Curriculum Vitae

Dr. S. NARAYANA KALKURA

Professor- UGC-BSR FACULTY FELLOW
Crystal Growth Centre (UGC - National Facility Centre),
Anna University,
Chennai- India 600025
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Education (Post-Graduation onwards & Professional Career)

Ph.D	Kerala University	1990	Crystal Growth and characterization Advisor: Prof. S. Devanarayanan, Ph.D(IISc)
M.Sc	Kerala University	1982	Physics
B.Sc	Kerala University	1980	Physics (major), Chemistry and mathematics (minor)

Position and Employment

Anna University	UGC-BSR Faculty Fellow	2020 -	
Anna University	Director	2016-2020	
Anna University	Professor	Since 2008	Crystal Growth, Biomaterials, Ion beam modification
Institute für Medizinische Biochemie und Molekular Biologie, DESY, University of Hamburg, Germany	Staff Scientist	2001-04	Crystallisation of proteins, Crystallisation in space, Crystal structure analysis, dynamic light scattering
Anna University	Assistant Professor	2000-08	Crystal Growth , Biomaterials, crystallization of biomolecules
AnnaUniversity	Senior Lecturer	1996-2000	Biomaterials, crystallization of biomolecules
National Institute of Biosciences and Human Technology, Tsukuba, Japan.	STA Fellow	1996-97	Crystallisation of proteins
AnnaUniversity	Lecturer	1991-96	Crystal deposition diseases, Crystallisation of biomolecules, biomaterials and characterization

Details of the students who have obtained Ph.D degree:-

Name	Title of the Ph.D.thesis
Dr.M.Manimaran (1995)	Instrumentation of computer controlled crystal growth system and crystallization and characterization of medium band gaps II-IV-V_2 semiconducting infrared nonlinear optical materials and organic biomolecules
Dr.E.K.Girija (1998)	Investigations on biological crystal and analyses and epidemiological studies of urinary calculi
Dr.G.R.Sivakumar (2000)	In vitro studies on the growth and characterization of the crystalline constituents of metabolic acid and nonmetabollic urinary stones: dicalcium phosphate and magnesium phosphate
Dr.M.Ashok (2003)	Investigation on the crystallization of calcium Phosphate biomaterials and the trace element Analysis of the urinary stones and gallstones
Dr.T. K. Anee (2003)	Investigations on the low temperature Synthesis of crystallization of calcium Phosphate based biomaterials
Dr.N. M. Sundaram (2005)	Investigation on the Cholesterol, Cholesteryl acetate, hydroxyapatite and lysozyme Crystallization and influence of magnetic field on the nucleation process
Dr .S. Ramalingam (2005)	Studies on the nucleation kinetics, crystallization and characterization of single crystals of potassium dihydrogen phosphate and sulphates of potassium and magnesium
Dr.R.Vani (2011)	Investigations on Biomineralsiation of Urinary Calculi and Synthesis of Nanobiomaterials.
Dr.R.V.Suganthi (2011)	Investigations on the Crystallisation and Effect of Swift Heavy ion Irradiation on Helical Hydroxyapatite
Dr.Ahymah Joshy (2012)	Synthesis of Nano Hydroxyapatite and its Polymer Composites for Drug Delivery and Tissue Engineering Applications.
Dr.K.Elayaraja (2012)	Investigations on the Bioactivity and Drug Delivery of the Nanocrystalline Hydroxyapatite Composites, Thin films and its surface Modification by Swift Heavy ion Irradiation.
Dr. V.S. Chandra (2013)	Investigations on Metal Ions Doping and Irradiation Effects on Hydroxyapatite for Drug Delivery Applications and Defluoridation
Dr.K.Thanigaiarul (2014)	Investigations on Metal Ions Incorporated Nanocrystalline Hydroxyapatite, Nanocomposite thin films and surface modification by Low energy Implantation
Dr.Ramana Ramya (2017)	Investigations on bioceramics and polymer comosites subjected to gamma and swift heavy ionirradiation
Dr. M.Shanthini (2017)	Studies on improved polymer -ceramic composite scaffolds for tissue engineering and drug delivery applications
Dr.N.Sakthivel (2017)	Synthesis and Characterization of gelatin based scaffolds for drug delivery and tissue engineering applications
Dr. R. Socrates (2018)	Biomimetic fabrication of a native fibrillar collagen composite for bone tissue engineering
Dr.S.Baskar (2020)	Metal Ion Incorporated Nano Sized Calcium Phosphates and Modification of its Physicochemical Properties for Biomedical Applications
Dr. M. Catherine (2021)	Gelatin Based Biosynthetic Scaffolds for Neural Tissue Engineering Applications
Dr.K.R Karthikeyan(2022)	Investigations on surface modification of polymer based metal ions incorporated hydroxyapatite nanocomposite coatings by ion implantation and irradiation

Details of the students who have obtained M.Phil/M.S degree:-

Name	**Title of the M.Phil/M.S. Thesis**
Saranya S(2017)	Synthesis of polysaccharide / hydroxyapatite based hydrogel for the removal of cadmium metal ions from water
Catherine M(2015)	Synthesis & Characterization Of Polymer Based Scaffolds For Tissue Engineering & Drug Delivery Applications
Preethi R(2014)	Fabrication of propolis loaded silk and keratin based scaffolds for tissue engineering applications
T.S.Sheena(2013)	Effect of metal ions on calcium phosphate mineralization
Ramya.J(2012)	Influence of Amino Acids on Mineralisation of Hydroxyapatite
K Dharani. (2011)	Synthesis and Characterisation of Biomaterials for Tissue Engineering and Drug Delivery
A. K. Jijin Raj, (2008)	Investigations On Hydroxyapatite Formation In A Collagen Matrix.
M. Gunasekaran(2001)	Crystallization and Characterization of Cystine and Ferrocene
R. Vani(2000)	*In vitro* Crystallization and Characterization of an Amino acid: Cystine
N.M.Sundaram (1998)	In vitro Crystallisation and Characterization of Cholesterol

Honors/Awards

1) Indo-French (CEFIPRA) sponsored research project "Biodegradable core shell electrospun mats and interconnected porous scaffolds for tunable anticancer drug delivery and tissue engineering application" with Institut Européen des Membranes, Montpellier, France.was graded as "excellent" –(2017-2019)
2) UGC-BSR Faculty Fellowship
3) Consultant Tissue Engineer- National Liver Research Foundation, Dr. Rela Institute and Medical Centre, Chennai
4) Visiting Professor of Osaka City University, Japan
5) Member of the Vice Chancellor officiating Committee of the Tamil Nadu Open University.
6) Syndicate member of Tamil Nadu Open University,Chennai
7) Planning Board Member of the Bharathidasan University. Tiruchirappalli
8) Member of Accelarator Users Committee of IUAC, New Delhi(2019-2021)
9) Member of the Advisory Committee of UGC SAP DRS for review of Saurashtra University, Rajkot and Bharathiyar University, Coimbatore – 2018-20
10) European Higher Education Expert(2016- 2018)
11) Fellow of the Academy of Sciences Chennai-2016
12) Governing Council Member of the Inter University Accelerator Centre, UGC-2014-2016
13) Governing Body Member Adhiyamann College of Engineering, Hosur
14) Governing Body Member of Vel Tech High Tech Dr.Rangarajan Dr.Sakunthala Engineering College.
15) Erasmus Mundus Heritage Fellow- 2016 at Politecnico di Milano, Milan, Italy
16) Erasmus-Mundus Svaagata Fellow-2014 at Universidad Politécnica de Valencia, Spain
17) ACITVE Researcher Award 2013 by the Anna University
18) Post-Doctoral Fellow at the Institute für Medizinische Biochemie und MolekularBiologie, DESY, University of Hamburg, Germany 2001-2004
19) *Award from Science and Technology Agency* (S.T.A) of Government of Japan.
20) National award of *Certificate of Excellence* from All India Council for Technical Education, Govt.of India, for carrying out research project with excellence.
21) *Andhra University Medal* for having shown conspicuous merit in research work in the field of Physics.
22) *Young Scientist Award* by Kerala State Committee on Science and Technology, Government of Kerala.
23) Department of Science and Technology, *S.E.R.C. Research fellowship* 1995.
24) *Boyscast Fellowship* awarded by Department of Science and Technology, Govt. of India.
25) Award of *Research Associateship and Senior Research* Fellowship by the Council of Scientific and Industrial Research (C.S.I.R).

Administrative Experience

1. Director of the Crystal Growth Centre(UGC-Inter University Centre), during 2016-2020.

   As the Director of the Centre,
   *Initiated collaboration with DRDO for developing GaO wafers
   Iniated collaboration with JNU, NEWDELHI under DST- Water Technology Initiative Programme
   Initiated collaboration with Global Hospital, Chennai, Sri Ramachandra Institute of Higher Education and Research, Central Leatther Research Institute, Sree Chitra Institute of Medical Sciences and Technology, UGC DAE CSR Kolkata Centre and Inter University Accelerator Centre, New Delhi on synthesis of biomaterials for tissue engineering and drug delivery applications.

   Initiated the establishment of "International Centre for Research Facilitation and Training (ICRFT), at the Crystal Growth Centre'
   *Initiated collaboration with German (University of Hamburg, University of Duisburg-Essen), French (University of Montpellier), Russian (St. Petersburg University),Spain(Polytechnic University of Valencia, UPV) and Japanese Universities (Osaka City University) and KTH Royal Institute of Technology in Stockholm, Sweden.
   *Entered in to MOU with Osaka City University, Japan

*Installed a sophisticated Floating Zone optical heating furnace to crystallise GaO for high speed electronic applications and an Atomic Absorption Spectrometer for trace element analysis.
*Initiated the process of purchasing a Transmission Electron Microscope worth more than 6 crores at the Crystal Growth Centre to augment the crystal characterisation facility of the Crystal Growth Centre.
*Conducted four GIAN courses involving experts from Germany, Italy and UK apart from organising workshop on material characterisation and an international conference.
*As the European higher education expert organised four workshops towards the awareness of higher education opportunities in European countries at Trichy, Tirunelveli and Chennai campuses of Anna University which covered more than 1000 participants involving graduate, post-graduate students, research scholars and faculty of various disciplines.
*Awarded International projects Indo-DAAD(INDO-GERMAN), CEFIPRA(INDO-FRENCH),INDO-SWEDEN

2. Principal Investigator of more than 17 national and international major research projects funded by DST, DBT, UGC, AICTE, CEFIPRA, INDO-DAAD, IUAC, UGC-DAEF etc.
3. Member of the Coordination Committee to process E-tender of Anna University.
4. Member of the Purchase Committee of Anna University

Reviewer of the manuscripts of the following research journals.

1. Journal of Colloid and Interface Science
2 Journals of Alloys and Compounds
3. Materials Research Bulletin-
4. Materials Science and Engineering C
5. Journal of Solid State Chemistry
6. Journal of Crystal Growth
7. Biomedical Materials-
8. Journal of Materials science: Materials in Medicine
9. Journal of Applied Surface Science
10. Materials Science and Engineering B
11. Bulletin of Materials Science
12. Solid State Sciences
13. Current Applied Physics
14. Chemical Papers
15. Journal of Materials Science
16. Colloids and Surfaces A: Physicochemical and Engineering Aspects
17. Indian Journal of Pure and Applied Physics
18. Journal of Physics and Chemistry of Solids
19. ActaBiomaterilia
20. Crystal Research and Technology
21. Crystal Growth and Design
22. SpectrochimicaActa
23. RSC Advances
24. Journal of Materials Science: Materials in Electronics

PATENT Granted:-

1. "Bio nanocomposite coating and its method thereof". Indian Patent No. : 396687- Date of Grant : 11/05/2022

PATENT Applied:-

2. "Lyophilized nano-hydroxyapatite a bio friendly adsorbent for fluoride adsorption", 202041028142, 02/07/2020
3. "Medium for Removal of Fluoride from Water"-1424/CHE/2010- (U/S 11A)-10/06/2011

Membership of Professional Organizations:

- Life Member of Indian Crystallographic Association.
- Life Member of Indian Association of Crystal Growth.
- Life Member of Society for Biomaterials and Artificial Organs.
- Life member of Association of Medical Physicists of India
- Life member of Society for Tissue Engineering and Regenerative Medicine

Visits and Training Abroad:

(a) St. PetersburgUniversity, Russia during September 23 to 3rd October 2018 to deliver a lecture and for interaction with the faculty.
(b) DST-DAAD Indo-German project exchange visit to University of Duisburg-Essen, Essen, Germany during 19th – 29th January 2018
(c) IFCPAR-CEFIPRA Indo-French research project exchange visit to Institute of European Membranes, University of Montpellier, Montpellier, France during 1st October – 15th October 2017
(d) Erasmus Mundus Heritage Fellow- 2016 at Politecnico di Milano, Milan, Italy
(e) Erasmus Mundus Swagatha Fellow- 2014 at Universidad Politécnica de Valencia, Spain
(f)Presentation at the Asian Bioceramics Symposium held at OsakaCityUniversity, Osaka, Japan during September 25-27 2007.
(g)Gave an Invited lecture at the Second International Conference on New Biomedical Materials, Cardiff, U.K, 5-8 April 2003
(h) Did experiments using Synchrotron radiation facility available at the ESRF, Grenoble, France during 7-8 May 2002
(i) Presented papers at the International Conference on Crystallization of Biological Macromolecules at Jena, Germany 20-28 March 2002.
(j) Gave Lectures oncrystallisation of biomolecules at Materials and Surface Science Institute, University of Limerick, Limerick,Ireland on October 2001 and February 2002.
(k) Did post-doctoral research at the InstitutefürMedizinischeBiochemie und Molkularbiologie at University of Hamburg, Germany on protein crystallization and structure analysis using synchrotron radiation facility available at DESY, Hamburg during 2001-2004.
(l) Worked as Science and Technology Agency (S.T.A) research fellow during 1996-97 for a year at National Institute of Bioscience and Human Technology at Tsukuba, Japan. Got training on the crystallisationof biological macromolecules like lysozyme and membrane proteins viz., reaction centers from RhodobactorSphaeroides. Studied the solubility, phase diagram and kinetics of crystallization of biological macromolecules.
(m) Presented a paper at the National conference on Crystal Growth held at Ritsumeiken University, Japan during July-August 1996.
(n)Delivered an invited lecture at the "International Conference on Crystal Growth of Biological Macromolecules", held at the University of Maryland, USA, during August 1989
(o)Attended an International Conference on Crystal Growth of Biological Macromolecules held at Strasbourg, France during July 1987.

Research experience and professional expertise:

Crystal Growth Centre of Anna University, where I am working (since 1991) is an UGC-Inter University Centre to popularize and take up advance research in the area of Crystal Growth. I have been specializing in an interdisciplinary field (involving physics, biochemistry, chemistry, medicine, nanotechnology etc.) of biomaterials, ***ion beam modification*** and biomimetics for more than 30 years. I was instrumental in developing a well-equipped Biocrystallisation Laboratory at the Crystal Growth Centre of Anna University, to study the crystallisation and growth kinetics of biological molecules and to synthesize nano sized crystalline biomaterials. Apart from **teaching courses** of graduate and postgraduate degree in physics, nanotechnology, I am engaged in the studies of various aspects of crystal growth of materials of industrial, medical and pharmaceutical importance. We have synthesised nanocrystalline materials using gel, sol-gel, and wet chemical, hydrothermal and spin coating techniques. Further, we have achieved significant breakthrough in the synthesis of nano sized biomaterials at room temperature, which was appreciated by the international research community.

I have also used the IUAC accelerator facility and collaborated with the IUAC extensively since the last twelve years. Under this collaboration with IUAC we studied the surface modification of calcium phosphate based bio ceramics and its composites with help of two projects sponsored by IUAC. The results of this research led to the award of six Ph.D. thesis and about fourteen research papers in highly cited international refereed journals. In collaboration with IUAC, VECC (Kolkata), IGCAR and IUC-DAEF- Kolkata, we have studied the ion beam surface modification of biomaterials leading to enhanced biomedical properties. We have also synthesized nano sized biomaterials which show excellent bioactivity and surface properties on swift heavy ion/low energy irradiation, for the first time. I have published about hundred research articles in standard refereed international research journals. So far, **twenty Ph.D. and nine M.Phil./MS** students have got their degree under my supervision.

I had training on synthesis and characterization of biomaterials at Sri Chitra Thirunal Institute for biomedical Sciences and Technology under a DST SERC fellowship during 1995. I have also undergone training for a year, on Crystallization of Biological Macromolecules at National Institute of Biosciences and Human Technology at Tsukuba, Japan under STA Fellowship. I did post-doctoral research during 2001-04, at DESY (German Synchrotron Facility at Hamburg) on crystallisation and structural analysis of biological macromolecules and also gained experience in analysing the particle sizes of biological molecules by dynamic light scattering. Further, structural analyses of the biomolecules were carried out at the **synchrotron radiation facility** available at DESY, Hamburg. Germany. I have performed micro-gravity experiments using space shuttle for crystallizing mistletoe lectin proteins.Studied the effect of zero gravity on the crystallization of Mistletoe Lectin proteins, in collaboration with European Space Agency, using Granada Crystallization facility (NASDA GCF -Second Flight) during January – March 2004.

In addition, analysis of the gallstones, urinary stones and kidney stones removed after surgery were analysed with the help of XRD, thermal, IR, Raman, SEM and micro hardness, PIXE and ICP techniques have been studied. Developed a technique to produce single crystals of uric acid fairly easily without the use of bulk solvents at room temperature. Uric acid, sodium urate, brushite, calcium oxalate and cystine that are responsible for arthritis, gout, urinary stones, and kidney stones have been crystallized and characterized. Inhibiting effects of juices of medicinal plants (Phyllanthusniruri and Ocimum Sanctum) which are used in native medicines to cure diseases of urino-genital system, on crystallization of brushite has been studied.

These studies are interdisciplinary and come under thrust areas of national funding agencies like DST, DBT, ICMR, etc., I handled as the principal investigator many major sponsored research projects from national funding agencies like AICTE, DST, UGC, IUC-DAEF, IUAC, DBT to the tune of Rs. 5 crores. I am also the principle investigator of the two international projects sponsored by INDO-DAAD (German) and CEFIPRA (Indo-French). I have collaborated with AIIMS, CLRI, IGCAR, IUC-DAEF, IUAC, University of Manipur, JNU and SCTIMST-Trivandrum along with urologists, gastroenterologists and dentists. I have extensive collaboration with laboratories in Germany, Japan, France, Spain Russia, Italy and Brazil. I have also visited and did collaborative research at University of Montpellier, France, University of Duisburg-Essen, Essen and DESY(Synchrotron Facility), University of Hamburg, Germany and Universidad Politécnica de Valencia, Valencia, Spain and Politecnico di Milano, Milan, Italy. I was appointed as the European Higher Education Expert by the Anna University in 2016. I have delivered more than hundred invited lectures at various national and international conferences held in India and abroad.

I have more than 30 years of teaching and research experience as a faculty of the Crystal Growth Centre. I was the member of the Governing Council of IUAC during 2014-2016. I am the board of studies member of many Universities and Institutes. I am also a recipient of fellowships from Erasmus Mundus Swagata(Spain) and Erasmus Mundus Heritage(Italy) schemes along with STA fellowship, Japan. I have been awarded with ***Certificate of Excellence*** from All India Council for Technical Education for carrying out a research project with excellence. *Kerala State Committee on Science and Technology, Government of Kerala also presented* ***Young Scientist Award*** *to me in the field of physical sciences*. Further, I have received ***University Medal***for having shown conspicuous merit in research work in the field of Physics. I have been selected as the Fellow of the Academy of Sciences Chennai. I have also been honored with ***Active Researcher*** award by the Anna University. Also I have authored **review articles** on crystallization in the 'Handbook of Crystal Growth, Defects and Characterization" published by **Springer Publishers** and also a chapter on **"Effect of Swift Heavy Ion Irradiation on Calcium Phosphate based Bioceramics" in the book "Synthesis and Engineering of Nanostructures by Energetic Ions"** published by Nova Publishers, USA. In addition I have coauthored two chapters in the **"Handbook of Nanofibers", Publisher: Springer International Publishing.**

Other relevant experience:

a. Teaching :**UG:30 yr. ; PG:32 yr.** b. Research : **35 yr.**

c. Research guidance**: Ph.D. (awarded): twenty; M.Phil/MS: nine**

Languages Known : Thulu, Tamil, Malayalam, Hindi, English, Kannada

Sponsored Research Projects executed:

1). 1986-88: Co-investigator of a project entitled "Structure, Crystallization and Physico-chemical Studies of Biopolymers", sponsored by the Department of Science, Technology and Environment committee, Government of Kerala.
2). 1995-1997: Principal Investigator of a major project entitled "Investigations on CholesterolCrystallization to Devise New Drugs and Treatment" sanctioned by All India Council for Technical Education, Government of India.
3) 1998-2002: Principal Investigator of a project entitled "Investigations on the trace elements analysis to study the crystal deposition diseases" sanctioned by Inter University Consortium for Department of atomic energy facilities".
4) 1999-2001: Principal Investigator of a project entitled "Study of **crystallogenesis** of protein to obtain higher quality crystals for structural analysis" supported by All India Council for Technical Education, Govt. of India.
5) 2001-2003: Principal Investigator of a Project entitled "Investigations on **Crystal deposition diseases**" supported by University Grants Commission of Government of India.
6) 2006-2009: Principal Investigator of a Project entitled 'Effect of **irradiation** on hydroxyapatite and their **biological performance**' Funding agency-Inter-UniversityAcceleratorCenter, New Delhi
7) 2007-2010: Principal Investigator of Project entitled" Investigations On The Synthesis Of Nanocrystalline Calcium Phosphates To Prepare **Bone and Dental Replacement** Materials And Drug Delivery Systems" by Department of Science and Technology, New Delhi.
8) 2009-2012- "Synthesis of Bioactive composite materials for tissue replacement" by All India Council for Technical Education, New Delhi.
9) 2009-2012- "Implantation and trace element analysis of materials of importance in Biology" by UGC-DAE consortium for Scientific Research. Kolkata
10) 2010-2013- "Synthesis and Physical Characterization of Hydroxyapatite Based Scaffolds" by the Department of Biotechnology, New Delhi.
11) 2010-2015- "Assessment of Inherent Toxicity of Certain rocks and its impact on Environment", University Grants Commission (under CPEES)
12) 2011-2014-Investigations of physical and biological performance of swift heavy ion irradiation on calcium phosphate based bioceramics and its polymercomposite by IUAC, New Delhi
13) 2013-2016- "Investigations on the Pathological deposition of bio minerals" by supported by University Grants Commission of Government of India.
14) 2015-2018- "Investigations on the synthesis of metal oxides nanobioceramic materials for hyperthermia against sarcoma" by Department of Biotechnology under Twinning Programme.
15) 2016- 2018-Indo- German (DST-DAAD) joint research project entitled Development of biomimetic collagen based composite scaffolds for tissue regeneration and drug delivery" with University of Duisburg-Essen
16) 2016-2018- Indo-French Centre for the Promotion of Advanced Research(IFCPAR)/Department of Science & Technology "Biodegradable core shell electrospun mats and interconnected porous scaffolds for tunable anticancer drug delivery and tissue engineering application" with Institut Européen des Membranes MONTPELLIER, France.
17) 2017 -2020 Identification of Arsenic and Fluoride vulnerability zones in the rural central gangetic plain and southern regions of India and remediation of drinking water using environmental friendly nanomaterials supported by DST.
18) 2019 -2022 Development of single crystal Gallium oxide (Ga_2O_3) growth technology for power device applications supported by DRDO
19) 2019 -2022 "Negatively charged ions on graphene-polymer-ceramic composite by low energy ions for biomedical applications" supported by the UGC-DAE consortium for Scientific Research. Kolkata

Workshops/schools/meetings/training attended /Invited Lectures:

1. Fifth International Course on Physics of Materials, IIT, Madras, December, 1986.
2. International Schools on Crystal Growth and Characterization of Advanced Materials for Solid State Applications, Anna University, Madras, Jan-Feb, 1988.
3. International workshop on Crystal Growth of Technologically important materials for Device Applications, Anna University, Madras, November 8-15, 1991.
4. International School on Advanced Electronic Materials, Anna University, Madras 6-15, February 1995.
5. Training on preparation of Biomaterials from 15-7-1995 to 15-10-1995 at Sri ChitraThirunal Institute of Medical Sciences and Technology, Trivandrum.
6. Workshop on Material processing in space and space Biotechnology, 1 August 1997, ISRO, Bangalore.
7. School on Materials for Advanced Research and Technology, 3-17 Oct. 1997, Anna University,
8. School of Synchrotron radiation held at Inter University Centre, Indore, November10-14, 1997
9. All India Training course on Application of Direct methods in Crystallography of small/medium sized molecules held at University of Madras, Chennai, 1--21 December 1998.
10. Workshop on potential Indian participation on board International space station for conducting scientific experiments. July 9-10, 1999, ISRO Bangalore.
11. Certificate Course on Advances in Instrumentation Analysis, AnnaUniversity, 3-8 July 2000
12. Workshop on Microscopic Techniques held at Saha Institute of Nuclear Physics, Calcutta, 19-22 Sept. 2000.
13. Workshop on Training in Methods for Macromolecular Crystallography: from Measurement to Model. At European Molecular Biology Laboratory at Hamburg, Germany from October 31- November 7, 2001.
14. Course of Crystallisation of Biological Macromolecules at IMB, Jena, Germany at 20-22 March 2002.
15. International Symposium on Recent Trends in Macromolecular Structure and Function organized by Department of Crystallography and Biophysics, University of Madras during January 19-23, 2004
16. U.G.C sponsored Refresher Course on Recent Trends in Crystal Growth and Characterization held at CrystalGrowthCenter, AnnaUniversity, Chennai during November17 – December 7 2004
17. Indo-Japan Workshop on Crystal Growth and applications of Advanced Materials for optoelectronics held at CrystalGrowthCenter during December 7-10 2004
18. Indo-Australian conference on Biomaterials, implantable Devices and Tissue Engineering held from January 19-21, 2005 at SreeChitra Institute of Medical Sciences and Technology, Trivandrum.
19. Tenth National Seminar on Crystal Growth he at Kongu Eng. College, Erode during 27-29 Jan. 2005
20. Seminar on Physics with Home Made Equipment and Innovative Experiments held at CrystalGrowthCenter, AnnaUniversity, on March 14-15 2005
21. National Conference on Optics and Related Phenomenon held at Condensed Matter Physics Laboratory, S.N.College, Kollam, 29-30 August 2005
24. National Symposium on Crystal Growth and Characterization, at Department of Physics, LoyolaCollege, Chennai during 29-30 September 2005.
25. International Workshop on Nanoscience and Technology during 13-17 February 2006 at Department of Physics, AnnaUniversity.
26. Indo-Australian Conference on Biomaterials, Implants, Tissue Engineering and Regenerative Medicine held from January 10-12, 2007 at SreeChitra Institute of Medical Sciences and Technology, Trivandrum.
27. The National Conference on Recent Trends in Optoelectronics and Laser Technology during April 9-11, 2007 at Department of Optoelectronics, University of Kerala, Trivandrum.
28. Asian Bioceramics Symposium held at OsakaCityUniversity, Osaka, Japan during September 25-27 2007.
29. 10th International Conference on Advanced Materials 8-13, October 2007, Bangalore, India
30. Workshop on Awareness of Intellectual Property Rights and Related Issues held at AnnaUniversity, Chennai on 21-22 Feb 2008.
31. The International Conference on Perspectives in Vibrational Spectroscopy held at Trivandrum during 24-28 February 2008
32. National Workshop on Trace Elements Research held at NorthEasternHillUniversity, Shillong during March 4-6 2008.
33. National Conference on Recent trends in Materials Science held at PondicherryUniversity on March 19-20 2008
34. Workshop on"Recent Developments in Nanomaterials Research" held at PeriyarUniversity, Salem on 31st March 2008.
35. Workshop on Electron Microscopy orgnised by SreeChitraThirunal Institute of Medical Sciences and Technology, Thiruvananthapuram on 5th July 2008-
36. 38th National Seminar on Crystallography ,February 11-13, 2009 at University of Mysore, Mysore
37. Invited lecture at the Indo-French conference on 'Nanostructuring by ion beams' organized from 25th Feb. to 2nd March 2009 at the Institute of Physics, Bhubaneswar

38. Invited lecture at the National Seminar on Advanced Materials and Applications March 5-6, 2009 Department of Physics, KarpagamUniversity, Coimbatore
39. Resource person for the Refresher course to be conducted by UGC academic staff college, University of Mysore, Mysore from 11th to 31st March 2009. The Thrust area of the course is "Advances in Materials processing and characterization".
40. Invited to give a talk and Chaired a session at the International Physics Conference held at the Bangladesh University of Engineering and Technology (BUET) from 15-17, May 2009 in Dhaka, Bangladesh.
41. Delivered a lecture at the 24th Refresher course in Physics organized by UGC-Academic Staff College of University of Kerala on 16th October 2009.
42. Invited lecture at the conference on Application of Bio Material in Engineering held at IFET College of Engineering, Villupuram on 23rd Jan 2010.
43. Invited lecture at the 14TH National Seminar on Crystal Growth held at Vellore Institute of Technology, Vellore on 10th March 2010.
44. Invited Lecture at Conference on Recent Scenario in Materials Science held at VivekanandaCollege, Kaniyakumari on 1st April 2010
45. Resource person at the Refresher Course on Materials Science held at the PondicherryUniversity on 18th March 2010.
46. Invited lecture at the AICTE sponsored staff development programme on Nanotechnology at SriSaiRamEngineeringCollege, Tambaram Chennai on April 2010.
48. Resource Person of the Refresher course in Physics to be held at the University of Kerala, on 13th July 2010.
49. Invited lecture at the 'Ion Beams for Biomaterials' to be held at IUAC, New Delhi on 3rdAugust, 2010.
50. Invited lecture at the UGC Refresher Course on "Nanoscience & Nanotechnology" held at Madras University Chennai-25 from Nov8-Dec2, 2010.
51. Invited lecture at the International workshop on "Advanced functional Nanomaterials" held at Centre for Nanoscience, Anna University Chennai-25 from 21-24 Feb 2011.
52. Invited lecture at the Physics Department, Karnatak University, Dharwad on 24-25 March 2011 in connection with the Faculty Development Programme for Undergraduate Science Faculty Members in Physics.
53. Invited lecture at 5th Refresher Course in Materials Science held at University on Mysore during 1-07-2011.
54. Invited lecture at Bangladesh University of Science and Technology on 8-9th October 2011.
55. Invited lecture at the Refresher Course on Nanoscience and Technology held at University of Madras during 11th November 2011
56. Invited lecture at the International Conference on Advanced Materials, ICAM 2012 – January 5-7, 2012- held at Loyola College, Chennai
57. Invited lecture at the International Conference on "Biomaterials, Implant Devices and Tissue Engineering BIDTE-2012" at Rajalakshmi Engineering College, Chennai, India from Jan 6-8, 2012.
58. Invited lecture on"Materials used in developing nano drug delivery systems",on Jan 27th 2012 at the Department of Pharmaceutics, Faculty of Pharmacy, Sri Ramachandra University, Chennai,
59. Invited talk at the National Seminar on Advanced Nanomaterials (ANM-2012) at Periyar University, Salem, on February 6, 2012.
60. Invited lecture at the Workshop on Photon and Ion induced X-ray emission spectroscopy held at Department of Physics, Karnatak University, Dharwad during 23-25 Feb 2012
61. Invited lecture at the National Seminar on Indigenous materials development for Industrial applications, held at Anna University during 28th Feb 2012
62. Invited talk at the National Workshop on Urolithiasis and its Management in Siddha at the Siddha Regional Research Institute, Puducherry on March 6, 2012.
63. Delivered an invited lecture at the seminar on "Nano materials" on 05/03/2012 at the Sri Sai Ram Institute of Technology, Chennai.
64. Invited lecture on Nanomaterials at the Workshop on Applied Materials held at Department of Physics, University of Calicut on 8-9 March 2012
65. Invited lecture at the National Seminar on Recent Trends in Physics held at University College, Thiruvananthapuram, on 23 March 2012.
66. Gave a seminar on "Investigations on Biomineralisation and Trace element analysis" at Bhabha Atomic Research Centre on May 8 2012.
67. Delivered an Invited lecture on Nano biomimetics at the Summer Training Programme 68.Nanoscience and Nanotechnology held at University of Madras on 12th June 2012
69.Invited lecture on 41st National seminar on Crystallography held at University of Madras on October 8 October 2012.
70.Invited to deliver a lecture and Chair the sessions during Karpagam University Annual Research Congress to be held during 29-30 Nov 2012 at the KARPAGAM UNIVERSITY, Coimbatore.
71.Resource person at the UGC - Academic Staff College of University of Mysore inthe 6th Refresher Course in Materials Science on December 14 2012.

72.I have delivered the invited a lecture at the Thematic orientation workshop on Trace element analysis and Radiological Sciences" held at Manipur University, Imphal during the period March 12-14 2013.

73.Lecture in the National Seminar on "Condensed Matter and Materials Physics" (NA-CMAMP) is proposed to be organized during 19-20, March 2013 in the Department of Physics, Gulbarga University, Gulbarga.

74.Delivered an Invited lecture at the referesher course in Physics held at CAS in Crystallography and Biophysics, University of Madras, 2nd Sept 2013

75.Delivered an Invited lecture on recent trends in Nanobiotechnolgy held at Anna University on 19th Sept 2013

76.Delivered an Invited lecture on Nano biomimetic Technology on 4th October 2013 at the Science City, Chennai.

77.Resource person at the UGC - Academic Staff College of University of Mysore in the 6th Refresher Course in Materials Science on October 29 2013.

78. Resource person at the Refresher Course in Nano-Sciences (Physics, Chemistry, Material Science, Mechanical / Electronics Engg.) for College / University teachers on 7th November 2013 in Academic Staff College, (UGC), University of Kerala.

79. Delivered an Invited lecture at the National Seminar on the "Recent trends in Physics" on Nov-27 2013 held at Govt.Arts& Science College, Kozhikode.

80. Delivered an Invited lecture and chaired a session at the IUMRS-ICA-2013, held in Bangalore, India on Dec.16- 17, 2013.

81. Delivered an Invited lecture at the World congress on Research and Innovations organised at St.Josephs College, Irinjalakuda, 19th December 2013.

82. Oral presentation at the National Conference on Condensed Matter Physics and Applications held at the Manipal Institute of Technology Manipal University on 27th December 2013

83. Invited lecture at the 5TH International Conference on Perspectives in Vibrational Spectroscopy on 9th July at Trivandrum,Kerala

84. Invited lecture at the Faculty Development programme on Advances in Molecular Diagnostics and Therapeutics held at PSG College of Technology, Coimbatore on 18-24 August 2014

85. Invited lecture at the National Conference on Advanced Technologies for Materials Processing and Diagnostics, held at Kochi Kerala during September 18-20 2014.

86.Invited talk at theNational Seminar on 'New Frontiers in Physics-Scope and Challenges" held during October 28-30, 2014 at St.Xavier's College, Thumba, Thiruvananthapuram.

87.Invited talk at theNational Seminar on 'Recent trends in Crystallography" held during 30-12-2014 at Department of Physics,Cochin University of Science and Technology,Cochin.

88. Invited talk at the National Conference on "Adavances in Crystal Growth and Nanotechnology, held at C.M.S.College, Kottayam Kerala during 16th January 2015

89. Invited Technical talk at the National Seminar on New materials and Nanotechnology, held at Heera College of Engineering and Technology, Thiruvananthapuram, on 17th January 2015

90. Resource person in the "National Level Lecture Workshop on Novel Materials" held during 13-14th February 2015, at the KLE's S.K.Arts College and H.S.K.Science Institute, Hubballi, Karnataka.

91. Resource person in the UGC refresher course on "Nanosciences' on 16th February 2015, at the University of Madras, Chennai.

92. Invited talk at the National Seminar on Advances in Crystallography held at the Lady Doc College, Madurai on 2MARCH 2015

93. Invited talk at the 19th National Seminar on Crystal Growthheld at the VIT UNIVERSITY, VELLORE, on 14thMarch, 2015.

94. Invited talk at the the National Seminar on Nano Science and Nano Technology held at S.N.COLLEGE, VARKALA March 16th 2015

95. Invited talk at the National Conference On Application Of Rapid Prototyping Techniques In Biomaterials held at the KarpagaVinayaga College Of Engineering And Technology, Padalam on 19-03 2015

96. International Summer School on "Advancements in Engineering and global development" conducted jointly by University of Edinburgh UK and Anna University on 24-06-2015

97. One day Workshop on "Recent Developments in Tissue Engineering" 29-09- 2015, CENTRE FOR MEDICAL ELECTRONICS, Anna University, Chennai

98. Invited lecture at the Workshop on "Fundamentals and applications of Nanoscience and Nanotechnology" conducted by Science City, Chennai, on 7-10-2015

99. UGC sponsored short term course on "New materials their characterisation and applications" Conducted by Dept of Aerospace and Engineering,MIT, Anna University on 13-10-2015

100. Resource Person at the UGC sponsored National Seminar on "Perspectives in Raman Spectroscopy" St.John's College, Anchal,Kerala on15th October 2015

101. Invited lecture at National seminar on " Photonics" conducted by Department of Optoelectronics, University of Kerala during 10-11 December 2015

102. UGC-HRDC organised invited lecture for the refresher course on Material Science atDepartment of Optoelectronics, University of Kerala during 29th November-19th December 2016
103. Invited lecture at conference on "OPTICS 2017" Conducted by NIT Calicut on 11th January 2017
104. Invited talk in the XXI National Seminar on Crystal Growth and Applications (XXI NSCGA-2017) organised by PG and Research Department of Physics, National College, Tiruchirappalli on 6th March 2017
105. Invited talk in 45th National seminar on Crystallography organized by the Indian Crystallographic Association at the School of Materials Science & Technology, IIT- Varanasi during 9-12 July 2017
106. Invited talk at the 6th Asian Biomaterials Congress organised by Sree Chitra Tirunal Institute for Medical Sciences & Technology(SCIMST), Thiruvananthapuram, the society for Tissue Engineering and regenerative Medicine India (STERMI) and the Asia Pacific Society for Artificial Organs (APSAO) at Thiruvananthapuram, Kerala during 25-27 October 2017.
107. Invited talk at the National Seminar on Advanced Materials on24th March 2018 at the School of Pure and Applied Physics, M.G.University , Kottayam.
108. Invited talk at the XII NSCGA-2018 held on 31-01-2018, at Sacred Heart College, Tirupattur.
109. Invited lecture at the National Seminar on 'Science and Technology of New Materials for Sustainable Future' (STNM2018) on February 9, 2018 at the Department of Physics, University of Calicut.
110. Keynote lecture in the National conference on Emerging Materials and Methods for Advanced application at Department of Physics, Periyar University, Salem on 1st March 2018
111. Delivered an invited lecture at the national workshop on Overview of Nanoscience and NanoTechnology held at Adhiyaman Arts and Science College for Women, Uthangarai on 17th July 2018.
112. Keynote speaker on 20th July 2018 at the DST-SERB Sponsored Three Days National Level Conference on 'Advances in Materials Science and Engineering for Societal Applications - NMSE 2018', held at Sri Ramakrishna Engineering College, Coimbatore.
113. Delivered a keynote address at the "International Conference on Recent Trends in Nanotechnology" held at Alpha Arts And Science College, Porur during 7th September 2018
114. Delivered a Plenary lecture at the VIth International Symposium on "Biogenic - abiogenic interactions in natural and anthropogenic systems" that took placeat the Saint-Petersburg University, Russia on 24-27 September 2018.
115. Delivered a plenary lecture at the Recent Trends in Materials Science and Technology held at IIST, Thiruvananthapuram during 12th October 2018.
116. Delivered an Invited lecture at the National Seminar on Nascent and Sustainable Materials at Kannur University, Kannur, Kerala on 28th November 2018.
117. Delivered an Invited lecture at the International Conference on Materials and Spectroscopy, Saveetha Engineering College, on 12th December 2018.
118. Webinar on "Advances in the Synthesis of Biopolymer-Ceramic Composites for Biomedical Applications". On 10th July conducted by Department of Physics, Saveetha Engineering College, Thandalam, Chennai 602105
119. Webinar on "Biomimetic Synthesis of Bioceramic Composites" on Jul 17, 2020, Department of Science and Humanities, National Engineering College, Kovilpatti. Tamil Nadu 628503
120. Webinar on "Advances in Functional Composite Materials", on Jul 22, 2020 conducted by The Center for Radiation, Environmental Science and Technology (CREST), Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam - 603 110.
121. Webinar on the : "Introduction to Bio-Inspired Technology" on 27.7.2020 organised by the School Of Advanced Science, Department Of Physics, Kalasalingam Academy Of Research And Education, Kalasalingam University, Anand Nagar, Krishnankoil, Viruthunagar (Dt.) – 626126, Tamil Nadu
122. Webinar on "Synthesis of Polymer Ceramic Composites for Biomedical Applications" on March 12, 2021 International Conference on Novel Engineering Materials for Biomedical, Energy, Environment, Sensing and Other Applications (ICON-BEES'21), jointly organized by the Department of physics and the Department of metallurgical and materials engineering, National Institute of Technology, Tiruchirappalli.
123. Virtual Webinar on "Future With Biomaterials" organised by the Department of Physical Sciences & Biotechnology, SONA College of Arts and Science Salem, Tamil Nadu 636005 On 16th April, 2021
124. Webinar on "Current Trends on Biomaterials" on Jun 9, 2021 organized by Institute of Science and Research, IPS Academy, Indore (M.P).
125. Webinar "Ion Beam Modification of Polymer-bioceramic Composites for Biomedical Applications" on July 16th 2021 in the Theme meeting on Science And Engineering of Materials using Ion Beams, Organised jointly by UGC-DAE Consortium for Scientific Research, Kolkata Centre & Variable Energy Cyclotron Centre, Kolkata.

126. Webinar on “Pathways of Biomineralization to Biofabrication” on October27, 2021, National Conference on ``Emerging Trends in Functional Oxides and Nanomaterials" - organized by Department of Physics, Saurashtra University, Rajkot (Gujarat).
127. Webinar on “Introduction to Bio-Inspired Technology” at the National Seminar on Next Generation Materials And Devices on – 16th December 2021 conducted by Department of Physics, AMET University, Chennai
128. Chaired the session III on 22nd April 2022 in the International Conference on Emerging Biomaterials for Advanced Applications (ICEBAA-2022), held at the Periyar University, Salem.
129. Webinar on “Introduction to Bio-Inspired Technology” on 3rd February 2022Refresher course on Nanoscience - XIth Batch organized by the National Centre for Nanoscience and Nanotechnology, University of Madras.
130. Delivered a Lecture on “Introduction to DLS analysis” on March 21, 2022- at the “Hands on Training and Workshop for Utilization of Microscopic and Spectroscopic Equipment” at Crystal Growth Centre, Anna University, Chennai – 600 025 Tamil Nadu
131. Webinar on the : "Introduction to Biomaterials" at the International webinar "Clinical Aspects of Stem Cells and Regenerative Medicine" held on April 27th 2022 organized by Dr. Rela Institute and Medical Centre.
132. Webinar on “Title: Dynamic Light Scattering-A tool to study the Crystallisation Phenomena”, on 17.05.2022, at the 2nd Indian Summer School on Crystal Growth conducted by Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam - 603 110.

Other Duties:

a)Board of Studies Member of Anna University, Karpagam University, Mysore University, National Engineering College, Kovilpatti, Saveetha Engineering College. Chennai

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b)Member of the syllabus Subcommittee for framing the Curricula and Syllabi for Undergraduate courses offered by the Engineering colleges affiliated to Anna University under the Faculty of Technology.

c) Governing Council Member of Inter University Accelerator Centre, New Delhi (2014-2016)

d) European Higher Education Expert (2016-2019)

e) Purchase committee member of various departments and member of the Coordination Committee to process E-tender of Anna University

f) Ph.D. thesis examiner of Kerala University, Madras University, Cochin University of Science and Technology, Karnatk University, M.G.University, Calicut University, M.S.University, University of Mysore.

List of publications:

a) Monographs/Book chapters

1. “Crystals of Organic Molecules “ in Conducting Polymers Edited by Xavier, F.P. and Pragasam, J., Loyola College Publications, Madras, 1996, p187-193

2. A chapter on “Application of Gel growth in the Field of Crystal Deposition Diseases” in the “Handbook of Crystal Growth” ISBN: 978-3-540-74761-1, published by Springer Publishers in 2010;pp 1607-1636), DOI 10.1007/978-3-540-74761-1

3. A chapter on “Effect of Swift Heavy Ion Irradiation on Calcium Phosphate based Bioceramics” in a book entitled “Synthesis and Engineering of Nanostructures by Energetic Ion” Published by Nova Publishers, USA in 2010; (chapter 20, pp 335-342), ISBN: 978-1-61668-209-5

4. A chapter on "Various techniques to functionalize nanofibers with biological interest molecule". in a book entitled "Handbook of Nanofibers",(2018) eReference ISBN: 978-3-319-42789-8, Springer International, doi.org/10.1007/978-3-319-42789-8_31-1

5. A chapter on "Nano Fibrous Scaffolds for Tissue Engineering Application",ISBN:978-3-319-42789-8 (2018) in a book entitled "Handbook of Nanofibers". Springer, Cham, doi.org/10.1007/978-3-319-42789-8_30-1,

6. A chapter on "Electrospun nanofibres for drug delivery in regenerative medicine", in a book entitled " Applications of Targeted Nano-Drugs and Delivery Systems: Nanoscience and Nanotechnology in Drug Delivery",ISBN:978-0-12-814029-1, (2019), Publisher: Elsevier, doi.org/10.1016/B978-0-12-814029-1.00020-X
7. A chapter on Collagen Based Biomaterials for Tissue Engineering Applications: A Review. In Processes and Phenomena on the Boundary Between Biogenic and Abiogenic Nature. Springer, Cham, 2020, pp. 3-22, Online ISBN: 978-3-030-21614-6, DOI: https://doi.org/10.1007/978-3-030-21614-6_1.

8. A chapter on Chitosan and Chitosan Based Nanocomposites for Applications as a Drug Delivery Carrier: A Review In Processes and Phenomena on the Boundary Between Biogenic and Abiogenic Nature. Springer, Cham, 2020, pp. 23-37, Online ISBN: 978-3-030-21614-6, DOI: https://doi.org/10.1007/978-3-030-21614-6_2

9. A chapter on Impact of Dopants on the Electrical and Optical Properties of Hydroxyapatite, Kumaravelu Thanigai Arul, Jayapalan Ramana Ramya, Subbaraya Narayana Kalkura, 2020, Book Biomaterials, Publisher: Intech Open, https://www.intechopen.com/online-first/impact-of-dopants-on-the-electrical-and-optical-properties-of-hydroxyapatite; DOI: 10.5772/intechopen.93092

b) Articles in journals:

1. **Narayana Kalkura, S**. and.Devanarayanan.S. (1986): Growth of Cholesterol Crystals in Silica gel, J.Mat.Sci.Lett. **5**, 741-742.

2.**Narayana Kalkura, S**. and Devanarayanan.S. (1987): Fibrous Crystals of Cholesterol in Silica gel, J.Cryst.Growth. **83**, 446-448.

4.**Narayana Kalkura S**., Ramakrishnan, V. and Devanarayanan. S. (1987): IR and Raman studies of Cholesterol monohydrate grown in gel medium, Infrared Physics. **27**, 335-337.

4. Devanarayanan, S. and **Narayana Kalkura, S.** (1988): Growth of $Te(OH)_6Na_2PO_4.H_2O$ single crystals in Silica gel and their characterisation, Cryst.Res.Tech. **6**, 811-813.

5. **Narayana Kalkura, S**. and Devanarayanan, S. (1988): Growth of Progesterone crystals in silica gel and their characterisation., J.Mat.Sci.Lett. **7**, 827-829.

6. **Narayana Kalkura, S**. and Devanarayanan, S. (1989): Growth of ß-sitosterol crystals in silica gel and their characterisation, J.Mat.Science Lett. **8**, 481-482.

7. **Narayana Kalkura, S**. and Devanarayanan, S. (1989): Crystal Growth of Steroids and in silica gel: Testesterone, J.Cryst.Growth. **94**, 810-813.

8. **Narayana Kalkura, S**. and Swamy, N.V.V.J. (1989): Physics and the Cat, Bull.IAPT. **6**, 274-276.**Impact Factor:**not available

9. Ramakrishnan, V., **Narayana Kalkura, S**. and Rajagopal, P. (1990): Vibrational Spectra of $Na_2P_4O_7.10\ H_2O$, PramanaJ.Phys. **34**, 555-560.

10. Devanarayanan, S. and **Narayana Kalkura, S**. (1991): Crystal growth of steroids in silica gel: Cholesteryl Acetate, J.Mat.Science Lett. **10**, 497-499.

11. **Narayana Kalkura, S.** and Devanarayanan, S. (1991): Crystallization of steroids in Silica gel, J.Cryst.Growth**110**, 265-269.

12. Irusan,T., Arivuoli, D., **Narayana Kalkura, S**. and Ramasamy, P. (1993): Dendritic structures of Brushite in silica gel, J.Cryst.Growth. **130**, 217-220.

13. **Narayana Kalkura, S**., Vaidyan V.K., Kanakavel M. and Ramasamy, P. (1993): Crystallization of Uric acid, J.Cryst.Growth. **132**, 617-620.

14. **Narayana Kalkura, S.,**Girija, E.K., Kanakavel, M. and Ramasamy, P. (1995): In Vitro Crystallization of spherulites of Monosodium urate monohydrate, J.Mat.Sci.in Med. **6**, 577-580.

15. Girija, E.K., **Narayana Kalkura, S**. and Ramasamy, P. (1995): Crystallization of Cystine, J.Mat.Sci.in Med. **6**, 617-619.

16. Manimaran, M., **Narayana Kalkura, S**., and Ramasamy, P. (1995): Crystallization of $ZnSnAs_2$ by Physical vapor transport, J.Mat.Sci.Lett., **14**, 1366-1368.

17.**Narayana Kalkura, S.,**Kanakavel, M. and Ramasamy. P. (1997): Crystallization of an organic intercalation compound: Cholic acid, Cryst.Res.Tech. **32**, 569-575.

18. Girija, E.K., **Narayana Kalkura, S**. and Ramasamy, P. (1998): Crystallization and microhardness of Calcium Oxalate monohydrate crystals, Mat.Chem.Phys. **52**, 253-257.

19. Sivakumar, G.R., Girija, E.K., **Narayana Kalkura, S**. and Ramasamy, P. (1998): Crystallization and characterisation of calcium phosphates:Brushite and monetite, Cryst.Res.Tech. **33**, 197-205.

20. Varma, H.K., **Narayana Kalkura, S**. and Sivakumar, R. (1998): Polymeric precursor route for calcium phosphate compounds, Ceramic Int. **24**, 467-470(selected as **cover page article**).

21. Poddar, J., Hossain, T. and **Narayana Kalkura, S**. (1998): Characterisation of pure KDP single crystals grown in silica gel, Jl. of Bangladesh Scientific Research. **16**, 59-64.

22. Sivakumar, G.R., **Narayana Kalkura, S**. and Ramasamy, P. (1999): Effect of Magnesium on the crystallization and hardness of dicalcium phospahate dihydrate, Mat.Chem and Phys. **57**, 238-243.

23. Girija, E.K. , **Narayana Kalkura, S.** and Ramasamy, P. (1999):Analysis of trace elements in Urinary calculi, Convergence. **1**, 55-58.

24. Girija, E, K., **Narayana Kalkura, S**, Ramasamy, P. and Sivaraman, P.B. (2000): Knoopmicrohardness studies of urinary calculi and pure Calcium oxalate monohydrate crystals.Mat.Chem and Phys. **63**, 50-54.

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27. Ashok,M., **Narayana Kalkura,S**, Vijayan,V., Magudapathy,P., Nair, K.G.M.,.(2001): Investigations of the Elemental Concentration of Kidney stones by PIXE analysis., International Journal of PIXIE. **11**, 21-25.

28. Ramalingom, S., Podder,J, and **Narayana Kalkura,S** (2001): Crystallization and Characterization of Orthorhombic B-MgSO4.7H2O., Cryst.Res.Tech. **36**, 1357-1364.

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31. Krauspenhar R, Rypneweski W, **Kalkura SN** , Moore K , Delucas L, Stoeva S, Mikhailov A, Voelter W and Betzel C: (2002) Crystallisation of Mistletoe lectin I from Viscum album in Complex with

Adeninemonophosphate under Microgravity conditions and Structure analysis to 1.9Å resolution Acta Cryst **D58** 1704-1707.

32. Sundaram NM, Ashok, M, Kalkura**S.N** (2002) Observation of Cholesterol nucleation in Magnetic field Acta Cryst **D 58** 1711-1714.

33. Enzymatic activity and Inhibition of the Neurotoxic Complex Vipoxin from the Venom of ViperaammodytesmeridionalisNotzel C, Chandra V, Perbandt M, Rajashankar K, Singh TP, Aleksiev B, **Kalkura N**, Genov N and Betzel C., (2002)Z.Naturforsch**57c** 1078-1083.

34. Ramalingom,S., Podder,J, and **Narayana Kalkura,**S(2003): Habit Modification of Epsomite in the presence of Urea, J. Cryst.Growth**247**, 523-529.

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36. Ashok, M, N.M. Sundaram, **S.NarayanaKalkura** (2003) Crystallisation of hydroxyapatite at physiological temperature, Materials Letters **57,** 2066-2070.

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38.M.Perbandt, Inn-Ho Tsai, A.Fuchs, S.Banumathi, K.R.Rajashankar, D.Gerogieva, **N.Kalkura**,T.P.Singh, N.Genov and C.Betzel (2003) Structure of the heterodimeric neurotoxic complex viperotoxin F from venom of ViperaRusselliformosensis at 1.9 Å : ActaCryst**D59**, 1679-1687.

39. T. K. Anee, M. Palanichamy, M. Ashok, N. MeenakshiSundaram, **S. Narayana Kalkura** (2004)Influence of Iron and temperature on the crystallization of Calcium phosphates at the physiological pH *Materials Letters, **58**, 478-482* .

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43. I. Schöll,**Narayana Kalkura**, Y. Shedziankova, A.Bergmann, P. Verdino,B. Hantusch, G. Boltz-Nitulescu, C. Betzel,‡ K.Dierks, W. Keller,and E. J-Jarolim Dimerization of the Major Birch Pollen Allergen Bet v 1 is important for its *in vivo* crosslinking potential in mice(2005) ***J.Immunol***.,**175**: 6645 – 6650.

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49. E K Girija, **S Narayana Kalkura**, P B Sivaraman and Y Yokogawa Mineralogical composition of urinary calculi from southern India Journal of Scientific and Industrial Research (2007) **66**, 632-639.

50. S. P.Parthiban, R.V. Suganthi, E.K. Girija, K. Elayaraja, P. Kulariya, Y.S. Katharria, F. Singh, I. Sulaniya, A. Tripathi, K. Asokan, D. Kanjilal, S.Yadav, T.P. Singh,**S. Narayana Kalkura**Influence of Swift Heavy Ion Irradiation on Hydroxyapatite bioceramics: Archives of Bioceramics Research (2007) **7,** 31-34.

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52. K. Elayaraja, S. P. Parthiban, S. Ramalingom, G. Bocelli , **S. Narayana Kalkura**
Tetraaquadiglycinemagnesium(II) hexaaquamagnesium(II) bis(sulfate) *Acta Cryst.* (2007). **E63**, m2901-02.

53. E.K. Girija, S. P.Parthiban, R.V. Suganthi, K. Elayaraja, P. Kulariya, Y.S. Katharria, F. Singh, I. Sulaniya, A. Tripathi, K. Asokan, D. Kanjilal,**S. Narayana Kalkura**: High energy radiation- a tool for enhancing the bioactivity of the hydroxyapatite (2008) J.Cer.Soc.Jp **116**, 320-324.

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