beam was allowed to incident on a sample surface, at an angle of 45°, packed in sample holder with front of 1 mm thick quartz plate. The output light was collected at an angle 90° (with direction of incidence) that was passed through 532 nm interference filter to remove IR components and fed to optical fiber based UV-Vis spectrophotometer (Black commet C-SR, Stellarnet, USA) to measure intensity. The intensity was measured and compared with intensity of 532 nm light by KDP polycrystalline material.



1. Nd:YAG laser, 2. Iris Diaphragm, 3. Interference filter 1064 nm, 4. IR Reflector, 5. Sample holder with interference filter 532 nm, 6. Spectrophotometer and 7. Computer

SHG Experimental Set-up

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Department of Physics, Sant Gadge Baba Amravati University
Amravati -444602, Maharastra
Mobile: +91-9850325379
E-mail: gajananggm@yahoo.co.in

Crystal Lab, University of Delhi Delhi

- Radiant Ferroelectric/ Piezoelectric System
- Pyroelectric system
- Impedance analyzer
- d_{33}-Piezometer & Poling Unit
- Microhardener
- Hall measurement
- Particle size analyzer & Current Preamplifier

Contact:
Dr. Binay Kumar, Professor
Crystal Lab, Department of Physics and Astro Physics, University of Delhi, Delhi-110007
Mobile: +91-9818168001
E-mail: b3kumar69@gmail.com

Department of Physics, Saurashtra University, Rajkot

- Powder XRD
- Fourier Transform Infrared Spectrum (FTIR)
- UV-Vis NIR Spectrophotometer
- TGA and DTA analyser
- Differential Scanning Calorimeter (DSC)
- Particle size by Dynamic Light scattering
- Dielectric set up

Contact:
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Centre for Crystal Growth, VIT University, Vellore

- Third Harmonic Generation (THG) - Z-Scan Measurement (Holmarc)
- Laser Damage Threshold (LDT)
  - Single & Multiple Shot
- Optical Microscope
  - Chemical Etching & Surface Features
- UV-Vis NIR Spectrophotometer

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Department of Physics, Sacred Heart College, Tirupattur

- Dielectric Set-up
- Photo Acoustic (PA) Spectrometer
- UV-Vis NIR Spectrophotometer
- FTIR
- Shock Wave Analyser
  - Crystal Sample
  - Thin Film Sample

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SSN Research Centre, SSN Institutions, Chennai

- Dielectric System
- d_{33}-Piezoelectric system
- UV-Vis NIR Spectrophotometer
- FTIR
- Optical Microscope for chemical etching
- Photoconductivity
  - Dark & Photocurrent measurement

Contact:
Prof. P. Ramasamy, Dean (Research)
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Dept. of Nanoscience & Technology Sri Ramakrishna Engg. College

- Powder XRD
- Atomic Force Microscopy (AFM)
- UV-Vis NIR Spectrophotometer
- FTIR & Particle Size Analsyer
- Electrochemical Workstation
- Fluorescence Spectrometer
- Solar Simulator

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NPL, New Delhi

- Powder X-ray Diffraction (PXRD)
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- Photoluminescence (PL) Spectrometer
- UV- Vis NIR Spectrophotometer
- Fourier Transform Infrared Spectrum
- Dielectric Analyser
- I-V measurement
- Electron spectrum for chemical analysis
- TGA-DTA and DSC
- Seebeck Resistivity
- Thermal Diffusivity measurement
- Vickers Microhardness tester
- Polarising microscope with dielectric analysis
- Cryogenic micro manipulated probe station
- Potentiostat-Galvanostat
- Scanning near field optical miscroscopy
- Microprobe surface analysis system
- Electron paramagnetic resonance (EPR)
- Physical Property Measurement System
- Secondary Ion Mass Spectrometer (SIMS)
- Resistivity measurement system

Contact:
Head, NPLONE Program
CSIR-National Physical Laboratory (NPL)
New Delhi-110012, Phone: 011-45608385; 45608396
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- Powder X-ray Diffraction (PXRD)
- High Resolution X-Ray Diffraction (HRXRD)
- SEM with EDAX
- TEM with EDAX
- Scanning Probe Microscope (SPM)
- P-E Loop Tracer
- Micro Raman Spectrum
- UV- VIS NIR Spectrophotometer
- FTIR
- Dielectric Analyser
- Massbauer Spectrum
- Electron spectrum for chemical analysis
- Vibrating sample magnetometer (VSM)
- Magneto-Optic Kerr effect (MOKE)
- AC susceptibility (80 – 300K/ 100e)
- SQUID magnetometer (2K - 320K; 7T)
- VSM-SQUID (2K/7T)
- Photoelectron spectroscopy (XPS, UPS, AES)
- Magnetoresistance/Specific heat (1.5K/8T)
- Differential Scanning Calorimeter (DSC)
- Low temperature thermal conductivity
- UHV-STM
- Confocal Microscope
- Low temperature and high field SPM (5K/9T)
- Liquid He based resistivity

Contact:
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E-mail: cd.indore@csr.res.in **Download -User form:**
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An indigenously developed Photoacoustic Spectrometer for Crystals

S.A. Martin Britto Dhas*, J. Thirupathy
Department of Physics, Abraham Panampara Research Center, Sacred Heart College,
Tirupattur-635601, Vellore, Tamilnadu

Photo Acoustic spectroscopy is a non-destructive tool to determine the thermophysical properties such as thermal diffusivity, thermal effusivity and thermal conductivity of the materials in solids, liquid or gas phase. Photoacoustics is a technique of detection and measurements the absorption coefficient of transparent, opaque and diffuse materials in which conventional spectroscopic measurements are not feasible. Since heat transfer processes are playing a vital role in high power laser devices, knowledge about thermophysical properties is essential in order to save the device from thermal damage due to sudden heat exchange. The principle of Photoacoustic spectroscopy is, when electromagnetic waves interact with mater, the molecules are excited and the de-excitation may occur by the emission of heat as non-radiative transition and this heat will be exchanged to the nearby medium. If the incident light is modulated, then there will be a temperature fluctuation in the medium followed by a pressure fluctuation. This pressure fluctuation can be detected by a microphone and this signal contains the signature of thermophysical properties of the surface of the material.

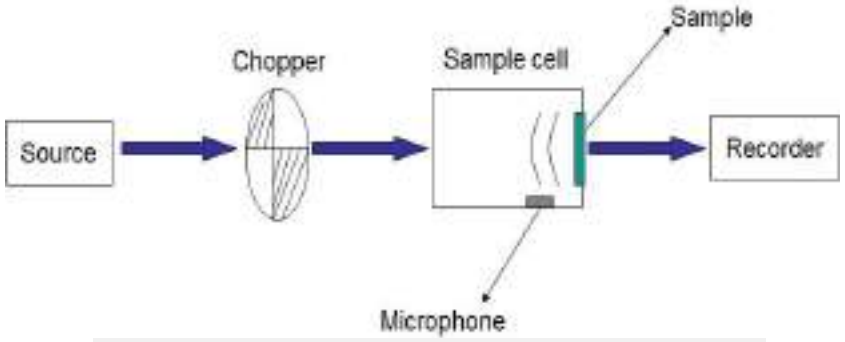


Fig.1 Block diagram of experimental setup of Photoacoustic spectrometer

Fig.2 The photograph of the fabricated Photoacoustic spectrometer

Photoacoustic spectrometer is fabricated indigenously in Sacred Heart College which is shown in Fig.2. It consists of a light source, light collimating arrangement, chopper, sample cell, detector and recorder. A 250 W halogen lamp is used as the source and a mechanical chopper with two blade system is used as a modulator. The crystal sample is placed in a cylindrical acoustic free glass sample cell and the sample surface is exposed to the collimated and modulated beam of light from the source. Photoacoustic (PA) signal generated in the sample cell is detected by a sensitive microphone which is placed close to the sample and controlled by a computer with sound recording software. The amplitude of the PA signal was collected for different modulation frequencies for every 10 minutes to enable the sample and sample cell to be is thermal equilibrium. The performance of the spectrometer is calibrated with standard samples Viz., BK7 glass, quartz glass and KDP crystals. PA spectra for the standard BK7 sample for different chopping frequencies is shown in Fig.3. The normalized spectra of PA signal versus square root of chopping frequency for the standard samples are shown in Fig.4. From this plot the thermal diffusivity was derived by curve fitting method by adopting Barros Mela and Fariea. The obtained values are in good agreement with the literature values and the results are published in International Peer Reviewed Journals.

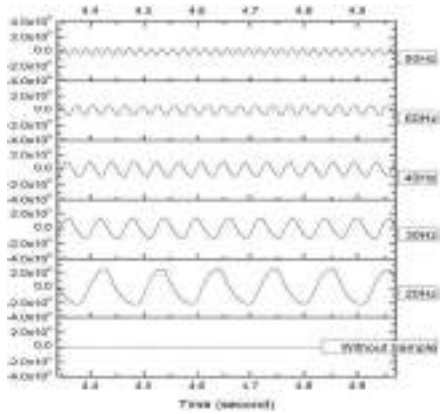


Fig.3 PA spectra for the standard BK7 sample for different chopping frequencies

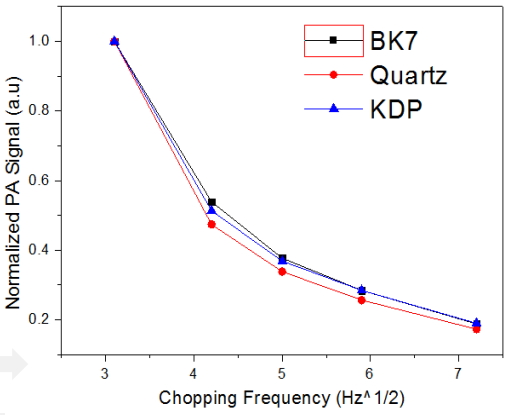


Fig.4 Square root of chopping frequency versus Normalized PA signal for BK7, Quartz and KDP crystal

Ph.D. Theses in Crystal Growth (2015-2016)

No	Name of the Student	Title of the Thesis	Supervisor & Affiliation
1	Arsala. A. Sheikh	Effect of Glycine Doped on Growth and Characterization of Ammonium dihydrogen Phosphate (ADP): A non linear Optical Crystal	Dr.K.Rewtkar Dr.Ambedkar College Nagpur-440010
2	Aditya Prasad. A	Growth, characterization and computational studies of novel optically active crystals: Hydrogen bonded supramolecular architectures	Dr.SP. Meenakshisundaram Annamalai University Chidambaram-608002
3	Andal. C	Growth and characterization third order nonlinear optical crystals	Dr.P.Murugakoothan Pachiyappa's College Chennai-600030
4	Arul. S	Synthesis and Characterization of $CuInGaSe_2$ (CIGS) Nano-crystals and studies on hot wall deposited CIGS thin films as an absorber layer for heterostructure based solar cells	Dr. R. Arun Kumar PSG College of Technology Coimbatore-641004
5	Agilandeswari. R	Synthesis, structure, crystal growth, hyperpolaraizability, hirshfeld surface analysis and computational studies of some technologically important crystals	Dr.S.P. Meenakshisundaram Annamalai University Chidambaram-608002
6	Baskaran. P	Studies on L-Leucine based single crystals for nonlinear optical applications	Dr. K. Selvaraju Govt. Arts College Ariyalur-621713
7	Balachandar. R.K	Synthesis, Growth and Characterisation of Schiff Base Organic Non Linear Optical Single Crystals by Slow Evaporation Technique	Dr. S. Kalainathan VIT University Vellore-632014
8	Budhdhagosh Singade	Effect of L-leucine Doped on Growth and Characterization of Ammonium Dihydrogen Phosphate (ADP).	Dr.K.Rewtkar Dr.Ambedkar College Nagpur-440010
9	Bhandari. S	Processing lead free perovskite ceramics, single crystal growth and characterization of pure and Mn-doped $Bi_{0.5}(Na_{1-y}K_y)_{0.5}TiO_3$ relaxor-like ferroelectrics	Dr.Binay Kumar University of Delhi New Delhi-110021
10	Boopathi. K	Structure, Growth and Characterization of L-Proline derivatives, Ammonium Hydrogen l-malate and Negatively soluble crystals for Nonlinear Optical Applications	Dr. P. Ramasamy SSN College of Engineering Chennai-603110
11	Chitra. A	Synthesis, experimental and theoretical investigations on glycine based nonlinear optical single crystals	Dr.J.Madhavan Loyola College Chennai-600034
12	Catherine Siriya Pushpa. K	Tuning the magnetic behavior and improving the antibacterial efficiency of ZnO nanocrystals through simultaneous doping of Zr with F/Mn/Fe crystalline materials for biomedical applications	Dr.A.T.Ravichandran National College Tiruchirappalli-620001
13	Ekadevasena. S	Structural, Mechanical, Optical, Dielectric and SHG studies of doped and undoped nonlinear optical crystals	Dr. J. Thomas Joseph Prakash Government Arts College Trichy-620022
14	Giri Dhari Patra	Single Crystal Growth of Lithium Tetra Borate and its Characterization as a Multi-functional Material for Personal Dosimetry	Prof. S. C. Gadkari Head TPD, BARC Mumbai-400085
15	Gurumurthi. T	Effect of rare earth elements neodymium, cerium, lanthanum and soft transition element niobium on L-Prolinium picrate single crystals	Dr.P.Murugakoothan Pachiyappa's College Chennai-600030
16	Geetha. P	Computational and spectroscopic studies on L-Isoleucine based noncentrosymmetric single crystals	Dr.J.Madhavan Loyola College Chennai-600034
17	Godara. S	Ferroelectric, ferromagnetic, dielectric and structural characterization of pure and substituted Multiferroic Bismuth ferrite ($BiFeO_3$) crystalline materials synthesized by auto-combustion route	Dr.Binay Kumar University of Delhi New Delhi-110021
18	Harsh Yadav	Morphological, optical and dielectric studies of piezoelectric crystals grown by solution and modified Czochralski techniques for patch antenna fabrication	Dr.Binay Kumar University of Delhi New Delhi-110021

19	Harshkant O. Jethva	Growth and Characterization of Lead- Cadmium and Other Mixed Levo Tartrate Crystals	Dr. Mihir Joshi Sourashtra University Gujarat-360005
20	Jaya Sree. D	Studies On the Growth and Characterization of certain Inorganic and Organic Single crystals	Dr. R. Kesavasamy Sri Ramakrishna Engg., College Coimbatore-641022
21	Jayanalina. T	Synthesis, Structure, Growth and Characterization of 2 - Amino 5 - Chloropyridine Derivative Crystals for Nonlinear Optical Applications	Dr. G. Rajarajan Vidhya Mandhir Inst. Of Technol. Erode-638052
22	Jothimani. R	Investigations on growth and characterization of some NLO based L-alanine dependent single crystals	Dr.P.Selvarajan Aditanar College of Arts & Science Tiruchendur-628216
23	Jyoti	Growth of piezoelectric nonlinear optical organic/semi organic single crystals and their structural, optical, thermal and dielectric characterizations	Dr.Binay Kumar University of Delhi New Delhi-110021
24	Jegatheesan. A	Effect of pH on Crystal Structure, Optical Property and Solid State Parameter Analysis of Amino Acid Doped NLO Crystals	Dr. G. Rajarajan Vidhya Mandhir Institute of Technology, Ingur, Erode-638052
25	Kavitha. E	Computational and spectroscopic studies on some organic and semiorganic nonlinear optical single crystals	Dr.J.Madhavan Loyola College Chennai-600034
26	Kalaiselvi. P	Investigation on the growth and characterization of amino acid based some organic and semi-organic nonlinear optical (NLO) single crystals	Dr.S. Alfred Cecil Raj St. Joseph's College Tiruchirappalli-620002
27	Kumaresh. A	Growth and characterization of Hippuric acid doped KDP, ADP, ZTS and Europium doped LTB, LKBO single crystals for NLO and Laser applications	Dr. R. Arun Kumar PSG College of Technology Coimbatore-641004
28	Karunagaran. N	Synthesis, growth and characterization of I-III-VI_2 chalcopyrite semiconductor single crystals for mid- IR applications by Bridgman-Stockbarger method	Dr. P. Ramasamy SSN College of Engineering Chennai-603110
29	Mary Sheeja. O.V	Studies on nanomaterial added KDP single crystals	Dr. C. K. Mahadevan PSN College of Engg. & Technol., Tirunelveli-627152
30	Martin Sam Gnanaraj. J	Growth and Characterization of some technologically important semi-organic crystals for possible nonlinear optical applications	Dr. J. Thomas Joseph Prakash, Government Arts College Trichy-620022
31	Maria Ashok Kumar. C	Structural, spectral and computational studies of nonlinear optical picrate single crystals	Dr.J.Madhavan Loyola College Chennai-600034
32	Muthuraja. A	Growth and characterization of organic NLO single crystals grown using vertical Bridgman technique	Dr. S. Kalainathan VIT University Vellore-632014
33	Murugesan. G	Growth and characterization of oxide single crystals by optical floating zone technique	Dr. S. Kalainathan VIT University Vellore-632014
34	Mohd Anis	Investigation on Properties of Nonlinear Optical Crystals Doped with Organic and Inorganic Additives for Device Applications	Dr. Gajanan G. Muley Sant Gadge Baba Amravati University, Amravati-444602 Maharashtra
35	Nallamuthu. S	Magnetic, thermodynamic and transport properties of R-T-X (R = La- Gd; T = Co, Ni, Cu, Rh and Ag; X Si, Ga and Al) type intermetallic compounds	Dr. R. Nagalakshmi National Institute of Technology Tiruchirappalli-620015
36	Nana Namdeo Shejwal	Influence of amino acids on metal complexes crystals	Dr. Mahendra D. Shirsat Dr. Babasaheb Ambedkar Marathwada University Aurangabad-431001
37	Niranjana. S.R	Linear and nonlinear optical properties of some organic single crystals	Dr.J.Madhavan Loyola College Chennai-600034

38	Pushpalatha. H.L	Growth and characterization of thin films of crystalline CdS on insulating glass substrates by photochemical deposition technique	Dr. R. Ganesha Yuvaraja's College, University of Mysore, Mysuru-570 005
39	Puhal Raj. A	Investigation on the growth and characterization of some amino acid and thiourea based nonlinear optical crystals	Dr. C. Ramachandra Raja Government Arts College Kumbakonam-612002
40	Ray. G	Ceramic synthesis, crystal growth and characterization of pure and Sb-modified lead free ferroelectric ternary perovskite sodium potassium lithium niobate	Dr.Binay Kumar University of Delhi New Delhi-110021
41	Rajalakshmi. V	Preparation and properties of some hydrogen bonded crystals	Dr. C. K. Mahadevan PSN College of Engg. &Technology Tirunelveli-627152
42	Ramesh Babu. P	Investigations on $RFeO_3$ crystals grown by optical floating zone technique	Dr. Ravi Shankar Babu VIT University Vellore-632014
43	Rajasekar. M	Crystal growth and characterization of metal thiourea complexes transition metal doping effects	Dr.SP. Meenakshisundaram Annamalai University Chidambaram-608002
44	Renugadevi. R	Structure, Growth and Characterization of Beta-Alanine Based Metal Organic and Acid Base Non linear Optical Single Crystals	Dr. R. Kesavasamy Sri Ramakrishna Engineering College, Coimbatore-641022
45	Renuka. N	Studies on Growth and Characterization of L-arginine acetate, L-alanine L-alaninium Picrate monohydrate, L-lysine Semi-maleate, metal Ions doped L-Prolinium Tricholoroacetate Single crystals	Dr. R. Ramesh Babu Bharathidasan University Tiruchirappalli-620024
46	Rekha. P	Investigations on the Growth and Characterization of Piperazine Based Organic Nonlinear Optical Single Crystals	Dr. R. Kanagadurai Dr. R. Mohankumar Presidency College, Chennai-600005
47	Sathiskumar. S	Synthesis, Crystal growth and Characterization of some metal complexes of L - Proline	Dr. T. Balakrishnan Periyar EVR College Tiruchirappalli-620023
48	Saravana Kumar. G	A combined experimental and theoretical investigations on N, N' Diphenyl guanidine based single crystals for nonlinear optical applications	Dr.P.Murugakoothan Pachiyappa's College Chennai-600030
49	Senthilvelan. N	Growth and Characterization of Urea and Thiourea Mixed NLO Crystals	Dr. G. Rajarajan Vidhya Mandhir Institute of Technology, Ingur Erode-638052
50	Seelam Rajyalakshmi	Investigations On Rare Earth Doped L-Histidine Hydrochloride Monohydrate Single Crystals For Luminescence Applications	Dr. K. Ramachandra Rao Government College Rajamundry-533103 Andhra Pradesh
51	Selvakumar. S	Investigation on the growth and characterization of para nitrophenoxide derivative single crystals for nonlinear optical applications	Dr. A. Leo Rajesh St. Joseph's College Tiruchirappalli-620002
52	Senthil. K	Synthesis, Growth And Characterization Of New Derivatives Of Stilbazolium Family Single Crystals By Slow Evaporation Technique For Nonlinear Optical Applications	Dr. S. Kalainathan VIT University Vellore-632014
53	Shaikh Rais Naeem	Effect of Amino Acids on Nonlinear Optical (NLO) Material Crystals	Dr.Hussaini Syed Shuakatullah Azmatullah Milliya Arts & Science College, Beed-431122, Maharastra
54	Shakila. K	Growth and Characterisation of Organic – Inorganic Hybrid Single Crystals by Slow Evaporation Technique	Dr. S. Kalainathan VIT University Vellore-632014
55	Shuriti K. Patle	Growth and characterization of Semi-organic nonlinear optical single crystal ADP Doped with L-Lysine and L-Histidine	Dr.K.Rewtkar Dr.Ambedkar College Nagpur-440010
56	Sivasankari	Growth and various studies of L-malic acid based single crystals	Dr.P.Selvarajan Aditanar College of Arts & Science Tiruchendur-628216

57	Sivakala. P	Investigation on some pure and doped NLO active thiourea based organo-metallic crystals	Dr. N. Joseph John Government Arts College Ooty-643002
58	Srinivasan. M	Numerical Modelling on mc-Silicon Growth Process for Enhancing solar cell efficiency	Dr. P. Ramasamy SSN College of Engineering Chennai-603110
59	Silambarasan. A	Investigation on Nucleation Kinetics and Bulk Growth of Inversely Soluble Single Crystals for NLO and Pyroelectric Applications	Dr. P. Rajesh SSN College of Engineering Chennai-60311
60	Sivanandhan. T	Growth and characterization of NLO crystals by gel growth technique	Dr. S. Kalainathan VIT University Vellore-632014
61	Surekha. R	Studies on the growth and charcterization of NLO active single crystals of γ-Glycine, BGHB, D-Alanine and LPLPB	Dr. K. Ambujam Queen Mary's College Chennai-600004
62	Sukumar. M	Growth of Some Alkali Metal and Melilite Type Borate Single Crystals by Czochralski Technique and their Characterization	Dr. R. Ramesh Babu Bharathidasan University Tiruchirappalli-620024
63	Suresh Kumar. A	Synthesis and Luminescent properties of $CaAl_4O_7:RE^{3+}$ (RE = Eu, Tm, Er) phosphor for white light emitting diode applications	Dr. R. Arun Kumar PSG College of Technology Coimbatore-641004
64	Sonal R. Vasant	Synthesis and Characterization of Pure and Doped Calcium Pyrophosphate Nanocrystalline materials	Dr. Mihir Joshi Sourashtra University Gujarat-360005
65	Thirumoorthi. M	A study on doping effects on structural morphological, optical and electrical properties of transparent conducting crystalline oxide thin films	Dr. J. Thomas Joseph Prakash Government Arts College Trichy-620022
66	Thamizhselvi. R	Physical characteristics, chemical properties, jotophine compound analysis and antifungal studies on jatropha curcas samples using various spectroscopic techniques	Dr.P.Selvarajan Aditanar College of Arts and Science, Tiruchendur-628216
67	Thirupugalmani. K	Investigations on Selected Technologically Important Organic Single Crystals for Nonlinear Optical, Terahertz and Semiconductor Applications	Dr. S. Brahadeeswaran BIT-Anna University Tiruchirappalli-620024
68	Tyagi. N	Structural, piezoelectric, ferroelectric, dielectric and mechanical properties in amino acid based single crystals	Dr.Binay Kumar University of Delhi New Delhi-110021
69	Umadevi. M	Acoustical and Physico-Chemical Behaviour of Ternary Liquid Systems and Amino Acid in Aqueous Sugar Solution	Dr. R. Kesavasamy Sri Ramakrishna Engineering College, Coimbatore-641022
70	Usha. S	Synthesis, characterization by spectral, single crystal XRD, thermal studies, optical properties, biological activity, docking and DFT studies of mandelic acid and its derivatives	Dr.Charles Kanakam Christopher Presidency College Chennai-600005
71	Vijayalakshmi. M	Investigations on the Nucleation kinetics, growth and characterization of pCA, mNA, PPLT and PPHS single crystals for frequency application	Dr. R. Ezhil Vizhi VIT University Vellore-632014
72	Vivek. P	Investigation on potential organic and semi-organic single crystals for nonlinear optical device applications	Dr.P.Murugakoothan Pachiyappa's College Chennai-600030
73	Vijayalakshmi Sanyal	Studies on the properties of co-substituted Fluorohydroxyapatite for Biomedical applications	Dr. C. Ramachandra Raja Government Arts College Kumbakonam-612002
74	Vijay Raghorte	Effect of Amino Acid Doping on Growth And Characterization of the non liner optical crystal of KDP	Dr.K.Rewtkar Dr.Ambedkar College Nagpur-440010
75	Vijayakumar. P	Investigations on vertical Bridgman method grown chalcopyrite single crystals for mid-IR applications	Dr. P. Ramasamy SSN College of Engineering Chennai-603110
76	Yogambal. C	Investigation on the growth aspects and property studies of nonlinear optical γ-glycine single crystals in the presence of different additivies	Dr. R. Ezhil Vizhi VIT University Vellore-632014

YOUNG/SENIOR RESEARCHERS FORUM

Dr. Leo Rajesh, St. Joseph College, Trichy received the **"Best Research Paper Award"** for Highest Impact factor for the academic year 2015

Dr.S.A. Martin Britto Dhas received **"Best Innovation Award"** from Indian Shock Wave Association during 26-27th February 2016

Prof.S.P.Meenakshisundaram, Head, Department of Chemistry, Annamalai Univ., Chithambaram selected for **CSIR-Emirtus Scientist** post on 2016. One Crystal Growth project in "*Supramolecular architecture of some mixed crystals and charge transfer complexes*" is approved for his post for 5 years.

Dr.S.Ganesamoorthy, Scientific Officer-F, IGCAR, Kalpakkam, TN delivered a Guest Lecture on the topic *"Crystal Growth from Melt Technique"* for "**3rd Dr.P.Sagayaraj Endowment Lecture"** in Department of Physics, Loyola College-600034, Chennai on 27th February 2017.

Highly Cited Research

Dr.R.Arun Kumar, Associate Professor, GRD Centre for Materials Research, PSG College of Technology, Coimbatore awarded with the appreciation certificate for **"Highly Cited Research"** by Elsevier. His research paper is among the top 5 papers to receive maximum citations in the period 2013 to June 2016. The paper on borate crystals was published in the International Journal- Progress in Crystal Growth and Characterization of Materials with the impact factor of 4.75.

Dr. Ketan D. Parikh, I/c Principal, Shri M.P.Shah Arts & Science College, Surendrangara, Gujarat published books in Crystal Growth, 2016, (ISBN:978-3-659-96783-2), LAMBERT Academic Publishing, Germany.

Dr. Mihir J. Joshi, Mr.Jaydeep Joshi and Mr. Karan Rathod, Saurashtra University, Rajkot got Ion Beam Irradiation/ Implantation beam experiment facility at Inter University Accelerator Centre (IUAC), New Delhi with collaboration of Dr. K.Asokan, Scientist, IUAC. The title of the Project Proposal is **"Irradiation of Ion beam on ADP and KB_5 crystals"**. They got an Ion beam irradiation and implantation facilities in terms of high and low energy.

Memorandum of Understanding between Sacred Heart College & SSN Research Centre

MOU between Sacred Heart College and SSN Research Centre was signed on 29th November, 2016 based on student/ faculty/ scholar exchange and resource sharing programs. **Prof. P. Ramasamy**, Director, SSN RC and **Rev.Dr.D. Maria Antony Raj**, Principal, Sacred Heart College have signed on behalf of the respective institutions. SSNRC is an extension of SSN Institutions, to script a unique chapter of excellence in education and research in fields vital to India's progress. It is a multi-disciplinary scientific research institution equipped with International standard laboratories devoted to solve problems in cutting edge research topics of promise to future applications. The domains of research focus are; increasing efficiency in generation, storage and utilization of energy, advanced materials that will enable new engineering applications. This MOU is the first step in creating that network between higher educational institutions for exchanging knowledge and solving social problems.

Nobel Laureate, Bhrat Ratna Dr. Sir. C. V. Raman Memorial Endowment Lecture

Prof. Vijendra Agarwal, Former Executive Fellow at the White House Office of Science and Technology Policy (OSTP) delivered the fifth **Sir C.V.Raman Memorial Endowment Lecture** in Department of Physics, National College on 7th February 2017. Prof. Vijendra Agarwal delivered a lecture on Global Trends in Science and Technology: India's Challenges/Opportunities. He started the lecture by saying that, A developed India by 2020, or even earlier, is not a dream. It is a mission we can all take up- and succeed. The nation's progress depend upon how the people think, how thoughts are transformed into action and mentioned that Make in India is manufacturing of the future and nano initiative is the material of the future. He also compared the vital facts of USA and India. **Dr.K.Anbarasu**, Principal welcomed the gathering, **Shri K.Raghunathan**, Secretary honoured the chief guest and offered felicitations. **Dr.A.T.Ravichandran**, Co-ordinator of the program proposed the vote of thanks. **Dr.R.Jagannathan**, former Vice-Chancellor, Middle East University, UAE, Staff and students from all science departments participated in this lecture.

Dr. Muthu Senthil Pandian, SSN RC received the **"Young Scientist Award"** from NSP-2016 held at Bharathidasan University during 18-19th March 2016

Dr.M.Selvapandiyan, Periyar University PG Extension Centre, Dharmapuri Received **ISPA Research Excellence Award** on 19th January 2016

Raman Post Doctoral Fellowship (R-PDF-2016)

Dr. K. Sethuraman, Assistant Professor, School of Physics, Madurai Kamaraj University, Madurai was selected for Raman PDF for one year. He is working in Prof. Arunava Gupta' lab, Centre for Materials for Information Technology (CMIT), University of Alabama, Tuscaloosa, USA.

Dr. K. Ramachandra Rao, Director, Crystal Growth & Nanoscience Research Centre, Govt. College, Rajamundry, A.P was selected for Raman PDF for one year. He is working in Prof. Mahedra.Sunkara' lab, Center for Renewable Energy Research, University of Louisville, Louisville-Kentucky, USA.

Patent Filed

Patent No:
201641011210
Dated 30th March 2016

Title: A system for growing a Unidirectional organic single crystal compound and method thereof

Inventors

K. Sankaranarayanan[a*], V. Govindan[a], B. Venkatraman[b], M.T. Jose[c]

[a]Department of Physics, Alagappa University, Karaikudi-630004, Tamilnadu

[b]Radiological Safety & Environmental Group

[c]Radiological Safety Division, IGCAR Kalpakkam-890789, Tamilnadu

Patent Filed

Patent No:
201741001472
Dated 13th January 2017

Title: Solution Grown Organic Single Crystal N-Benzyl-2-Methyl-4-Nitroaniline and a Method of Growing Thereof for Terahertz Applications

Inventors

S. Brahadeeswaran[a*], K. Thirupugalmani[a], M. Venkatesh[b], A. K. Chaudhary[b]

[a]Crystal Research Laboratory, Department of Physics, Bharathidasan Institute of Technology, Anna University, Tiruchirappalli-620024, TN

[b]Advanced Center of Research in High Energy Materials (ACRHEM), University of Hyderabad, Hyderabad-500046

Dr. Radha Perumal Ramasamy received the **"Young Crystal Grower Award"** in XX NSCGA-2016 held at BARC during 19-21st January 2016

Dr. Mohit Tyagi received the **"Young Crystal Grower Award"** in XX NSCGA-2016 held at BARC during 19-21st January 2016

Young Physicist Award

Dr.Mohit Tyagi, Scientific Officer, TPD, BARC Received **"Young Physicist Award in Young Physics Colloquium - 2016"** held at SINP, Kolkata in July 2016 For presenting his work on "A journey from the raw powder to the development of radiation detectors based on single crystal scintillators".

Young Applied Scientist & Technologist Award

Dr. S. G. Singh, Scientific Officer, TPD, BARC Received **"DAE Young Applied Scientist and Technologist Award 2015"** in October 2016 For his contribution in "Growth of Single Crystal, Device Fabrication & Characterization".

Active Participation in 44th NSC-2016

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

Professor Rajni Kant was invited to chair a technical session at XX National Seminar on Crystal Growth & Applications (XX-NSCGA-2016) held at BARC, Mumbai during 19-21st January 2016 & 44th NSC-2016 held at Indian Institute of Science Education and Research, Pune during July 10-12th 2016. As a Member of the Executive Council for Indian Crystallography Association (ICA), he also participated in its Annual General Body Meeting, held on June 11th 2016, for the election of the New President and Executive Council of ICA for the next three year term.

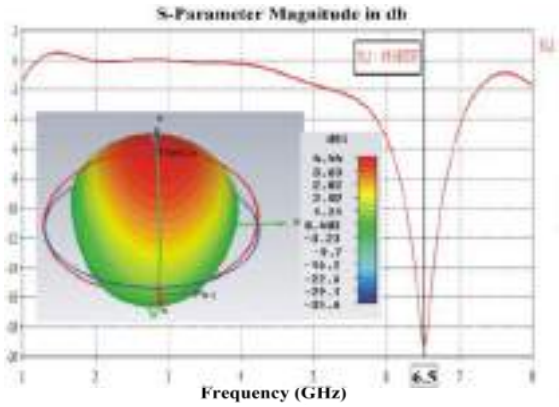
Young Crystal Growers Meet

Crystal Growth Researchers from various universities participated in project meeting under **Prof.P.Ramasamy** in SSN Research Centre, Chennai on June 2016.

Simulation and fabrication of piezoelectric crystal based patch antenna for wireless communication applications

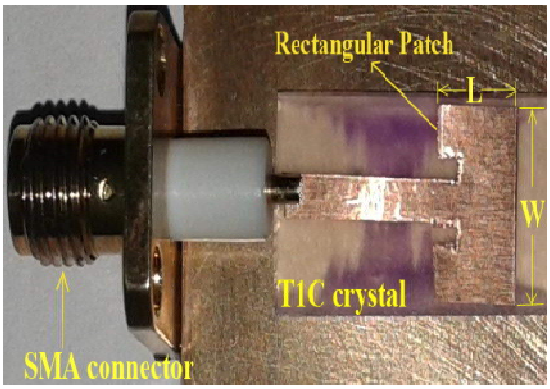
Harsh Yadav [a], Nidhi Sinha[b], Binay Kumar [a]*
[a]Crystal Lab, Department of Physics & Astrophysics, University of Delhi, Delhi-110007
[b]Department of Physics & Electronics, SGTB Khalsa College, University of Delhi, Delhi-110007

Patch antenna are required to fulfill the demand of the various technical aspects of communication system where size, weight and performance plays an important role. Patch antennas are popular due to their many wireless applications, simplest planar design with low fabrication cost. Dielectric and piezoelectric properties of TGS can be exploited to design patch antenna which can serve both for communication (Wi-Fi LAN, Bluetooth) and energy harvesting applications.



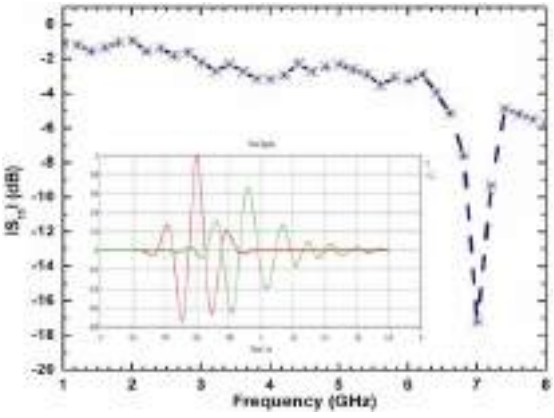
Simulation

CST Microwave Studio was used for the simulation of the patch antenna. The transmission line model was used to analyze the mechanism and to calculate the dimensions of the patch antenna for a selected resonating frequency (6.5 GHz). Simulated S_{11} parameter versus frequency and 3D far-field radiation pattern at the resonance of 6.5 GHz (inset) are shown in the figure.



Fabrication

High quality Triglycine Sulphate (TGS) piezoelectric single crystal, Copper plate and standard SMA connector were used to fabricate the patch antenna as shown in Figure. The dimensions of crystal, copper plate, gap, etc were taken as per simulated values for desired output as shown in adjoining figure.



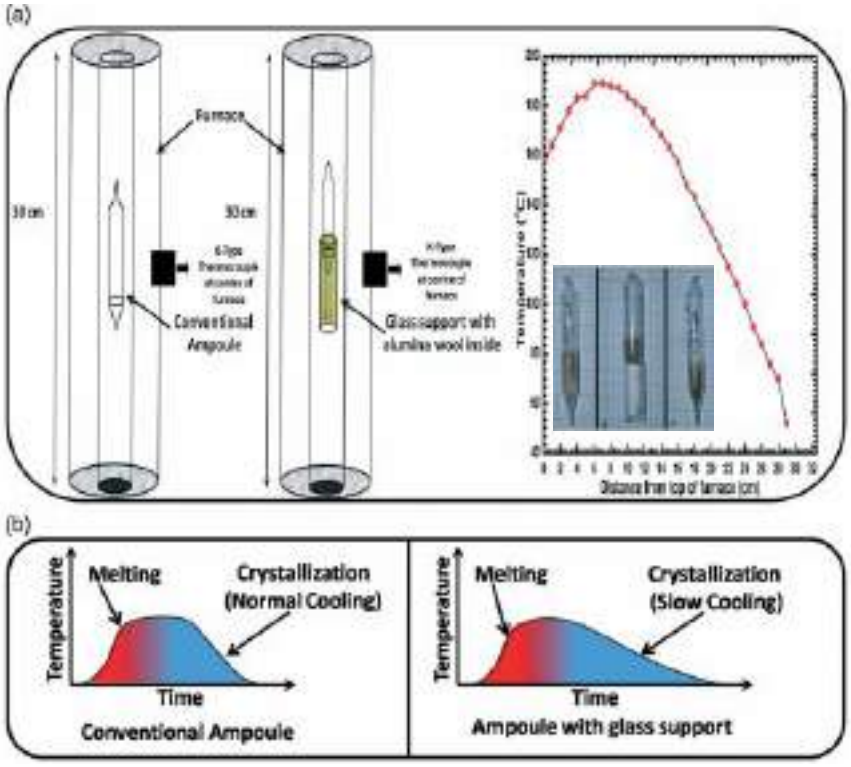
Output and Applications

In a single port measurement by vector network analyzer operating frequency of the patch antenna was found to be 7.1 GHz with a return loss of -17 db (adjoining figure). The inset plot shows the time signals which describe the mode amplitudes at the waveguide ports. The same set-up is used to demonstrate the energy harvesting and pressure sensor applications.

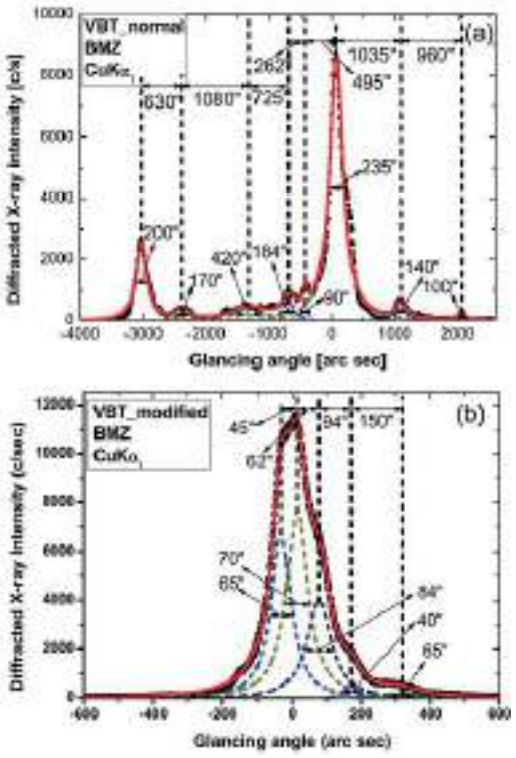
Effect of ampoule support on the growth of organic single crystals by vertical Bridgman technique for nonlinear optical (NLO) applications: a novel approach

Anuj Krishna, N. Vijayan*
Crystal Growth Section, CSIR-National Physical Laboratory (NPL), New Delhi-110012

A novel growth procedure is developed for the growth of Benzimidazole single crystal where a conventional glass ampoule was provided with a glass support at the base of the ampoule. Further, in order to avoid any air convection during the growth, alumina wool was inserted at the joint portion between the ampoule and the support (made of glass). The growth of single crystals using a conventional ampoule sometimes suffers from thermal fluctuations due to the thermal gradient along the length of the ampoule which leads to the development of stress and hence results in defects during growth. However an ampoule with a support arrangement reduces the spurious heat flow and maintains the proper thermal gradient and hence, tries to stabilise the melting flow in the radial direction. It also provides a way to have slow cooling (annealing). This in turn reduces the chances of the development of stress during growth thus minimizing the formation of stress-induced cracks in the crystal, hence leading to the periodic arrangement of atoms throughout the crystal lattice, providing comparatively better crystalline perfection.



(a) Schematic diagram of the furnace with the conventional ampoule and the ampoule with support inside it along with the actual thermal profile of the furnace used for the growth of the BMZ single crystals. (b) Schematic diagram of the temperature vs. time profiles inside of the conventional ampoule and the ampoule with support during the growth of the BMZ single crystals



Diffraction curves recorded for the BMZ single crystals using the (200) diffracting planes with CuKα1 radiation grown by: (a)conventional ampoule and (b) ampoule with support

Reference
[1] Anuj Krishna, N. Vijayan, Chandan Bagdia, Kanika Thukral, Sonia, D. Haranath, K. K. Maurya, G. Bhagavannarayana, Cryst. Eng. Comm. 18 (2016) 4844-4850.

Crystal Growth of InGaSb alloy Semiconductors under microgravity at International Space Station and comparison with terrestrial experiment

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$In_xGa_{1-x}Sb$ is one of the narrow band gap alloy semiconductor useful for thermo-photovoltaic and infra-red detector applications which demand high-quality crystals as substrate materials.[1] Moreover, the main advantage of $In_xGa_{1-x}Sb$ is that its lattice parameter and wavelength can be tuned in the range of 6.096 ~ 6.479 Å and 1.7 ~ 6.8 μm, respectively, by adjusting its composition ratio. However, it is difficult to grow high-quality $In_xGa_{1-x}Sb$ bulk crystals because the solute and heat transport are influenced by convection, which affects the quality of the crystals.[2] Microgravity (μG) is a suitable environment for investigating the solute transport and growth kinetics.[3] Under μG conditions, it is quite feasible to suppress the complex convective heat and mass transports to gain deeper insight into the transport phenomena. The purpose of the "Alloy Semi Project" was to elucidate the factors which are affecting the crystal growth of a high-quality bulk ternary alloy semiconductor under mG conditions at the ISS. The overview of the project and the main results of the microgravity experiment are given in the present review.

A serious of GaSb/Te-doped InSb/GaSb sandwich samples with different orientation of GaSb seed and feed crystals were used for the growth of the $In_xGa_{1-x}Sb$ bulk crystal under μG at the ISS by vertical gradient freezing method.[4,5] The same experiments were conducted in the laboratory under 1G condition for comparative analysis.[6,7] GaSb single crystals with different orientations of <100>, <110> and <111> were grown by the Czochralski method for the preparation of sandwich samples.[7] Based on the reference temperature (measured by the thermocouple) and the temperature gradient, the temperature at the GaSb seed interface was determined and controlled. To measure the growth rate of the crystal, several numbers of heat pulses were periodically introduced during the growth process after 3 h at 700 °C. By applying this kind of heat pulse, the Te concentration was modulated and striations were introduced in the grown crystal. The grown crystals were cut along the growth direction and polished with alumina powder to obtain a mirror finished surface. The polished samples were etched in a 1:3:1 solution of HF: $KMnO_4$: CH_3COOH for 30 min at room temperature to observe the Te impurity striations and etch pits. The composition profiles, interface shapes, and striations of the grown crystals were analysed by Electron Probe Micro Analysis (EPMA), polarized optical microscopy, and Field Emission Scanning Electron Microscope (FE-SEM).

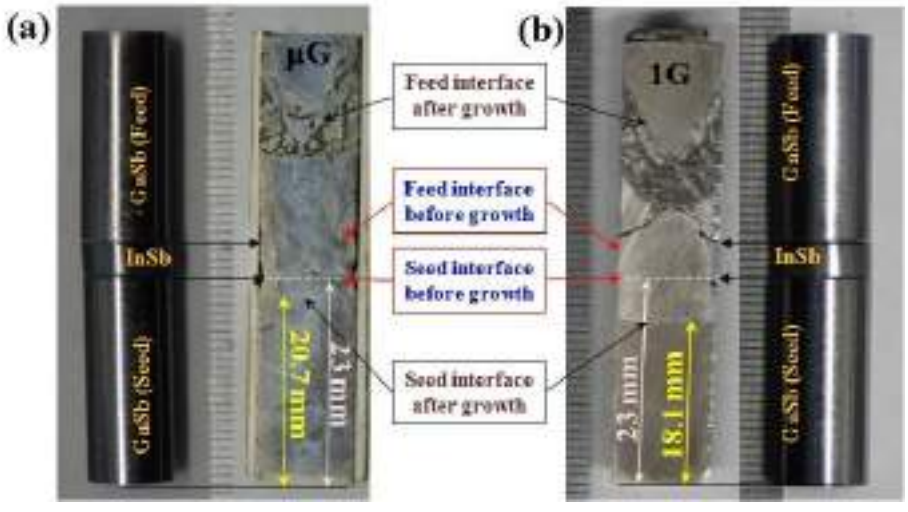

Figure 1(a) and 1(b) Cross section of μG and 1G samples grown from GaSb(111)A seed crystal.

As can be seen from Figure 2a, the interface shape of the μG sample was slightly concave toward the seed end and symmetric. However, the interface shape of the 1G sample was nearly flat with steps at the peripheries (Figure 2b and c). Moreover, the angle of steps one and two (Figure 2d) are around 70° , which confirmed that both steps were in the (111) plane. This shows that the kinetics played a more dominant role in the dissolution process under 1G when compared with μG. The etch pit density (EPD) was calculated by counting the pits in both samples with respect to seed and grown crystals. The EPD was higher for the seed crystals in both samples because the seed crystals are grown by the Czochralski method at high temperature. The EPD was lower in the grown crystal under μG ($2.16 \times 10^4/cm^2$) compared with that grown under 1G ($2.72 \times 10^4 /cm^2$). The composition profile clearly indicates that $In_xGa_{1-x}Sb$ crystal grew under μG from 20.2 to 35.1 mm; thus, the length of the grown crystal was 14.9 mm. However, the crystal grew under 1G from 18.0 to 30.6 mm, with a grown length of 12.6 mm. The growth rate of the μG sample was 0.135 mm/h at 0.5 mm of grown length, increasing to a maximum of 0.16 mm/h when the grown length reached 2.4 mm, and the growth rate became stable after the grown length of 3 mm. The diffusion-controlled steady state growth continued for the next 6 mm of grown length.

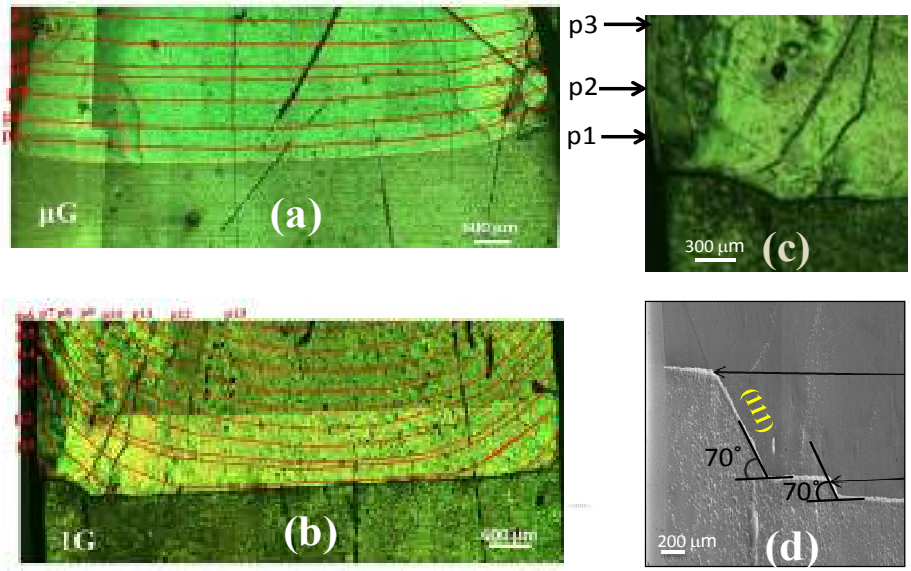

Figure 2: Optical micrograph of the un-dissolved seed interface of μG (a) and 1G (b, c) and SEM image of 1G (d) samples.

$In_xGa_{1-x}Sb$ alloy crystal was grown under μG at the ISS using a GaSb (111)A/Te-doped InSb/GaSb (111)A sandwich sample using a vertical gradient freezing method. A similar experiment was conducted under 1G on Earth. The dissolution and growth processes of μG and 1G samples were comparatively analysed. The kinetics played a dominant role in dissolution process under 1G, as steps were observed at the peripheries of the seed interface. The seed interface of the μG sample was highly symmetric and slightly concave. The growth started at the peripheries under 1G, which can be explained using the calculated flow velocity of the solution at high temperature. The growth rate was higher under μG compared with 1G. The quality of the μG sample was better, as low EPD was observed compared with the 1G sample. The suppressed convection under μG affected the dissolution and growth process of this alloy semiconductor.

Reference

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Crystals in my gallbladder

(This is to alert our Crystal Growth community to have good health)

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Tirunelveli-627152, Tamilnadu

I have been doing and guiding research on crystalline materials (preparation and characterization of single crystals, poly crystals and nano crystals) for the past about 35 years. The crystals (including whevellite, brushite and struvite-urinary stone crystals) were prepared/grown in the laboratory. Now, let me share my experience in growing (*in vivo*) stone crystals in my gallbladder. I have been a diabetic (type II) patient for about 20 years taking the prescribed tablets with reasonable diet control. However, the sugar level in blood was not under control due to lack of proper physical exercise. Blood pressure and cholesterol level in blood were under control. But, the micro albumin level in urine was not under control. This was expected to cause kidney, heart, etc problems. If these organs are not affected, then micro nerves may be affected. In my case, it is that the micro nerves might be affected but not the other organs. About 10 years back I was having jaundice and got cured. This might have induced crystal nucleation in my gallbladder. Moreover, I had undergone a major surgery in 1986 (to reduce a large diaphragmatic hernia in the right side). This problem came to me due to an accident I met in 1961. That is, it was properly known only after 25 years. Most of my inside parts were placed in proper position during the first surgery which was first of its kind and Dr. Nicolas V. Zekos (Riverside Community Hospital, California, USA) told me that he was going to publish this surgery in a medical journal. I do not know whether he published or not.

Recently, I became sick with abdominal pain and was hospitalized (in Apollo Speciality Hospital, Tiruchirappalli-10) because I had grown (A good crystal grower !) four big size stones (normally we consider as stone crystals) along with some tiny ones in my gallbladder, two of which (size about 1.2 × 1.1 × 0.4 cm^3) (an ERCP picture of them is shown below) had entered into the food tube (bowel) along with so much puss (leading to some infection). The puss and stones in food tube were removed through endoscopic surgery. Also, jaundice developed. The other stones along with gallbladder were removed laparoscopically after getting cured from jaundice. Size of the second large stone is about 2.0 × 1.5 × 1.2 cm^3 (a photograph of it is shown below). The largest one was about 1.5 times larger than the above and so could not be removed laparoscopically. So, it was smashed into pieces and removed along with the tiny ones. As no fluid was found in the gall bladder along with stones, we can consider that a method similar to Sankaranarayanan-Ramasamy (SR) method had been used to grow the crystals in my gall bladder (but *in vivo* crystallization). Anyway, with the blessings of God, I am OK now.

Gallstone crystals are pieces of solid material that form in the gallbladder, a small organ located under our liver. The presence of stones in the gallbladder is referred to as cholelithiasis. We might not even know we have them until they block a bile duct, causing pain that we need to get treated right away. They are of two main kinds (in addition to the mixed ones):

- ***Cholesterol stones*** (These are usually yellow-green in colour and are the most common kind accounting for 80 % of gallstones).
- ***Pigment stones*** (These are smaller and darker and are made up of bilirubin, which comes from bile, a fluid our liver makes and our gallbladder stores) (***Crystals grown in my gallbladder are expected to be of this kind***).

Symptoms of gallstone complications may include pain of more than five hours duration, fever, yellowish skin, vomiting, or tea-colour urine. Risk factors for gallstones include birth control pills, pregnancy, a family history of gallstones, obesity, diabetes, liver disease, or rapid weight loss. Bile can be a part of the problem. Our body needs bile, but if it has too much cholesterol in it, that makes gallstones more likely. It can also happen if our gallbladder can't empty properly. Pigment stones are more common in people with certain medical conditions, such as ***cirrhosis*** (a liver disease) or blood diseases such as ***sickle cell anemia***. Rarely, in cases of severe inflammation, gallstones may erode through the gallbladder into adherent bowel potentially (***as happened in my case***) causing an obstruction termed ***gallstone ileus.*** Other complications include ***ascending cholangitis*** if there is a bacterial infection which can cause purulent inflammation in the biliary tree and liver, and ***acute pancreatitis*** as blockage of the bile ducts can prevent active enzymes being secreted into the bowel, instead damaging the pancreas. In addition to pain, nausea, and vomiting, a person may experience a fever. If the stones block the duct and cause ***bilirubin*** to leak into the bloodstream and surrounding tissue, there may also be jaundice (***as happened in my case***) and itching. This can also lead to confusion. If this is the case, the liver enzymes are likely to be raised.

Diagnosis involves the following:

1. Blood tests to check for signs of infection or obstruction, and to rule out other conditions.
2. Ultrasound scan makes images of the inside of our body (***In my case, this failed due to my body condition***).
3. CT scan allows to see inside our body including our gallbladder.
4. Magnetic resonance cholangiopancreatography (MRCP) test uses a magnetic field and pulses of radio-wave energy to make pictures of the inside of our body including the liver and gallbladder.
5. Cholescintigraphy (HIDA scan) test can check on (by injecting a harmless radioactive material into the organ) whether the gallbladder squeezes correctly.
6. Endoscopic ultrasound test combines ultrasound and endoscopy to look for gallstones.
7. Endoscopic retrograde cholangiopancreatography (ERCP), based on inserting an endoscope through our mouth down to the small intestine and injecting a dye to allow the bile ducts to be seen, can be used to remove any gallstones that have moved into the bile ducts (***Two stone crystals in bowel and puss were removed by this procedure in my case***).

Many people with gallstones get surgery to take out the gallbladder. There are two different kinds of operations:

1. Laparoscopic cholecystectomy is the more common procedure in which the surgeon passes instruments, a light, and a camera through several small cuts in the belly and views the inside of the body on a video monitor (***Gall bladder and the stone crystals inside it were removed by this procedure in my case***).
2. Open cholecystectomy is a relatively old technique in which the surgeon makes bigger cuts in the belly to remove the gallbladder.

Prevention is by maintaining a healthy weight and eating a proper diet. Moreover, it is better to control (***through proper physical exercise***) our sugar and cholesterol levels in blood and micro albumin level in urine to protect us. If there are no symptoms, treatment is usually not needed. In those who are having gallbladder attacks surgery to remove the gallbladder is typically recommended. This can be either done through several small incisions or through a single larger incision. Surgery is typically done under general anesthesia. In those who are unable to have surgery, medication to try to dissolve the stones or ***shock wave lithotripsy*** may be tried. The downside of using medication is that we may have to take it for years to completely dissolve the stones, which may come back after we stop taking the drug.

I sincerely hope that the information given above may be useful to our Crystal Growth community to maintain a healthy life. Let us hope for the best to happen in our life.

Development of tissue equivalent materials - europium (Eu) and dysprosium (Dy) doped lithium potassium tetraborate ($LiKB_4O_7$) single crystals for TL personnel dosimetry applications

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Thermoluminescent dosimeters (TLDs) are radiation detectors that are very significant for biological applications. The absorption of harmful radiations by the biological tissues of human beings is carefully monitored by personnel dosimeters. Lithium potassium tetraborate ($LiKB_4O_7$) seems to be more attractive for personnel and medical dosimetry purposes. This is mainly due to the effective atomic number of this compound Z_{eff} = 8.07, which is nearly close to that of biological tissue (Ze_{ff} =7.39). Therefore, research on tissue equivalent materials – europium doped lithium potassium tetraborate (Eu:$LiKB_4O_7$) and dysprosium doped lithium potassium tetraborate (Dy:$LiKB_4O_7$) was attempted. The Eu:$LiKB_4O_7$ and Dy:$LiKB_4O_7$ polycrystalline compounds were synthesized by standard high temperature solid - state reaction method. The single crystal growth was performed by Czochralski technique. The grown crystals are shown in the figure a and figure b.

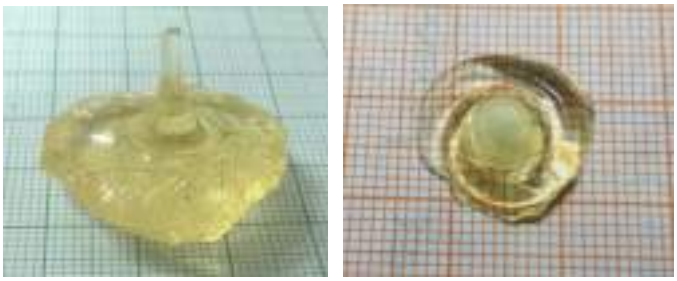

Figure a) As grown Eu:$LiKB_4O_7$ single crystal (Diameter 31 mm; Height 13 mm) b) As grown Dy: $LiKB_4O_7$ single crystal (Diameter 16 mm; Height 05 mm).

TL characteristics of Eu:$LiKB_4O_7$ and Dy:$LiKB_4O_7$ have been studied after γ-ray irradiation by ^{60}Co source at room temperature with 26 Gy dose. Generally it is desired that the glow curve gives a single glow peak at 180°C-250°C. TL glow peaks of the grown crystals were found to occur at 184°C (Eu:$LiKB_4O_7$) and 181°C (Dy:$LiKB_4O_7$). The TL response curve of Eu:$LiKB_4O_7$ and Dy:$LiKB_4O_7$ samples exposed to different doses (26, 52, 78, 104, 130 and 156 Gy) of gamma irradiation. The TL response in terms of intensity is increased linearly with increase in the gamma dose from 26 Gy to 156 Gy for grown Eu:$LiKB_4O_7$ and Dy:$LiKB_4O_7$ single crystals and are shown in the figure c and figure d. The TL glow curve structure of the samples remained stable for higher doses of ^{60}Co source. The fading effect was studied over a period of 270 min. For light fading studies, we have exposed 26 Gy gamma irradiated Eu:$LiKB_4O_7$ and Dy:$LiKB_4O_7$ crystalline samples under room light. TL signals of grown crystals are almost stable and very slow signal losses observed in the room light after 270 min. Due to single glow peak at ambient temperature, linear dose response as a function of various gamma doses and also very low fading rate in room light exposes of irradiated samples, Eu:$LiKB_4O_7$ and Dy:$LiKB_4O_7$ single crystals are potential candidates to be used as a TL personnel dosimeter.

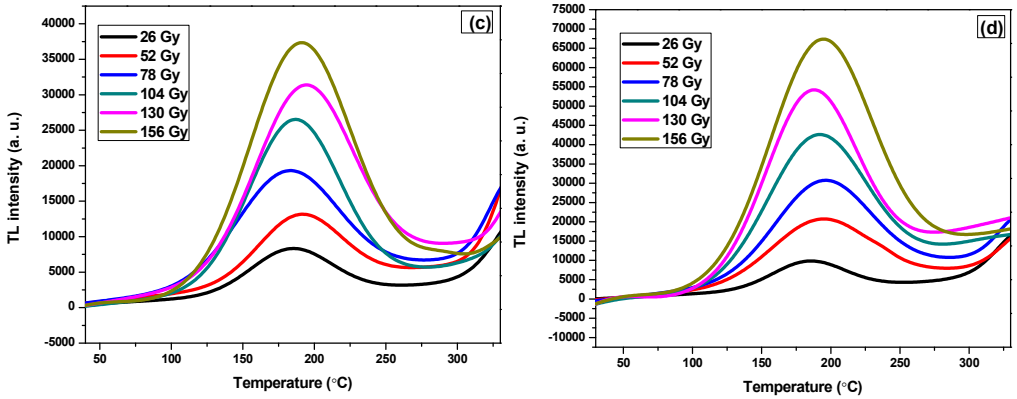

Figure TL response c) Eu:$LiKB_4O_7$ single crystal d) Dy:$LiKB_4O_7$ single crystal as a function of the various γ-doses

Bridging Terahertz Gap in Electromagnetic Spectrum

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Terahertz waves have attracted worldwide attention as they find applications in the fields such as basic and applied physics, biological, medical, communications and security. However, this THz region remained elusive in the electromagnetic spectrum due to lack of suitable and efficient sources and detectors and this gap is referred as "THz Gap". Although there are presently a range of methods available for the generation and detection of THz waves, only few of them, such as Photoconductive (PC), free electron laser (FEL), Optical Rectification (OR), Difference Frequency Generation (DFG) are found to be of efficient and they can facilitate to narrow down the "Gap" in the electromagnetic spectrum. The OR and DFG methods depend mainly on the availability of highly efficient nonlinear optical (NLO) methods.

Attempts were made to generate the THz waves in India by employing highly efficient organic NLO single crystals such as DAST, DASC, BNA which could lead to indigenous approach. The starting materials were synthesized in the laboratory and the crystals were grown by isothermal solvent evaporation method in a suitable growth chamber. The preliminary results on growth of DAST and BNA crystals (Fig. 1(a) and (b)) are encouraging and thus ensuring possible realization of THz waves in an efficient (~2.5 times ZnTe) manner (Fig 1 (c)).

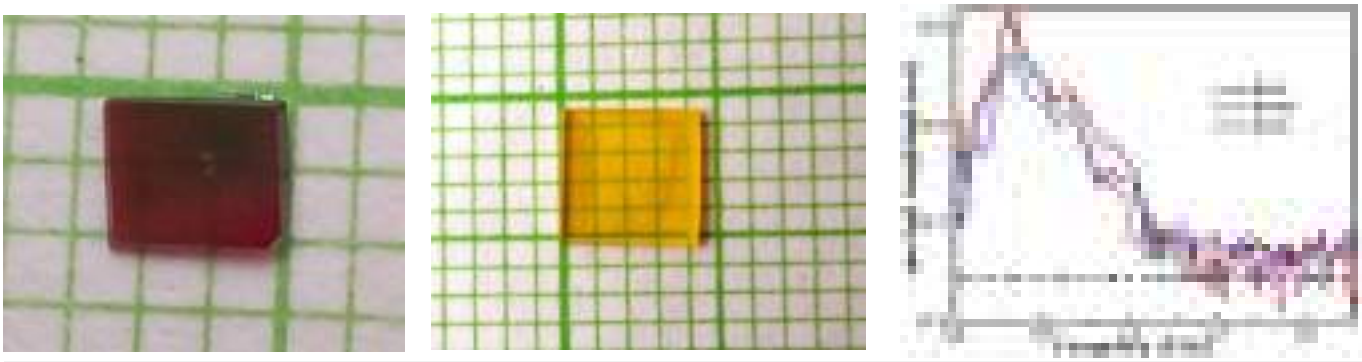

Figure 1 (a) DAST, (b) BNA and (c) THz waves

Growth of type-I and type-II SHG device oriented flat-top KDP crystals

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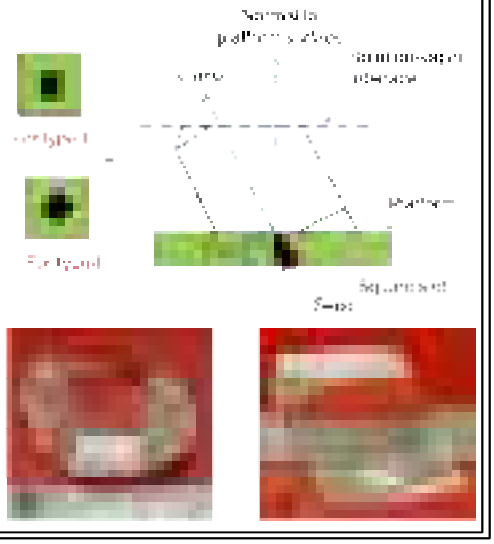
Flat-top technique for KDP crystals where c-oriented seed was grown between the platform and solution-vapor interface to enhance usable volume fraction by eliminating less usable pyramidal cap portion. The grown crystal contains almost 100% volume usable for Pockels cell application and an enhanced usable percentage frequency conversion application as compared to the conventional morphology KDP crystal. However to improve the SHG device yield of the grown crystal further, a novel methodology has been developed based on selectively orienting the natural morphology c-oriented point seed on the growth platform. This methodology of orienting seed was used successfully for the growth of type-I and type-II SHG oriented flat-top KDP crystals are shown in Fig. The elements were characterized for optical quality and SHG efficiency.



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FORTH-COMING EVENTS IN CRYSTAL GROWTH

- International Conference on Materials and Methods in Crystal Growth, Italian Crystal Growth Association, 20-21st November 2017, University of Milano Bicocca, Milano, Italy
  Web: http://sites.unimi.it/ICG2017/index.html
- Gordon Research Conference on Crystal Growth & Assembly, 25-30st June 2017, University of New England, Biddeford, ME, USA
  Web: http://www.grc.org/programs.aspx?id=12674
- 7th International Workshop on Crystal Growth Technology, 2-6th July 2017, Potsdam (near Berlin), Germany
  Web: https://iwcgt-7.ikz-berlin.de/
- International Summer School on Crystal Growth and Advanced Materials for Energy, 10-15th July 2017, Bucharest, Romania.
  Web: http://rocam.unibuc.ro/rocam2017/intschool/index.php
- 2nd International Workshop on Gallium Oxide and Related Materials (IWGO-2017), 13-15th September 2017, Parma, Italy
  Web: http://www.iwgo2017.unipr.it/
- 21st American Conference on Crystal Growth and Epitaxy (ACCGE-21), 30th July – 4th August 2017, Santa Fe, New Mexico, USA
  Web: http://www.crystalgrowth.org/Santa-Fe.html
- 48th British Association of Crystal Growth (BACG), Annual Conference, 27-30th June 2017, University of Manchester, Manchester, UK
  Web: http://www.bacg-2017.co.uk/home
- 20th International Symposium on Industrial Crystallization, 3-6th September 2017, University College Dublin, UCD Campus, Ireland
  Web: http://isic20.com/
- 19th International Conference on Crystal Growth & Epitaxy (ICCGE-19), 28th July – 2nd August 2019, Keystone, Colorado, USA
  Web: www.crystalgrowth.org
- 17th International Summer School on Crystal Growth (ISSCG-17), 21-27th July 2019, Colorado, USA
  Web: www.crystalgrowth.org
- National Workshop on Theory and Practice of X-Ray Diffraction Techniques, 25-27th May 2017, Department of Physics, Alagappa Chettiar College of Engineering & Technology, Karaikudi-630004, Tamilnadu
  Web: http://www.accet.edu.in/
- International Conference on Advances in Materials (ICAM-2017), 7th April 2017, Department of Physics, M.Kumarasamy College of Engineering, Karur-639113, Tamilnadu
  Web: http://www.mkce.ac.in/

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**

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**

Your commitment to crystal growth is taller than Everest
Your love for your research scholars is deeper than Pacific

Dr. R. Gopalakrishnan

(8.9.1965 – 15.4.2016)

Associate Professor

Crystal Research Laboratory (CRL)

Department of Physics

Anna University, Chennai-600025, Tamilnadu

Hard work pays off later, the reason being, a perfection is stable that can be attained after a certain duration whereas shortcuts can bring instant results, but they are not consistent. **Dr. R. Gopalakrishnan** is one of the legends who earned his expertise after contributing over 26 years. His passionate love and attraction for crystals made him a keen worshiper of the subject. Most of us might be knowing Dr.R.Gopalakrishnan, but for some, he might be still unknown. Yet it is perpetually refreshing to reflect on his life, which is an infinite source of inspiration. Let us find out, who is he and what makes him so special and how his contribution holds a special place in the field of Crystal Growth.

Dr.R.Gopalakrishnan (hereafter RG) was born on 8th September 1965 in a village named Sammatividuthi near Pudukottai. His mother's name was R.Lakshmi and his father's name was K.Rengasamy. He was a farmer. K. Rengasamy and R. Lakshmi had 7 children. He is the eldest son. RG Matriculated in the age of 15. In the year 1982, he joined in H.H.The Rajah's College Pudukottai to pursue his Bachelors in Science (Physics) and came out with flying colors. Consequently he pursued his M.Sc (Material Science) in the Department of Physics, Anna University and completed in the year 1988.

He started his career as a Technical Assistant in the Department of Physics, Anna University Chennai in February 1989 and subsequently he did Ph.D. under the guidance of Prof. P. Ramasamy in Crystal Growth Centre, Anna University, Chennai. The relation between the Guru and the disciple is extremely sacred, everlasting and spiritual. There is no worldly relationship to which it can be compared. The true and ideal disciple's devotion to his Guru excels the devotion that an ideal son has for his father, an ideal Pativrata has for her husband, a most loyal servant has for his master. Therefore, Guru Bhakti and Guru Seva are indispensable for one's success. Dr.R.Gopalakrishnan was a real embodiment and an example of how a true disciple should be. His piety towards his guru is always worth mentioning.

Dr.R.Gopalakrishnan handing over the Memento to **Prof.R.Jayavel** in NSRTCGN-2013 at The National College, Trichy on 13-15th March 2013

Dr.R.Gopalakrishnan handing over the Memento to **Prof.P.Ramasamy** in XVII NSCG-2013 held at Anna University, Chennai on 9-11st January 2013

Invited Speakers with **Dr.R.Gopalakrishnan** in XVII NSCG held at Anna University, 9-11 January 2013

Dr. R. Gopalakrishnan receiving the **Active Researcher Award-2013** from **Prof. M. Rajaram**

Dr.R.Gopalakrishnan started his research work in the field of Crystal Growth. This was a lesser known subject of research during those days, and very few material scientists were working in this area. In connection with his choice for the research field that was not in vogue, it is appropriate to quote following lines from a poem of Robert Frost

Two roads diverged in a yellow wood And sorry I could not travel both
I took the one less travelled by
And that has made all the difference.

He made a remarkable contribution in the areas of Crystal Growth and gave them a distinct identity. He was awarded Ph.D. in the year 1999. He bagged many laurels, to name a few AIST Fellow (1999-2000) (Agency of Industrial Science and Technology), Japan, Young Scientist Awardee (1998) (International Union of Crystallography-IUCr), IHP-ESRF Visiting Fellow (1998), France, VW-Stiftung Fellow, Germany (1998), Young Scientist Awardee (1996) (Tamil Nadu State Council for Science and Technology) for his contributions in Crystal Growth.

In the world of research and academia Dr.R.Gopalakrishnan is an internationally acclaimed personality. He has published around 300 research articles and 5 books on Crystal Growth and various other subjects. A large number of Post Graduate Students and Doctoral students have the privilege of working under his supervision. More than 100 research students completed their PG (M.Sc, M.Tech and M.Phil) Dissertation work under the supervision of Dr.R.Gopalakrishnan. Nearly 25 Students have completed their Ph.D. under his Supervision. He has handled externally funded research projects to the tune of Rs.1 crore from renowned funding agencies in India. He was a member of the Editorial Boards of large number of prestigious International journals dealing with Crystal physics, spectroscopy, solid state physics and material science. He was a recipient of Active Researcher Award 2013 by Anna University, Chennai, Tamil Nadu Scientists Award (TANSA) for the year 2009 by Tamil Nadu State Council for Science and Technology (TNSCST), Fellow of Tamilnadu Academy of Sciences, IACG Prof.P.Ramasamy National Award for Crystal Growth for the year 2005.

In addition to his glorious research activity, he took time to think and do something for the bright future of young students, young scientists and for the bright future of the country as a whole. In addition to his deep involvement in research, teaching and writing work, Dr.RG is a true patriot having serious concern for the progress of India. He firmly believed that proper attention towards the progress of Science and Technology is essential for the development of a Nation and its citizens.

- IACG & Students of Dr. R.Gopalakrishnan

BEST PAPER AWARDS

Dr.S.K.Sharma, RRCAT, Indore received **BEST CRYSTAL DISPLAY AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

A.K.Singh, CTS, BARC, Mumbai received **BEST CRYSTAL DISPLAY AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

A. Silambarasan, SSN RC, Chennai received **BEST CRYSTAL DISPLAY AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

G.D. Patra, CTS, BARC, Mumbai received **BEST ORAL PRESENTATION AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

Dr.S.R.Thilagavathi, Hindustan University, Chennai received **BEST POSTER AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

D.G.Desai, BARC, Mumbai received **BEST POSTER AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

Dr.Harsh Yadav, University of Delhi, Delhi received **BEST ORAL PRESENTATION AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

Dr.Gunjan Verma, BARC, Mumbai received **BEST POSTER AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

Dr.Dillip Maske, Department of Physics, D.G.Ruparel College, Mumbai received **BEST POSTER AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

Dr.C.L.Prajapat, BARC, Mumbai received **BEST POSTER AWARD** in the XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) held at BARC during 19-21st January 2016

L. Jayanthi, Sri Sarada College for Women, Salem received Cash Prize for **BEST POSTER PRESENTATION AWARD** in the NCECMS-2016 held at Muthayammal College of Arts & Science, Rasipuram on 27-28th January 2017

Mr.Karthick, Department of Physics, Sacred Heart College, Tirupattur received **BEST PAPER PRESENTATION AWARD** in the NCCPCM-2016 held at Govt. Arts College, Tiruvannamalai during 4-5th August 2016

M.Logu, School of Physics, MK University received **BEST POSTER PRESENTATION AWARD** in the UGC Sponsored ICRTMSA held at Department of Physics, Sri Meenakshi Govt. Arts College for Women, Madurai during 6th January 2017

T. Solaiyammal, Pachaiyappa's College received **BEST POSTER PRESENTATION AWARD** in the UGC Sponsored ICRTMSA held at Department of Physics, Sri Meenakshi Govt. Arts College for Women, Madurai during 6th January 2017

S.Karthick, BIT-Anna University received **BEST POSTER PRESENTATION AWARD** in the UGC Sponsored ICRTMSA held at Department of Physics, Sri Meenakshi Govt. Arts College for Women, Madurai during 6th January 2017

N.Marimuthu, Vellammal Engg. College received **BEST POSTER PRESENTATION AWARD** in the UGC Sponsored ICRTMSA held at Department of Physics, Sri Meenakshi Govt. Arts College for Women, Madurai during 6th January 2017

Dr. J. Thomas Joseph Prakash received **BEST POSTER PRESENTATION AWARD** in the UGC Sponsored ICRTMSA held at Department of Physics, Sri Meenakshi Govt. Arts College for Women, Madurai during 6th January 2017

L. Jayanthi, Department of Physics , Sri Sarada College for Women, Salem received **BEST POSTER PRESENTATION AWARD** in the GAMES-2016 held at Department of Physics, M.Kumarasamy College of Engg., during 4th March 2016

P.Vijayakumar, SSN RC, Chennai received **BEST ORAL PRESENTATION AWARD** in the NCNP-2016 held at Department of Physics, Bharathidasan University during 18-19th March 2016

L. Jayanthi, Sri Sarada College for Women, Salem received Cash Prize for **BEST PAPER PRESENTATION AWARD** in the NCESDMT-2017 held at Chikkanna Government Arts College, Tiruppur, Tamilnadu during 19-20th January 2017

R.Niranjana Devi, Department of Physics, The American College, Madurai received **BEST ORAL PRESENTATION AWARD** in the ISMSA-2016 held at Department of Physics, Mother Teresa Women's Univ., during 27th November 2016

A. Jennifer Christy, PG & Research Department of Physics, Bishop Heber College received **BEST PAPER AWARD** in the NCNP-2016 held at School of Physics, Bharathidasan University, Tiruchirappalli during 18-19th March 2016

T.Gayathri, GRD Centre for Materials Research, PSG Tech. received **BEST PAPER AWARD** in the Materials Science Conference held at PG and Research Department of Physics, Sacred Heart College, Tirupattur during 1st December 2016

K.Mariselvam, GRD Centre for Materials Research, PSG Tech. received **BEST PAPER AWARD** in the Materials Science Conference held at PG and Research Department of Physics, Sacred Heart College, Tirupattur during 1st December 2016

CONFERENCE HIGHLIGHTS

XX National Seminar on Crystal Growth & Applications (XX NSCGA-2016) in association with Indian Association for Crystal Growth (IACG), January 19-21, 2016

Technical Physics Division, BARC, Mumbai-400085, Maharastra

The '20th National Seminar on Crystal Growth and Applications' was organized by TPD, BARC during 19th to 21st January 2016 at the multipurpose hall, TSH. This was partially supported by the 'Board of Research in Nuclear Science (BRNS)' and the 'Materials Research Society of India- Mumbai Chapter (MRSI). This was the 20th in the series of such seminars dedicated to crystal growth and held at various universities working in this area of research. This was the first time that it was held at BARC. **Dr. S. C. Gadkari**, OS & Head CTS, TPD was the chairman NSCGA-2016 of the conference with **Dr. Shashwati Sen** acting as the Convener NSCGA-2016 and **Dr. Mohit Tyagi** the secretary NSCGA-2016. Dr. Srikumar Banerjee, Former Chairman, Atomic Energy Commission and Secretary to the Department of Atomic Energy (DAE), was the chief guest in the inaugural function. He also unveiled the proceedings of the seminar. **Dr. S. M. Sharma**, Director Physics Group gave the inaugural address and **Dr S. K. Gupta** gave the welcome address. The newsletter of ***Indian Association for Crystal growth (IACG), Issue-28*** was unveiled by **Dr. G. P. Kothiyal**, Chairman of MRSI-Mumbai Chapter. The industrial exhibition was inaugurated by **Dr. R. K. Sharma**, Director, SSPL, New Delhi. The keynote address was given by **Dr. V. Nagarkar**, Vice-President, Radiation Monitoring Devices, USA.

Total 157 manuscripts were received from all over the country working on crystal growth and related fields. Manuscripts were invited under 8 different topics ranging from growth of single crystals, Nano crystals to devices based on single crystals for societal benefits. The application of crystals for device fabrication was specially emphasized in the seminar. Around 150-175 participants from all over the country attended the seminar and presented their work. There were 15 invited talks given by eminent scientist coming from across the globe as well as throughout the country.

Beside this there were two evening talk given by **Dr. S. K. Gupta**, Associate Director Physics Group, BARC and **Dr.B.N.Jagtap**, Director Chemistry Group, BARC. To synergize the interaction between the researchers and industry an industrial exhibition was also organized in which 10 companies participated. One local industry also gave industrial presentation pertaining to their products for Crystal Growth equipment.

The participants presented their work in the form of posters and 10 oral presentations. Participants also contributed in two award categories; '**Young Crystal Grower Award**' and '**Best Crystal/Device Display Award**'. There were four entries in each of these categories and two awards were given in each of the above categories. Four best poster awards and two best oral award were also given to motivate the students to perform better. The conference covered a wide range of topics in the field of single crystal growth, their applications and technologically important devices based on the single crystals. Interesting devices showcasing the application of crystals were displayed at the conference. The participants were highly interested in the technological aspects and were keen to take up research which can have direct implications to society.

Dr. Shashwati Sen
Scientific Officer-F
Crystal Technology Section, Technical Physics Division (TPD)
Bhabha Atomic Research Centre (BARC), Mumbai-400 085

(From BARC News Letter)

CONFERENCE HIGHLIGHTS

National Conference on Computational and Experimental Physics of Functional Materials (NCCEPFM-2016), December 16-17, 2016

Department of Physics, KSR College of Arts and Science for Women (KSRCASW), Tiruchengode-637215, Namakkal, Tamilnadu

Department of Physics of KSR College of Arts and Science for Women organized a two days National level conference on Computational and Experimental Physics of Functional Materials on 16 & 17 December 2016 with a financial assistance of DST-Serb. Totally 162 participants from various educational institutions and 165 participants from KSRCASW were attended the conference. The Inauguration started with the blessings of almighty god. **Dr.M.Karthikeyan**, Principal of KSRCASW welcomed the gathering. Emeritus **Prof.Ganapathy Baskaran,** Institute of Mathematical Sciences, Chennai, acted as a Chief guest for this conference. **Lion. Dr.K.S. Rangasamy** MJF, and **Mr.R.Srinivasan**, Secretary, KSR Educational institutions presided over the function. **Ms.J.Hepzhibah**, Convener of NCCEPFM shared about the view and goals of organizing the conference. Dr.V.Radhakrishnan, Principal, K.S.Rangasamy college of arts and science has felicitated the gathering. On behalf of **Elavenil organization**, Chennai, Emeritus Prof. Ganapathy Baskaran from Institute of mathematical Sciences honored **Prof. P. Ramasamy**, Dean, SSN Institutions and **Prof. M. Lakshmanan,** Professor, Centre for Nonlinear Dynamics, Bharadhidasan University, Trichy by dedicating ***Life Achievement Award*** to them. After that **Prof. Rita John** from University of Madras has published the book "Nobel Parisu Vendra Vethiyiyal Vinniyanigal" written by **Ms. S. Jothimani**, Assistant Professor of Chemistry, KSRCASW and delivered a most inspirational and motivational talk for the empowerment of the students especially for the benefit of women students.

Prof.P.Ramasamy delivered a talk on Optical imaging during unidirectional crystal growth and development of high quality NLO single crystals for device applications. Followed by him Prof.M.Lakshmanan has briefed about Nonlinear physics and Nanoferromagnetism. Prof. Rita John gave an insight into the impact of buckling in two dimensional materials with reference to graphene. Followed by her talk participants from various institutions were presented their research papers orally as well through poster mode. After the lunch the session starts with a talk on Nanostructured thermoelectric materials for waste heat recovery which was given by Dr.M.Arivanandhan. Mr.M.Srinivasan, SSN institutions has shared his view on Modeling for solar cell applications which is most essential for the entire globe. Prof.P. Kolandhaivel, Bharathiyar University delivered the talk; in his talk he elaborated the role of Amyloid β -Peptides in Alzheimer disease. Dr.N.Vijayan, NPL, New Delhi enunciated about the technologically important single crystals for Energy generation. Technical Session of second day starts with a talk of Prof. R. Jayavel, Director (Research), Anna University. He explained how Graphene metal oxide nanocomposite is used in the energy and environmental applications. Followed by him Prof.K.Sankaranarayanan, Alagappa University briefed about the development of organic scintillator crystal generator. Dr. Muthu Senthil Pandian from SSN Institutions has delivered a talk on fabrication of DSSC and its applications. Dr.R.Sumathi, Munich University, Germany has delivered on Material Development for green house emission and green technology which is most important aspect for the world at present. After the lunch Dr.K. Gunasekaran, from Madras University gave a very energetic and powerful talk about Experimental physics and modern drug delivery and Dr.R.Ramesh Babu, Bharathidasan University has explained about bulk growth and characterization of organic single crystals by melt techniques. Finally, Best Oral & Poster Presentations were selected & awarded with a **"BEST PAPER AWARD"** and **"BEST CRYSTAL DISPLAY AWARD"** were given to the outstanding participants.

Dr. M. Karthikeyan
Principal
KSR College of Arts and Science for Women (KSRCASW), Tiruchengode-637215, Tamilnadu

CONFERENCE HIGHLIGHTS

International Conference on Materials Processing and Applications (ICMPA-2016), December 14-16, 2016

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

The International Conference on Materials Processing and Applications (ICMPA-2016) was held during 14-16 December 2016 in VIT University, Vellore with the collaboration of Akita University, Japan. The conference deals with the theme of Materials processing and Applications. The topic was so relevant that Advances in Materials are becoming day today affairs, for example grapheme, topological insulators, transparent conducting oxides and the Warm superconductors, Emerging crystals, Thin films, Polymer composites are not only important from the basic science and technology point of view but also in terms of products revolutionizing every sphere of Technological Advancements uplifting the humankind. The scientific mission of this conference offered a platform for scholars and young researchers from various disciplines to come together, present their recent finding and develop professional links aimed at collaborative research. The conference was made possible by dedicated team of organizers and the generous supports from the many sponsors.

The conference was a great success, attracting 350 participants and 60 speakers from Japan, Sweden, Germany, France, Poland and India. Accepted contributory papers are presented as Oral and Poster presentation. The ICMPA-2016 provided a wide platform for scientists, engineers, educators and students from research and various academic institutions and industries shared their ideas and presented their work in various fields of Material sciences such as Crystal growth, polymer science, Nanomaterials and Thin film. Interaction with the eminent personalities has been a great motivation to the research scholars and post graduate students who participated in the conference. Many novel and innovative ideas to reform the field of Material science and its applications were evolved through the discussions and sharing between the distinguished professors and renowned scientists. Thus, the scientists and researchers from various national laboratories, universities and research institutions of our country and foreign country were participated in the above seminar and discussed on the growth of single crystals, preparation of nanomaterials, thin films and fabrication of practical devices.

More than 370 authors have submitted their abstract and papers to be included in the conference. The peer review process has selected top hundred papers for publication in the scopus indexed periodical articles in the Mechanics, Materials Science & Engineering journal with impact factor 0.2, sponsored by National university of Mines, Ukraine.

Prof. S. Kalainathan
Director
Centre for Crystal Growth, VIT University, Vellore-632014, Tamilnadu

CONFERENCE HIGHLIGHTS

National Conference on Advanced Materials (NCAM - 2016),

October 7, 2016

Department of Physics, St. Joseph's College, Tiruchirappalli-620002, Tamilnadu

One Day National Conference on Advanced Materials was organized by the Department of Physics, St. Joseph's College on 7th October, 2016. It mainly focused on the upcoming and interesting fields such as Crystal Growth, Thin Films and Nanomaterials. National conference was inaugurated by **Rev. Dr. S. John Britto**, SJ Rector, St. Joseph's College. Around 300 students and research scholars were participated. **Prof. S. Antony Raj**, Head, Department of Physics welcomed the gathering, delivered a poignant discourse on the essence and spirit of the conference. **Dr. A. Leo Rajesh**, Organising Secretary, introduced the chief Guest **Prof. P. Ramasamy**, Dean, SSN Institutions. Conference souvenir was released by the rector and it was received by the chief guest. **Rev. Fr. S. John Britto, SJ Rector** honored the chief guest with a shawl and a memento. (Prof.Ramasamy spoke highly of his mentor Rev. Fr. S. M. Irudayam, SJ his HOD, Physics in St. Joseph's College, Trichy).

Key note address was delivered by the chief guest Dr. P. Ramasamy about the need of research in Crystal Growth. He gave a clear and brief knowledge about crystals and finding new materials for the benefit of the society. He showed his own grown crystals of large size and explained the parameters to grow them to the student participants. The first session was taken by **Dr. M. C. Santhosh Kumar**, Assistant Professor, NIT- Trichy delivered a talk on "Thin films for optoelectronics and photovoltaic applications". Being an expert in this field, he explored the methods of preparing thin films for solar cell applications. Next talk is started by **Dr. P. Thangadurai**, Assistant Professor, Centre for Nanoscience and Technology, Puducherry University on "Electron microscopy for nanomaterials". His speech included with the basics, need, applications and wonders of nanomaterials. **Dr. N. Siva Kumar**, Assistant Professor, Chikkaiah Naicker College, Erode shared the next session on " influence of grain size on thin film cathode materials for lithium ion batteries" followed by the lunch. Oral and poster presentations were held on various fields like crystal growth, thin films and nanomaterials. 81 abstracts have been submitted by the participants. The best presenter awarded with a prize and a certificate. **Dr. N. Lawrence** welcomed the gathering for the valediction. **Rev. Dr. A. Antony Pappuraj**, SJ, Secretary delivered the valedictory address. Rev.Fr. Secretary and Dr. P. Ramasamy issued the certificates and awards to the participants. The conference ended with the final Vote of Thanks by Dr. A. Leo Rajesh, Organising secretary. The conference NCAM 2016 concluded with the National Anthem.

Dr. Leo Rajesh
Associate Professor
Department of Physics, St. Joseph's College, Tiruchirappalli-620002, Tamilnadu

CRYSTAL GROWTH PROJECTS-2016

Dr. R. Arun Kumar, Associate Professor, GRD Centre for Materials Research, PSG College of Technology, Coimbatore-641004, Tamil Nadu

Project Title : Growth and Characterization of single crystals of potassium aluminium borate (KAB) – Potential materials for laser applications

Funding Agency : UGC **Year :** 2016-2018 **Amount :** Rs. 2.20 lakhs

Project Title : Research equipment for growing technologically important crystals/ Synthesis of Nanomaterials

Funding Agency : Industrial Collaborative Project, M/s. INDFURR Superheat Furnaces, Chennai **Year :** 2016-2018 **Amount :** Rs. 20.0 lakhs

PI: Dr. G. Anandha Babu, Assistant Professor, Department of Physics, SSN College of Engineering, Chennai-603 110, Tamilnadu

Co-PI: Prof. P. Ramasamy, Dean (Research), SSN CE, Chennai-603110, TN

Project Title : Growth and characterization of defect controlled topological insulator Bi_2Te_2Se and Bi_2-xSbxTe_3-ySey single crystals

Funding Agency: SERB **Year :** 2016-2018 **Amount :** Rs. 18.80 lakhs

Dr. Binay Kumar, Crystal Lab, Department of Physics and Astrophysics, University of Delhi, Delhi-110007

Project Title : Fabrication and characterization of piezoelectric nanocrystals organic hybrid sheet for energy harvesting and pressure sensor

Funding Agency: SERB **Year :** 2016-2019 **Amount :** Rs. 25.0 lakhs

Dr. P. Dhanasekaran, Assistant Professor, Department of Physics, Bharathiar University Arts and Science College, Erode-638109, Tamilnadu

Project Title : Nonlinear optical (NLO) and anti-bacterial applications of glycine and its derivatives

Funding Agency : SERB **Year :** 2016-2018 **Amount :** Rs. 24.42 lakhs

Dr. M. Jose, Assistant Professor, Department of Physics, Sacred Heart College (Autonomous), Tirupattur-635601, Vellore District, Tamilnadu

Project Title : Growth and investigation of potential DSTMS single crystals using z-scan technique

Funding Agency : UGC **Year :** 2016-2018 **Amount :** Rs. 3.19 lakhs

Dr. S. Kalainathan, Professor & Director, Centre for Crystal Growth, VIT University, Vellore-632014, Tamilnadu

Project Title : Investigation of luminescence property and scintillation mechanism of 1, 1, 4, 4-tetraphenyl- 1,3-butadiene organic scintillation single crystal for fast neutron detection

Funding Agency : SERB **Year :** 2016-2018 **Amount :** Rs.21.70 lakhs

Dr. P. Kalaiselvi, DST-Women Scientist, Department of Physics, St. Joseph's College, Tiruchirappalli-620022, Tamilnadu

Project Title : Explorations of endowed properties of DAST NLO crystals for THz generators

Funding Agency : DST-WOS-B **Year :** 2016-2018 **Amount :** Rs. 17.03 lakhs

PI: Dr. Muthu Senthil Pandian, Department of Physics & SSN Research Centre SSN College of Engineering, Chennai-603 110, Tamilnadu

Co-PI: Prof. P. Ramasamy, Dean (Research), SSN CE, Chennai-603110, TN

Collaborator: Dr. Sunil Verma, Scientific Officer-G, LMDDD, RRCAT, Indore

Project Title : High quality Unidirectional 4-nitrophenol (4NP) derivative single crystals for SHG device applications

Funding Agency: BRNS **Year :** 2016-2019 **Amount :** Rs. 30.0 lakhs

PI: Dr. Muthu Senthil Pandian, Department of Physics & SSN Research Centre SSN College of Engineering, Chennai-603 110, Tamilnadu

Co-PI: Prof. P. Ramasamy, Dean (Research), SSN CE, Chennai-603110, TN

Advisor: Prof. A.K.Barua, CEGESS, IIEST, West Bengal-711103, Kolkata

Project Title : Fabrication of stable Perovskite solar cells using inorganic hole transport crystalline materials

Funding Agency: DST-SERI **Year :** 2017-2020 **Amount :** Rs. 75.0 lakhs

Dr. S.P. Meenakshisundaram, Professor and Head, Department of Chemistry, Annamalai University, Chidambaram-608002, Tamilnadu

Project Title : Effect of Doped Phthalate Crystals for Nollinear optical applications

Funding Agency : SERB **Year :** 2016-2018 **Amount :** Rs.27.72 lakhs

Project Title : Synthesis, crystal growth, structure, characterization and supramolecular architecture of some mixed crystals and charge transfer complexes: NLO applications

Funding Agency : CSIR **Year :** 2016-2019 **Amount :** Rs.20.0 lakhs

PI: Dr. N.P. Rajesh, Assistant Professor, Department of Physics, SSN College of Engineering, Chennai-603110, Tamilnadu

Co-PI: Prof. P. Ramasamy, Dean (Research), SSN CE, Chennai-603110, TN

Project Title : Investigation on rare earth doped CsI single crystals for scintilation applications

Funding Agency: SERB **Year :** 2016-2019 **Amount :** Rs. 28.0 lakhs

PI: Dr. P. Rajesh, Assistant Professor, Department of Physics, SSN College of Engineering, Chennai-603110, Tamilnadu

Co-PI: Prof. P. Ramasamy, Dean (Research), SSN CE, Chennai-603110, TN

Project Title : Growth of direction controlled homogenous mixed crystals for optical applications

Funding Agency: CSIR **Year :** 2016-2019 **Amount :** Rs. 20.0 lakhs

Dr. S. M. Ravi Kumar, Assistant Professor, PG and Research Department of Physics, Government Arts College, Tiruvannamalai-606603, Tamilnadu

Project Title : Investigations on bimetallic thiocyanate ligand based nonlinear optical crystals $ZnCd(SCN)_4$, $ZnHg(SCN)_4$, $MnHg(SCN)_4$, $CdHg(SCN)_4$, $Hg_4CdBr_2(SCN)_6$ for Laser Applications

Funding Agency : SERB **Year :** 2016-2019 **Amount :** Rs. 27.0 lakhs

Dr. R. Ravi Sankar, Assistant Professor, PG and Research Department of Physics, Government Arts College, Tiruvannamalai-606603, Tamilnadu

Project Title : Investigations on nonlinear optical glycine complex metal Nitrates crystal from Practical applications in the domnian of optoelectronics and photonics

Funding Agency : UGC **Year :** 2016-2019 **Amount :** Rs. 18.0 lakhs

Dr. A. Senthil, Assistant Professor Department of Physics, SRM University, Ramapuram, Chennai-600089, Tamilnadu

Project Title : Unidirectional growth and characterization of high quality, nonlinear optical (NLO) Hydrazone derivative single crystals for Second Harmonic Generation (SHG) device applications

Funding Agency : SERB **Year :** 2016-2018 **Amount :** Rs.22.19 lakhs

INDIAN ASSOCIATION FOR CRYSTAL GROWTH

Centre for Crystal Growth, SSN College of Engineering,
Chennai-603110, Tamilnadu, INDIA
Mobile: +91-9283105760; 9944294169 Landline: 044-27469700
Email: iacgind@gmail.com
Website: http://www.ia-cg.com/

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.**

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

2000	**Dr. P. Santhana Raghavan**, *Managing Director,* GT Solar Corporation Limited, USA **Dr. G. Dhanaraj**, *Scientist,* Department of Materials Sciences and Engineering, Stony Brook Univ., USA
2002	**Prof. R. Dhanasekaran**, *Emeritus Professor,* Crystal Growth Centre, Anna University, Chennai.
2003	**Prof. M. Ichimura**, *Head,* Dept. of Electrical & Electronic Engg, Nagoya Institute of Technology, Japan
2004	**Prof. K. Sankaranarayanan**, *Professor*, Department of Physics, Alagappa University, Karaikudi
2005	**Dr. R. Gopalakrishnan**, Crystal Research Laboratory, Department of Physics, Anna University, Chennai
2006	**Prof. C. K. Mahadevan**, Physics Research Centre, Department of Physics, S.T. Hindu College, Nagercoil
2007	**Dr. N. Vijayan**, *Scientist*, X-ray analysis & Crystal Growth Section, National Physical Laboratory, New Delhi
2008	**Prof. S. Moorthy Babu**, *Director,* Centre for Nanoscience and Technology, Anna University, Chennai.
2009	**Prof. K. Ramamurthi**, *Professor & Head*, Department of Physics, Bharathidasan University, Trichirappalli **Dr.S.Ganesamoorthy**, *Scientific Officer-F*, LMDDD, RRCAT, Indore
2010	**Prof. G. Bhagavannarayana**, *Chief Scientist & Head,* Crystal Growth & X-ray Analysis Sec., NPL, New Delhi **Prof. S. Kalainathan**, *Director,* Centre for Crystal Growth, VIT University, Vellore
2012	**Dr. S. C. Gadkari**, *Outstanding Scientist and Head,* Crystal Technology Section, TPD, BARC, Mumbai
2015	**Prof. K. Byrappa**, *Vice-Chancellor,* Mangalore University, Karnataka **Dr. A. K. Karnal**, *Scientific Officer-G, Crystal Growth Section,* LMDDD, RRCAT, Indore

LIST OF CRYSTAL GROWTH RELATED JOURNALS WITH THOMSON REUTERS IMPACT FACTOR – MARCH 2017

Journal Name	IF
Applied Surface Science	3.15
Applied Physics A : Materials Science and Processing	1.444
Arabian Journal of Chemistry	3.613
Bulletin of Materials Science	0.895
Chinese Science Bulletin	1.789
Chemical Physics Letters	1.860
Crystal Growth and Design	4.425
Crystal Engineering Communication	3.849
Crystal Research and Technology	0.908
Current Applied Physics	2.101
Ferroelectrics	0.491
Japanese Journal of Applied Physics	1.122
Journal of Crystal Growth	1.462
Journal of Applied Crystallography	2.57
Journal of Alloys and Compounds	3.014
Journal of Physics and Chemistry of Solids	2.048
Journal of Physics D: Applied Physics	2.772
Journal of Solid State Chemistry	2.265
Journal of Physics: Condensed Matter	2.209
Journal of Materials Chemistry	8.262
Journal of Materials Science and Technology	2.267
Journal of Materials Science: Materials in Electronics	1.798

Journal Name	IF
Journal of Thermal Analysis and Calorimetry	1.781
Materials Letters	2.437
Materials Chemistry and Physics	2.101
Materials Research and Bulletin	2.435
Materials Science and Engineering A	2.331
Materials Characterizations	2.383
New Journal of Chemistry	3.277
Optical Materials	2.183
Optics Communications	1.480
Optics and Laser Technology	1.879
Optik- International Journal for Light and Electron Optics	0.742
Progress in Crystal Growth and Characterization of Materials	4.750
Physica B:Condensed Matter	1.352
RSC Advances	3.289
Results in Physics	1.337
Science of Advanced Materials	1.812
Solid State Communications	1.458
Solid State Science	2.041
Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy	2.653
Surface Science Letters	1.931
Synthetic Metals	2.299
The European Physical Journal of Applied Physics	0.667

SOME OF THE CRYSTAL GROWTH RESEARCH GROUPS

Prof. Rajni Kant and his Ph.D. students in Department of Physics, University of Jammu Jammu

Prof.Mihir. J. Joshi and his Ph.D. Scholars in Crystal Growth Laboratory, Department of Physics, Saurashtra University, Rajkot, Gujarat

Prof.K. Rewatkar and his Ph.D. students in Crystal Research Lab, Department of Physics, Dr.Ambedkar College, Nagpur, Maharastra

Crystal Growth Researchers at the Department of Physics, SRM University, Ramapuram Campus, Chennai, Tamilnadu

Dr.P.Ramesh Kumar and his Ph.D. students in Department of Physics, Periyar EVR College, Tiruchirapppalli, Tamilnadu

Dr.K. Balasubramanian and his Ph.D. Students in Department of Physics, MDT Hindu College, Tirunelveli, Tamilnadu

GOVERNMENT FUNDING FOR EXTERNAL PROJECTS

1. **BRNS**- Regular Research Project (RP) (https://brns.res.in)
2. **BRNS**- Young Scientist's Research Award (YSRA) (https://brns.res.in)
3. **CSIR**- Research Grants (http://csirhrdg.res.in/resg/Res_grants.htm)
4. **DST**- Women Scientist Scheme- A (WOS-A) (www. online-wosa.gov.in)
5. **DST**- Women Scientist Scheme- B (WOS-B) /Societal Research Fellowship (SoRF) (www.dst.gov.in/scientific-programmes/scientific-engineering-research/women-scientists-programs)
6. **DST**- Women Scientist Scheme- C (WOS-C) (www.dst.gov.in/scientific-programmes/scientific-engineering-research/women-scientists-programs)
7. **DST**- Scheme for Young Scientists and Technologists (www.dst.gov.in/callforproposals/call-proposals-scheme-young-scientists-and-technologists)
8. **DST**- Solar Energy Research Initiative (SERI) (http://www.dst.gov.in/clean-energy-research-initiative)
9. **DST**- INSPIRE FACULTY Scheme (www.inspire-dst.gov.in)
10. **DST**- Science for Equity, Empowerment & Development (SEED) Division (http://www.scienceandsociety-dst.org/Aboutscheme.htm)
11. **DST**- International Science & Technology co-operation (Indo-French, Indo-US & Indo-German) (http://www.dst.gov.in/international-st-cooperation)
12. **DST**- Sophisticated Analytical Instrument Facilities (http://www.dst.gov.in/scientific-programmes/scientific-engineering-research/sophisticated-analytical-instrument-facilities-saifs)
13. **DST**- Oriented Research & Technology Development Proposals on Materials for Energy Storage (MES) (http://www.dst.gov.in/)
14. **DST**- Water Technology Initiative (WTI-2017) for Water Technology Research and Innovation Centres (WATER-IC) (http://www.dst.gov.in/)
15. **DST**- **FIST** Program (www.fist-dst.org)
16. **DST**- Partnership for International Research and Education (PIRE) (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12819)
17. **DSIR**- Technology Development and Utilization Programme for Women (TDUPW) (www.dsir.gov.in)
18. **DRDO**- Extramural Research Grant (http://www.drdo.gov.in)
19. **ISRO**- Submission of Research proposal (http://isro.gov.in/sponsored-research-respond/submission-of-research-proposal)
20. **MNRE**- Ministry of New and Renewable Energy (http://mnre.gov.in/schemes/solar-rd-projects/)
21. **NRB**- Naval Research Board (nrbdrdo.res.in)
22. **SERB**- Extra Mural Research Funding (Individual Centric) (http://www.serb.gov.in/emr.php)
23. **SERB**- Early Career Research (ECR) Award (http://serbonline.in/SERB/ecr?HomePage=New)
24. **SERB**- High Risk High Reward (http://www.serb.gov.in/hrhrr.php)
25. **SERB**- Women Excellence Award (www.serb.gov.in/women.php)
26. **SERB**- Empowerment and Equity Opportunities for Excellence in Science for SC/ST faculties (http://www.serb.gov.in/emeq.php)
27. **SERB**- Industry relevant Research and Development (http://serbonline.in/SERB/IRR?HomePage=New)
28. **TNSCST**- Science & Technology Projects (http://www.tanscst.nic.in/stp.html)
29. **UGC**- Start-up Grant (www.ugcfrps.ac.in)
30. **UGC**- Major and Minor Research Projects (www.ugcfrp.ac.in)
31. **UGC**- Mid-Career Award (www.ugcfrps.ac.in)
32. **UGC**- BSR Faculty Fellowships (www.ugcfrps.ac.in)
33. **UGC-DAE CSR** (http://www.csr.res.in/csr_indore_collaborative_research.html)

FELLOWSHIPS AVAILABLE IN INDIA

1. **CSIR** - Senior Research Fellowship and RA (http://www.csirhrdg.res.in/jrfsrfra2.htm)
2. **CSIR** - Nehru Science Post Doctoral Research Fellowship (http://www.csirhrdg.res.in/npdf.htm)
3. **DAE** - Dr. K. S. Krishnan Research Associateship (KSKRA) (http://www.barc.ernet.in/)
4. **DST** - Ramanujan Fellowships (http://www.dst.gov.in/scientific-programme/nsti/ramanujanfellowship.pdf)
5. **DST** - JC Bose National Fellowships (http://www.dst.gov.in/scientific-programme/nsti/jc bosefellowship.pdf)
6. **DST**- Science, Technology & Innovation Policy Fellowship Programme (http://dst.gov.in/news/announcement-dst-science-technology-and-innovation-policy-fellowships)
7. **DST**-Bhaskara Advanced Solar Energy Fellowship Programme (http://indousstf.org/base-program/index.html)
8. **INSA** - Science Academies Summer Research Fellowship (http://www.insaindia.res.in/)
9. **INSA** - Visiting Fellowship (http://www.insaindia.res.in/)
10. **INSA**- Indo-Australia Early and Mid-Career Researchers (EMCR) Fellowship Programme (http://www.insaindia.res.in/)
11. **JSPS** - Japan Society for the Promotion of Science Fellowship Programs for Overseas Researchers (http://www.jsps.go.jp/english/e-fpo/index.html)
12. **JNMF** - Jawaharlal Nehru Memorial fellowship (http://www.jnmf.in/fabout.html)
13. **JNCASR** - Summer Research Fellowship Programme (http://www.jncasr.ac.in/fe/srfp.php)
14. **Lady Tata Memorial Trust** - Junior Scholarship and Post Doctoral Fellowship (PDF) (https://www.ladytatatrust.org/StaticPageIndia/Awards/7)
15. **MNRE** - National Solar Science Fellowship Programme (NSSFP) (www.mnre.gov.in)
16. **Raman Charpak Fellowship** (http://www.inde.campusfrance.org/en/news/charpak-scholarship-awardees-20132014)
17. **SERB** - Distinguished Fellowship (http://www.serb.gov.in/sdf.php)
18. **SERB** - Women Excellence Award (http://www.serb.gov.in/wea.php)
19. **SERB** - Overseas Post Doctoral Fellowship (http://www.serb.gov.in/opf.php)
20. **SERB** - National Post Doctoral Fellowship (http://www.serb.gov.in/npdf.php)
21. **SERB** - Indo - US Fellowship Program (http://serbonline.in/SERB/indous?HomePage=New)
22. **SERB** - SN Bose Scholar Program (http://serbonline.in/SERB/snbose?HomePage=New)
23. **SERB** - Graduate Student Exchange Programme (http://serbonline.in/SERB/gsep?HomePage=New)
24. **SERB** - Prime Minister's Fellowship Scheme for Doctoral Research (http://primeministerfellowshipscheme.in/Home.aspx)
25. **SERC –** Swarnajayanti Fellowships (http://www.dst.gov.in/scientific-programmes/scientific-engineering-research)
26. **TNSCST** - Young Scientist Fellowship Scheme (http://www.tanscst.nic.in/ysf.html)
27. **TIFR** - ICTS - Simons Post Doctoral Fellowship (PDF) (https://www.icts.res.in/opportunities/simons-pdf-sept-2016)
28. **UGC** -Post Doctoral Fellowship for Women Candidates (http://www.ugc.ac.in/pdfw/)
29. **UGC** -Post Doctoral Fellowship for SC/ST candidates (http://www.ugc.ac.in/pdfss/)
30. **UGC** - Rajiv Gandhi National Fellowship (RGNF) for SC/ST candidates (http://www.ugc.ac.in/rgnf/)
31. **UGC** - Dr. S. Kothari Post Doctoral Fellowship (http://www.ugc.ac.in/)
32. **UGC** - Raman Fellowship for Post Doctoral Research for Indian Scholars in USA (http://www.ugc.ac.in/ramanpdf/)
33. **UGC** - Maulana Azad National Fellowship for Minority Students (http://www.ugc.ac.in/)

PAST CONFERENCES/SEMINARS/WORKSHOPS

Prof .P. Ramasamy felicitating **Dr. B. K. Nayak**, BARC in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.S.M. Sharma (Director, Physics Group, BARC) giving Memento to **Dr. S. Banerji** (Former Chairman, DAE) in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.G. P. Kothiyal, MRSI (Mumbai Chapter) felicitating **Prof. Binay Kumar**, University of Delhi in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr. V. Nagarkar, RMD, US felicitating **Dr.G.Amarendra**, IGCAR in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr. V. Nagarkar, RMD, USA felicitating **Dr.S.C.Gadkari**, BARC in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr. V. Nagarkar, RMD, USA felicitating **Prof.S.Kalainathan**, VIT University in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.G. P. Kothiyal, MRSI (Mumbai Chapter) felicitating **Prof.A.Thamizavel,** TIFR in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Prof.Binay Kumar felicitating **Prof.Suja Elizabeth**, IISc-Bangalore in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr. R.K.Singh, Director, SSPL felicitating **Dr.S.C.Gadkari** (Chairman, NSCGA-2016) in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Prof. P.Ramasamy felicitating **Prof.Merry Koschan**, SMRC, University of Tennessee in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.R.K.Singh, Director, SSPL felicitating **Dr.A.K.Karnal,** RRCAT in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.Mihir.J.Joshi felicitating **Prof.K.Srinivasan**, Bharathiyar University, Coimbatore in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr. Vivek Nagarkar, RMD, USA felicitating **Dr.R.K.Singh**, Director, SSPL in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Prof.P.Ramasamy, SSNCE felicitating **Prof.S.C.Gadkari,** BARC in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.S. K.Gupta, Head ,TPD, BARC felicitated after his evening lecture in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.S. Banerji giving memento to **Dr.Vivek Nagarkar**, RMD, USA (Key note address) in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.S. C. Gadkari (Chairman, NSCGA-2016) felicitating **Dr.G. P. Kothiyal**, MRSI (Mumbai Chapter) in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr.Mihir.J.Joshi, Saurastra University giving memento to **Dr.M.Arivanandhan**, Anna University in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Prof.P.Ramasamy delivering inaugural address in the RAFAMS-2016 held at Department of Physics, Alagappa University during 23-24th March 2016

Rev.Dr.Antony Raj, Secretary presenting shawl to **Prof.P.Ramasamy** in inauguration of Academic & Shelters Association-2016 held at Sacred Heart College, Tirupattur During 5th July 2016

Prof.K.Sankaranarayanan handing over the Memento to **Dr.K.Alagappan** in the RAFAMS-2016 held at Department of Physics, Alagappa University during 23-24th March 2016

Dr.S.Brahadeeswaran, BIT-Anna Univ, Trichy delivered an Invited Talk in **Indo-JSPS Alumni Association MHS-2016** held at Kohinoor Asiana Hotels, Chennai during August 2016

Dr.C.Ramachandra Raja delivered Invited Lecture in WLNOM-2016 in Mass College of Arts and Science, Kallapuliyur during 5th October 2016

Dr. Muthu Senthil Pandian receiving memento in SSMSA-2016 held at PG and Research Department of Physics, Sri Vijay Vidyalaya College of Arts and Science, Nallampalli, Dharmapuri on 24th September 2016

Dr.K.Sethuraman, MK University receiving memento from **Dr.K.Jegannathan** in NCNP-2016 held at School of Physics, Bharathidasan University Tiruchirappalli during 18-19th March 2016

Prof. Ayothi, Principal presenting shawl to **Dr. R. Ramesh Babu** in ETMS-2016 held at PG and Research Department of Physics, Thanthai Hans Roever College, Perambalur, during 5-6th October 2016

Dr.C.Ramachandra Raja delivered Invited Lecture in NSFMPW- 2016 in Arignar Anna Government Arts College, Cheyyar during 7th October 2016

Dr.Albert Iruthiaraj, HOD, Physics presenting memento to **Prof.P.Ramasamy** in inauguration of Academic & Shelters Association-2016 held at Sacred Heart College, Tirupattur during 6th July 2016

Dr.R.Senthur Pandi handing over the memento **Dr.Muthu Senthil Pandian** in Workshop on Physics in Engineering held at Department of Physics, Thiagarajar College of Engineering, Madurai on 9-11th March 2016

Dr.D.B.Gadkari, Mithibai College delivered Guest Lecture in School of Nanoscience and Technology, Shivaji University, Kolhapur on 6th January 2016

Inauguration of Materials Research Society of India (MRSI) - Trichy Chapter held at Bharathiadsan University on 28th January 2017. **Dr. S. Brahadeeswaran** has been elected as Vice-Chairman of MRSI Trichy Chapter.

Prof.Mihir.J.Joshi, Saurastra University, Gujarat delivered lecture in Sir C.V. Raman Hall of Raja Lakhammagouda Institute of Science in Belgaun during August 2016

Dr. R Ezhil Vizhi, VIT University delivered a invited lecture in Physics association meeting conducted by Department of Physics, Muthurangam Arts and Sciences College, Vellore during 10th March 2016

Dr.R.Arun Kumar, GRD Centre for Materials Research, PSG Tech, Comibatore organized National Workshop on Luminescent Materials (NWLM 2016) during 26th February 2016

The release of Abstract Book in the NCCPCM-2016 held at Department of Physics, Govt. Arts College, Tiruvannamalai during 4-5th August 2016 organized by **Dr.S.M.Ravikumar**

Dr. Manimaran adoring the shawl to **Dr. R. Ramesh Babu** in Sir CV Raman Club, PG and Research Department of Physics, Thanthai Hans Rover College, Perambalur on 27th December 2016

Dr.K.Porsezian with **Dr.Sunil Verma**, Scientific Officer-G, RRCAT in DST-SERC School on Lasers and Nonlinear Optics held at Department of Physics, Pondicherry University during 22nd March to 11th April 2016

Dr. R. Ramesh Babu distributing certificates to the participants in National Conference on Advanced Materials (NCAM-2016) held at Department of Physics, Periyar University, Salem during 25-26th February 2016

Dr.P.Indra Devi handing over the memento to **Dr.Muthu Senthil Pandian** in UGC Sponsored ICRTMSA held at Department of Physics, Sri Meenakshi Government Arts College for Women, Madurai on 6th January 2016

The release of Abstract Book in 2nd National conference on Nanophotonics (NCNP-2016) held at School of Physics, Bharathidasan University during 18-19th March 2016 organized by **Dr. T.C. Sabari Girisun**

Dr. K. Balasubramanian, Department of Physics, MDT Hindu College, Tirunelveli received the **"Science Enrichment Award"** from Pearl Foundation on December 2016 at Madurai.

Prof.P.Selvarajan, Aditanar College of Arts & Science delivering invited lecture in NCCNAP-2017 held at Department of Physics, John's college, Tirunelveli during 3-4th February 2017

Prof.P.Ramasamy and Prof.G.Ravi handing over the Memento to **Prof.S.Subbiah**, Vice Chancellor in the RAFAMS-2016 held at Department of Physics, Alagappa University during 23-24th March 2016

The release of Abstract Book in NCAM-2016 held at Department of Physics, St.Joseph's College, Trichy during 7th October 2016 organized by **Dr.Leo Rajesh**

Prof. S. Moorthy Babu handing over the Memento to **Dr. R. Ramesh Babu** in 2nd National conference on Nanophotonics (NCNP-2016) held at School of Physics, Bharathidasan University during 18-19th March 2016

Prof.M.Lakshmanan receiving Life Time Achiever Award in NCCEPFM-2016 organized by Department of Physics, KSR College of Arts and Science for Women (KSRCASW) during 16-17th December 2016 organized by **Ms.J.Hepzhibah**

One Day Workshop organized by **Dr.Paul Mary Deborrah** and **Dr.S.Stephen Rajkumar Inbanathan**, PG & Research Department of Physics, The American College, Madurai during 19th August 2016

Dr.Muthu Senthil Pandian presenting Crystal Display in Science Academic Refresher Course in Experimental Physics held at Department of Physics, Thiagarajar College of Engineering, Madurai during 5-20th July 2016

Dr.N.Vijayan, Senior Scientist, NPL, New Delhi delivered special lecture in Physics Association Meeting at Department of Physics, Arul Anandar College, Karumathur during 5th February 2016

Dr.G.Vinitha, VIT University, Chennai in inauguration of NCNP-2016 held at School of Physics, Bharathidasan University during 18-19th March 2016 organized by **Dr. T.C. Sabari Girisun**

Prof.P.Ramasamy receiving memento from **Dr.G.Viswanathan**, Chancellor, VIT University in ICMPA-2016 organized by Centre for Crystal Growth, VIT University, Vellore during 14-16th December 2016

Dr.Muthu Senthil Pandian delivered Guest Lecture in Department of Physics, Jamal Mohamed College, Tiruchirappalli on 27th July 2016 organized by **Dr.Shek Dhavud**

Valedictory function in ICAMS-2016 organized by Department of Physics, Holly Cross College, Trichy during 6-7th December 2016 organized by **Dr.K.Maria Eugenie Pia**

Dr.K.Suresh receiving memento from **Dr.K.Lilly Mary Eucharista** in UGC Sponsored ICRTMSA held at Department of Physics, Sri Meenakshi Government Arts College for Women, Madurai on 6th January 2016

Dr.Sunil Verma, Scientific Officer-G, RRCAT receiving memento in DST-SERC School on Lasers and Nonlinear Optics held at Department of Physics, Pondicherry University during 22nd March to 11th April 2016

Prof.P.Ramasamy, Dr.P.Rajesh and **M.Silambarasan** have visited Prof.Usami's Lab, Nagoya University, Japan during 18th International Conference on Crystal Growth and Epitaxy (ICCGE-18) held at Nagoya, Japan during 7-12th August 2016

Dr.N.Vijayan receiving memento from **Prof.K.Ramamurthi** in ICNSMH-2016 held at Department of Applied Physics, Faculty of Engineering & Technology, Uttar Pradesh (U.P.) during 21-23rd October 2016,

Dr.Muthu Senthil Pandian presenting Crystal Display in SSMSA-2016 held at PG and Research Department of Physics, Sri Vijay Vidyalaya College of Arts and Science, Nallampalli, Dharmapuri on 24th September 2016

Dr.S.A.Martin Britto Dhas in inauguration of Academic & Shelters Association-2016 held at Sacred Heart College, Tirupattur during 5th July 2016

The release of Abstract Book in ICAMS-2016 organized by Department of Physics, Holly Cross College, Trichy during 6-7th December 2016 organized by **Dr.K.Maria Eugenie Pia**

INDIAN ASSOCIATION FOR CRYSTAL GROWTH

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Email: iacgind@gmail.com
Website: http://www.ia-cg.com/

Prof. P. Ramasamy
Dean (Research)
SSN College of Engineering
Chennai
President

Prof. S. Moorthy Babu
Director
Centre for Nanoscience & Technology
Anna University, Chennai
Treasurer

Dr. Muthu Senthil Pandian
Department of Physics &
SSN Research Centre, SSN CE
Chennai
Editor, IACG News Letter

Executive Committee Members

- **Dr. Bansi Lal**, Professor, IIT Kanpur, Uttar Pradesh (U.P.)
- **Dr. Bamzai. K.K**, Professor, University of Jammu, Jammu
- **Dr. Binay Kumar**, Professor, Crystal Lab, University of Delhi, New Delhi
- **Dr. Bhagavannarayana. G**, Director, RGUKT-IIIT, Andhra Pradesh (A.P.)
- **Dr. Byrappa. K**, Vice-Chancellor, Mangalore University, Karnataka
- **Dr. Das. S.K**, Department of Physics, KIIT University, Odisha
- **Dr. Ganesamoorthy**. S, Scientific Officer-F, X-ray Scattering & Crystal Growth Section, IGCAR
- **Dr. Gadkari. S.C**, Outstanding Scientist & Head, Crystal Technology Section, BARC, Mumbai
- **Dr. Jayavel. R**, Director (Research), Crystal Growth Centre, Anna University, Chennai
- **Dr. Karnal. A.K**, Scientific Officer-G & Head, Crystal Growth Section, RRCAT, Indore, M.P.
- **Dr. Kalainathan. S**, Director, Centre for Crystal Growth, VIT University, Vellore
- **Dr. Mihir. J. Joshi**, Professor, Saurashtra University, Gujarat
- **Dr. Suja Elizabeth**, Principal Scientist, IISc, Bangalore
- **Dr. Sunil Verma**, Scientific Officer-G, Crystal Growth Section, LMDDD, RRCAT, Indore, M.P.
- **Dr. Sankaranarayanan. K**, Professor, Alagappa University, Karaikudi
- **Dr. Thamizhavel. A**, Scientist, Crystal Growth Laboratory, TIFR, Mumbai
- **Dr. Vijayan. N**, Scientist, Crystal Growth Section, National Physical Laboratory, New Delhi

HONORS/AWARDS

Prof.P.Ramasamy, SSN CE receiving Life Time Achiever Award in NCCEPFM-2016 organized by Department of Physics, KSR College of Arts and Science for Women (KSRCASW) during 16-17th December 2016

Dr.Mihir.J.Joshi felicitating **Dr.R.Gopalakrishnan**, Anna University, Chennai in the XX-NSCGA-2016 held at BARC during 19-21st January 2016

Dr. R. Ramesh Babu received memento in SSMSA-2016 held at PG and Research Department of Physics, Sri Vijay Vidyalaya College of Arts and Science, Nallampalli, Dharmapuri on 24th September 2016

Dr.M.Arivanandhan receiving memento from **Dr.K.Balachandar** in Albert Einstein Physics Forum Inaugural Function held at Dept. of Physics, Sri Sankara Arts and Science College, Kanchipuram on 3rd August 2016

Rev. Fr. S. John Britto, SJ Rector honored **Prof.P.Ramasamy** in NCAM-2016 held at Department of Physics, St.Joseph's College, Trichy during 7th October 2016

Prof.S.Moorthy Babu receiving memento from **Dr.T.C.Sabari Girisun** in NCNP-2016 held at School of Physics, Bharathidasan University during 18-19th March 2016

To my dear Dr.R.Gopalakrishnan

On your last day Fifteenth April 2016

You were with your arm in my palm

With tears in my eyes I saw you sinking

I watched you fade away

Your commitment to crystal growth is taller than Everest

Your love for your research scholars is deeper than Pacific

You faced your task with courage

Your sprit did not bend

You kept on fighting until the very end

God did not want to see you getting exhausted

With love he put his arms around you

And whispered in his words of love "come to me"

I saw your quiet journey to eternity

You are in my heart eternally

From
Prof. P. Ramasamy

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