

ABSTRACT

Name	: Dr.G.Velraj
Designation	: Assistant Professor
Educational Qualification	: M.Sc., Ph.D.
Post Doctoral Fellowship	: Indian Institute of Science (IISc), Bangalore 2008
Experience	: Teaching 11 years; Research 14 years
Areas of Research	: Vibrational spectroscopy & Materials Science
Research Guidance	: Ph.D – awarded : 07; submitted : 04 M.Phil- awarded : 40
Countries Visited	: United States of America and Malaysia
Fellowships Awarded	: International and National fellowships awarded by DST,UGC,INSA, TNSCST, IASc
Major Research Projects	: 01 completed; 01 ongoing; (Total cost Rs. 27 lakhs)
Papers Published	: International: 55 National: 03
Collaboration	: National: 08
Seminars/Conferences	: Organized: 04 Attended: 47
Journals Review	: International: 05 National: 01
Chapters in the edited books published	: 07
Books/Study materials written	: 07
Membership in Professional	: Scientific bodies : 07
Administrative Experience	: NSS Officer (2003-04) MIT-Anna University Chennai, NSS Programme Officer (Unit-II) Periyar University Salem-11.

BIODATA

Name : **Dr.G.VELRAJ**

Date of Birth : 14.05.1976

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Residence

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Academic details

University Academic Record :

Ph.D. – Physics	Annamalai University, Annamalai nagar,Tamil Nadu	Highly Commended
M.Sc. - (Physics)	Annamalai University, Annamalai nagar,Tamil Nadu	First class

Post Doctoral Experience:

Worked as a Post Doctoral Research Fellow in the project 'FT-IR Micro spectroscopy and its applications' sponsored by TNSCST, Govt. Of Tamilnadu through Young Scientist Fellowship Scheme under the supervision of **Prof. S. Umapathy** - Department of Inorganic and Physical Chemistry , Indian Institute of Science, Bangalore.

Teaching Experience : 11 Years

Research Experience : 14 Years

Areas of Research : Vibrational Spectroscopy, Ultrasonic,
Conducting Polymers, Archaeomagnetism
& Materials Science

Research Guidance :

Ph.D	Awarded:07 Submitted:04 Ongoing:05
M.Phil	Awarded: 40 Ongoing: 03
M.Sc projects	34 Students Ongoing: 06

Countries Visited : United States of America, Malaysia.

Fellowships Awarded:

Young Scientist Fellowship- 2007-08, Tamilnadu State Council for Science and Technology, Govt. of TamilNadu, Chennai.

Summer Research Fellowship- 2009, IASc Bangalore, INSA New Delhi & NASI Allahabad.

Young Scientist International Travel Fellowship 2010, Department of Science and Technology (DST), New Delhi, to visit U.S.A.

INSA Visiting Scientist 2010-11, Indian National Science Academy (INSA), New Delhi, under INSA Visiting Scientist Programme 2010-11.

Visiting Fellowship 2010-11, University Grants Commission (UGC), New Delhi, Under Indo-Hungarian Educational Exchange Program.

Visiting Scientist:

Indian Institute of Geomagnetism (IIG), Navi Mumbai 2010 awarded by

Indian National Science Academy (INSA), NewDelhi.

Awards:

Best Male NSS Volunteer in Annamalai University (1998-99)

TamilNadu State NSS Award Best Volunteer (1998-99).

Professional Training :

Year	Nature of Training	Duration	Organization where training was provided
2008	Orientation Program	15-05-2008 to 11-06-2008	Academic Staff College, Bharathiar University, Coimbatore
2007	Physics with Homemade Equipment and Innovative Experiments	24.09.2007 to 29.09.2007	Inter University Accelerator Center, New Delhi
2012	Refresher Course in Physics	23.08.2012 to 12.09.2012	Academic Staff College, University of Madras, Chennai
2012	Orientation Course	12.12.2012 to 18.12.2012	NSS- Empanelled Training Institute, Madras School of Social Work, Chennai

Agency	Title of The Project	Period of Support	Remarks
UGC	ESR Dating Of Archaeological Samples Recently Excavated In South India	2010-2013 3 Years	Completed
DAE- BRNS	Provenance Studies and Determination of Iron Concentration in Archaeological Artifacts using NAA to subject the Samples for Archeomagnetic dating	2013-2015 3 Years	Ongoing

Major Research Projects (Total grant received: 27lakhs)

National Collaborations:

Dr.N.Basavaiah ,Professor and Head, Department of Environment and Geomagnetism, Indian Institute of Geomagnetism, Mumbai
Dr. Ponraj, Department of Irradiation and Safety division, Indra Gandhi Center for Atomic Research, (IGCAR), Kalpakkam
Dr. S.Asokan, Scientist, Inter University Accelerator Center (IUAC), New Delhi
Dr.S.Umapathy, Professor of Inorganic and Physical Chemistry, Indian Institute of Science (IISc), Bangalore
Dr.Deepak Mathur, Director, Centre for basic Sciences, University of Mumbai and Professor of Atomic and Molecular Physics, Tata Institute of Fundamental Research (TIFR), Mumbai
Dr.A.V.R.Reddy, Chairman, Analytical Chemistry Division, Bhabha Atomic Research Centre (BARC), Mumbai.
Dr.R.Acharya, SOG, Radio Chemistry division, Bhabha Atomic Research Centre (BARC), Mumbai.
Dr.K.K.Swain, SOG, Analytical Chemistry division, Bhabha Atomic Research Centre (BARC), Mumbai

Seminars/Conferences Organized:

National Conference on Recent Advances in Vibrational Spectroscopy (NCVS – 2007), Department of Physics, Periyar University, Salem. 29 th & 30 th January, 2007.
Workshop on Electronics in Daily Life (WEDL-2008), Department of Physics, Periyar University, Salem-11, During 27 th & 28 th February 2008.
Workshop on Physics Experiments through Computer Interfacing (WPECI-2010), Department of Physics, Periyar University, Salem. 9 th & 10 th December, 2010.
One Day workshop on recent Advances in Physics Experiments (WRAPE-2012) Department of Physics, Periyar University, Salem on 28 th March 2012.

Editorial board

Joint Editor Journal of Current Sciences, an International Journal, India

Associate Editor, Journal of Convergence engineering, Technology and Science, India

Membership of Professional Bodies :

- Ø Life member- Indian Spectrophysics Association (ISPA)
- Ø Life member- Indian Laser Association (ILA).
- Ø Life member- Nature- An International Journal.
- Ø Life Member- Journal of Current Sciences- An International Quarterly Journal.
- Ø Member – Spectroscopy Asia – An International Quarterly Journal
- Ø Member- Materials To-day- An International Monthly Magazine
- Ø Life member- Microscopy- An international magazine

List of Papers Published (Journals)

In the refereed journals

1. Palanivel.R Sethupathi. R Rakkappan.C and **Velraj.G**
Vibrational Spectral Analysis of M- and P- Aminobenzoic Acids. Asian Chemistry Letters, Vol.6 No (1), PP.6-12 (2002).
2. Palanivel.R and **Velraj. G**
Porosity measurements to estimate the firing temperature of ancient potteries. Journal of Current Sciences, Vol 3 No (1), PP 63-66 (2003).
3. Palanivel. R, Sethupathi. R and **Velraj. G**
Fourier Transform Infrared Spectral Studies of O-M and P- Aminophenols. Journal of Annamalai University Vol 2 (1), pp 1-6 (2004).
4. Palanivel.R and **Velraj.G.**
Fourier Transform Infrared Spectroscopic analysis of Archaeological potteries recently excavated in Tamil Nadu. Asian Journal of Physics Vol 13 No (2),pp 6-14 (2004).
5. Palanivel.R and **Velraj.G.**
FTIR and FT – Raman spectroscopic studies of fired clay artifacts recently excavated in Tamil Nadu, India. Indian Journal of Pure & Applied Physics Vol 45 PP. 501-508, (2007). Impact factor:0.854
6. **G.Velraj** and M.Vigneswari.
FT-IR Spectroscopic Analysis of some Archaeological pottery shreds recently excavated at Adichanallur in Tamilnadu. Journal of Current Sciences, Vol 10 No (1), PP 51-56 (2007).
7. **G.Velraj and** Palanivel.R
Clay minerals identification of archaeological potteries using FT-Raman spectroscopy. Journal of Current Sciences, Vol 10 No (1), PP 349-352 (2007).
8. **G.Velraj**, K.Janaki, A.Mohamed Musthafa and R.Palanivel.
Firing temperature determination of Maligaimedu pottery shreds excavated in Tamilnadu, India. Journal of Current Sciences, Vol 10 No (2), PP 503-506 (2007)

9. **G.Velraj** and K.Janaki
FT-IR Spectroscopic method and chemical analysis to determine the atmospheric condition adopted by artisans at the time of manufacturing potteries recently excavated in Tamilnadu, India. Journal of Current Sciences, Vol. 10 (2): pp 785-788 (2007).
10. **G.Velraj** and K.Janaki
Microscopic and Porosimetry studies to estimate the firing temperature of archaeological potteries of Perur site in Tamilnadu, India. Journal of Current Sciences, Vol. 12(1): pp 43-48 (2008).
11. **G.Velraj** and K.Janaki
Estimation of firing temperature of archaeological pottery shreds recently excavated in Salamankuppam, Tamilnadu, India. Journal of Current Sciences, Vol. 12(1): pp 109-113 (2008).
12. **G.Velraj** and K.Janaki
Characterization of potteries from Melchietamur by a combined FT-IR and Chemical analysis. Journal of Current Sciences, Vol. 12(1): pp 303-308 (2008).
13. **G.Velraj** and K.Janaki
Electron Spin Resonance spectroscopic techniques for dating of fossil bones. Journal of Current Sciences, Vol. 12(1): pp 309-313 (2008)
14. **G.Velraj** and A.Mohamed Musthafa
ESR dating of the Neolithic Pottery recently excavated in Banahalli, Karnataka State, India. J. Cur. Sci. 12 (2): pp 467-470 (2008).
15. C. Roumana **G. Velraj**, M.Roumaisa and M.G. Mohamed Kamil,
Acoustical Investigation of molecular interactions in Aqueous Antibiotic solution. Journal of Pure and Applied Ultrasonic Vol. 30, pp 97-102 (2008).
16. **G.Velraj**, K.Janaki, A.Mohamed Musthafa and R.Palanivel
Spectroscopic and porosimetry studies to estimate the firing temperature of some archaeological pottery shreds from India. Applied Clay Science, Vol.43, pp 303-307 (2009). Impact factor 2.342.

17. **G.Velraj**, K.Janaki, A.Mohamed Musthafa and R.Palanive
Estimation of firing temperature of some archaeological pottery
shreds excavated recently in Tamilnadu, India. Spectrochimica
Acta Part A, Vol. 72, pp 730-733. (2009). Impact factor:1.977.
18. A. Mohamed Musthafa and **G. Velraj**
Archaeomagnetic study and Dating of Tittakudi Archaeological
site in Tamilnadu, India. Recent Research in Science and
Technology Vol 1(4), pp 176-179 (2009).
19. **G.Velraj** and K.Radha
Microspectroscopy study on different coloured butterfly wings.
Journal of Convergence engineering, Technology and Science
Vol.1 (1) pp 27-31 (2009).
20. **G. Velraj**, K.Janaki and A.Mohammed Musthafa
Microscopy, Porosimetry and Chemical analysis to estimate the
firing temperature of some archaeological pottery shreds from
India. Microchemical Journal, Vol.95, pp311-314 (2010). Impact
factor 2.879.
21. **G.Velraj** and C.Roumana
Molecular interaction study of antibiotic doxycycline hyclate
with linoleic acid. International Journal Pharma and
Biosciences, Vol.1 (2), pp1-8 (2010).
22. C.Roumana, **G.Velraj**, P.E.Ahilandeswari and M.G. Mohamed
Kamil,
Investigations of molecular interactions of Antibiotic Doxycycline
Hyclate with Palmitic acid. Recent Research in Science and
Technology Vol 2(2), pp 06-12 (2010).
23. **G.Velraj** and R.Sathya
Spectroscopic and microscopic studies of archaeological celadon
recently excavated from Alagankulam, Tamilnadu, India.Recent
Research in Science and Technology, Vol.2 (3), pp 58-63 (2010).
24. C. Shanmuga Priya, S.Nithya, **G.Velraj** and A.N.Kannappan
Molecular interactions studies in liquid mixture using Ultrasonic
technique. International Journal of Advanced Science and
Technology. Vol.18, pp 59-73 (2010).

25. **G. Velraj**, A.Mohammed Musthafa, K.Janaki, K.Deenadayalan and N.Basavaiah Estimation of Firing temperature and ancient geomagnetic field intensities of archaeological potteries recently excavated from Tamilnadu, India. *Applied Clay Science* Vol. 50 pp: 148-153 (2010). Impact factor 2.342.
26. M.Kandhasamy **G.Velraj** and G.Raja
Vibrational spectra and assignmetal of fundamentals vibration modes of O-Bromobenzoyl chloride based on DFT calculations.*Asian Journal of Science and Technology*, Vol. 4, pp 75-80 (2010).
27. **G.Velraj** and K.Janaki
Fourier Transform Infra red Spectroscopy in the Clay minerals identification of ancient potteries.*Journal of Modern Science*, Vol 2 (2), pp 19-28 (2010)
28. **G. Velraj**, R.Sudha and R. Hemamalini
X-ray diffraction and TG-DTA studies of archaeological artifacts recently excavated in Salamankuppam Tamilnadu. *Recent Research in Science and Technology*, Vol.2 (10) pp 89-93, (2010).
29. **G. Velraj**, K. Prabakaran, A. Mohamed Mustafa and R. Hemamalini
FT-IR and Micro Raman Spectroscopic studies of Archaeological potteries recently excavated in Tamilnadu, India.*Recent Research in Science and Technology* Vol. 2(10): pp 94 – 99, (2010).
30. **G.Velraj and** K. Janaki
Spectroscopic studies of some fired clay artifacts recently excavated at Tittagudi in Tamilnadu. *Recent Research in Science and Technology*, Vol. 3(3), pp 89-91, (2011).
31. **G.Velraj**, R.Ramya and P.Nazni
Fourier Transform Infrared Spectroscopic Study on Glycoalkaloid Concentration in Varieties of *Solanum tuberosum*. *Journal of Experimental Sciences*, Vol.2 (2), pp 68-71, (2011).
32. **G.Velraj** and R.Ramya
Electron Spin Resonance dating and XRD analysis of bones recently excavated Karnataka, India.*Elixir Chemical Physics*, Vol. 41, pp 5750-5754, (2011).

33. Poongodi Vijayakumar.T, Gowri Manohari. R and **Velraj.G**
Effect of optimum processing conditions on total polyphenols, antioxidant activity and FT-IR spectra of kodo millet (*Paspalum Scrobiculatum*). *Elixir Bio physics*, Vol.32, pp 2029-2033, (2011).
34. C.Sridevi, G.Shanthi and **G.Velraj**
Structure, Vibrational, Electronic, NMR and reactivity analyses of 2-amino-4H-chromene-3-carbonitrile (ACC) by ab initio HF and DFT calculations. *Spectrochimica Acta Part-A: Molecular and Biomolecular Spectroscopy*, Vol. 89, pp 46-54, (2012). Impact factor 1.952
35. R.Hemamalini and **G.Velraj**
FT-IR and X-Ray Diffraction and Thermal studies to estimate the firing temperature of the archaeological samples excavated recently at Banahalli in Karnataka, South India. *Journal of Chemical and Pharmaceutical Sciences*, Vol.4 (4), pp: 135-139, (2012).
36. M.Kandasamy and **G.Velraj**
Molecular Structure and Vibrational spectra of 3-and 4-amino 2-bromopyridine by density functional methods. *Spectrochimica Acta Part-A: Molecular and Biomolecular Spectroscopy*, Vol. 91, pp 206-216, (2012). . Impact factor 1.952
37. C.Shanmugapriya and **G.Velraj**
Synthesis and Characterization of nano and micro copper doped conducting polymer. *Materials letters* Vol.77, pp 29-31 (2012). Impact factor 2.307.
38. R.Ramya and **G.Velraj**
Electron Spin Resonance dating and XRD analysis of ancient marine shell recently excavated in Tamilnadu, India. *International Journal of Current Research*, Vol. 4, (3), pp.151-154 March (2012). Impact factor 0.535.
39. C. Sridevi and **G.Velraj**
Investigation of molecular structure, Vibrational, electronic, NMR and NBO analysis of 5-Chloro-1-methyl-4-nitro-1H-imidazole (CMNI) using ab initio HF and DFT calculations. *Journal of Molecular Structure*, Vol.1019, pp 50-60 (2012). Impact factor 1.634.

40. M.Kandasamy and **G.Velraj**
Ab initio/DFT electronic structure calculations, spectroscopic studies of 5-bromo-2-pyridinecarbonitrile – A comparative study. Solid State Sciences, Vol. 14, pp 1071-1079 (2012). Impact factor 1.856.
41. R.Ramya and **G.Velraj**
Electron Spin Resonance Dating and XRD Analysis of Archaeological Bone Samples Recently Excavated In Tamilnadu, India. International Journal of Chemical and Analytical Science, 3(5), 1398-1401(2012). Impact factor 0.470.
42. **G.Velraj**, R.Ramya and R.Hemamalini
FT-IR Spectroscopy, Scanning Electron Microscopy and Porosity Measurements to determine the firing temperature of ancient megalithic period potteries excavated in Tamilnadu, South India. Journal of Molecular Structure, 1028 (2012) 16-21. . Impact factor 1.634.
43. C.Sridevi, N.Panneer Selvam, G.Shanthi and **G. Velraj**
Tautomeric stability, Vibrational, electronic, NBO and NMR analyses of N-[acetylamino-(3-nitrophenyl) methyl] – acetamide (ANPMA) by ab initio HF and DFT calculations. Journal of Molecular Structure, 1030 (2012) 46-56. Impact factor 1.634.
44. S. Ramachandran and **G. Velraj**
FT-IR, FT-Raman spectral analysis and Density Functional Theory calculations studies of 3-Chloro-2-Nitrobenzyl Alcohol. Rom. Journ. Phys., Vol. 57, Nos. 7–8, P. 1128–1137, Bucharest, 2012. Impact factor 0.53
45. R.Ramya and **G.Velraj**
FT-IR Spectroscopy and X-Ray Diffraction Studies to Determine the Firing Temperature of Ancient Potteries Excavated at Gudnapur in Karnataka, South India. International Journal of Chemical and Analytical Science, 3(11), 1615-1619 (2012).
46. S.Meyvel, P.Sathya and **G.Velraj**
Thermal Characterization of archaeological pot shreds recently excavated in Nedunkur, Tamilnadu, India. Ceramica, 58 (2012) 338-341.

47. P.Sathya, **G.Velraj** and S.Meyvel
Fourier Transform Infrared Spectroscopic Study of ancient brick samples from Salavankuppam Region, Tamilnadu, India. *Advances in Applied Science Research*, 3(2)58 (2012) 770-779.
48. C.Shanmugapriya and **G.Velraj**
FT-IR Spectroscopy and SEM-EDX studies on nano copper doped conducting polymer. *Advanced Materials Research*, 584 (2012) 541-545. Impact factor 0.010
49. S. Ramachandran and **G. Velraj**
Molecular structure and spectral analysis of 4-(2-pyridyl) benzaldehyde: A combined experiment and DFT approach. *Journal of Chemical and Pharmaceutical Research*, Vol.4 (12), pp5126-5138, (2012).
50. M. Kandasamy, **G.Velraj** and S.Kalaiselvan
Vibrational Spectra, NMR and HOMO-LUMO analysis of 9-fluorenone-2-carboxylic acid. *Spectrochimica Acta Part-A: Molecular and Biomolecular Spectroscopy*, Vol. 105, pp 176-183, (2013). Impact factor 1.952.
51. S. Ramachandran and **G. Velraj**
Molecular structural, Spectroscopic (FT-IR, FT-Raman and UV-VIS) studies on the 3-(4-Fluorobenzoyl) Propionic acid by DFT calculations. *International journal of Current Research*, Vol. 5(2), Pp 240-247 (2013). Impact factor 0.535
52. C.Sridevi and **G.Velraj**
Structural, Vibrational, Electronic, NMR, NLO and reactivity analyses of (3Z)-3-(2-oxo-2-phenylethylidene) 1, 3-dihydro-2H-indol-2-One (OPEDI) by ab initio HF and DFT calculations. *Spectrochimica Acta Part-A: Molecular and Biomolecular Spectroscopy*, Vol. 107, pp 334-346, (2013). Impact factor 1.952.
53. M. Usharani, E. Akila, S. Ramachandran, **G. Velraj** and R. Rajavel
Synthesis, composition, geometry and antibacterial assay of binuclear Schiff base metal complexes derived from benzene-1, 4-dicarbaldehyde, 2-hydroxybenzaldehyde and pyridine-2,6-diamine. *International Journal of Pharmacy and Pharmaceutical Sciences*, Vol 5, pp. 639-647, (2013). Impact factor 1.1.

54. S. Ramachandran and **G. Velraj**
DFT, FT-IR and FT-Raman Investigations of 2-Chloro-5-Nitrobenzyl Alcohol. Rom. Journ. Phys., Vol. (58), Nos.3-4, pp.305-317 (2013). Impact factor 0.512.
55. C.Sridevi and **G.Velraj**
Molecular structure, tautomeric stability, protonation and deprotonation effects, vibrational, NMR and NBO analyses of 2, 4-Dioxoimidazolidine-5- acetic acid (DOIAA) by quantum chemical calculations.Spectrochimica Acta Part-A: Molecular and Biomolecular Spectroscopy, Vol.121, pp 533-543, (2014). Impact factor 1.977
56. **G.Velraj**, S. Soundharam and C. Sridevi
Structure, vibrational, electronic, NBO and NMR analyses of 3-methyl-2,6-diphenylpiperidin-4-one (MDPO) by experimental and theoretical approach. Journal of Molecular Structure, Vol.1060, (2014) Pp 156-165. Impact factor 1.404.
57. **G.Velraj**, D.Seetha and R.Hemamalini
FT-IR, XRD, Porosity and TG-DTA analysis of Archaeological potteries excavated from Kottapuram, Kerala, South India. *Elixir Vibrational Spectroscopy* Vol.66 (2014) Pp.20815-20819.
58. D.Seetha and **G.Velraj**
Determination of Firing Techniques of Ancient Artifacts by using FT-IR analysis. Chemical Science Review and Letters Vol. 2 (6), pp 456-463 (2014). ISSN: 2278-6783.

List of Papers accepted for Publications

1. G.Velraj and V.Velmurugan
FT-IR Spectroscopic method and Chemical analysis to determine the atmospheric condition adopted by artisans at the time of manufacturing potteries recently excavated in Tamilnadu, India.
J. Cur. Sci. 12 (1) (2010) Article in Press.
2. E. Akila, M. Usharani, S. Ramachandran, P. Jayaseelan, **G. Velraj** and R. Rajavel,
Tetradentate-arm Schiff base derived from the condensation reaction of 3, 30-dihydroxybenzidine, glyoxal/diacetyl and 2-aminophenol: Designing, structural elucidation and properties of their binuclear metal (II) complexes. Arabian Journal of Chemistry Vol.7 (1) (2014) p.xxx–xxx, **Article in press.**

List of paper proceedings in conferences

1. R.Palanivel and **G.Velraj**
FT-Raman spectroscopic analysis of some Archaeological pottery shreds excavated in Palur, Kanchipuram district, Tamilnadu. **National laser Symposium (NLS 2005)**. Department of Physics, Vellore Institute of Technology (VIT), Deemed University, Vellore, 7th - 10th December, 2005 Pp-350-51.
2. R. Palanivel, **G.Velraj**, M. Vigneswari and A. Mohamed Musthafa
Clay minerals determination of some ancient potteries excavated in Thiruverkadu, Kanchipuram district, Tamilnadu using FT-Raman Spectroscopy. **National Seminar** on Advances in Materials Science (**NSAMS-2006**), Department of Physics, Manonmaniam Sundaranar University, Tirunelveli on 27th & 28th March, 2006 Pp.71-72.
3. R.Palanivel, **G.Velraj**, K.Janaki and A.Mohamed Musthafa
Electron spin resonance spectroscopic studies to estimate the firing temperature of the archaeological pottery shred excavated in Tamilnadu. **National conference** on Application Oriented Materials (**NCAOM-2006**), Department of Physics, SRM College of Arts & Science, SRM Deemed University, Chennai on 21st & 22nd April, 2006 Pp.110-111.
4. R. Palanivel, **G. Velraj**, K. Janaki and A. Mohamed Musthafa
FT-Raman spectroscopic analysis of Archaeological potteries excavated at Maligaimedu, Cuddalore district in Tamilnadu, India. **National Laser Symposium (NLS-6)**, Raja Ramanna Center for Advanced Technology, Indore on 5th – 8th December, 2006, pp 264-265.
5. R. Palanivel, **G. Velraj**, K. Janaki and A. Mohamed Musthafa
FT-IR and ESR spectroscopic studies to estimate the lower limit of firing temperature of the Archaeological pottery excavated in Tamilnadu, India. **First Asian Spectroscopy Conference (FASC-2007)**, Indian Institute of Science, Bangalore on 29th January – 3rd February 2007.

6. C. Roumana, M. Roumaisa, M.G. Mohammed Kamil and **G.Velraj**
Acoustical investigation of molecular interaction in antibiotic – Cefadroxil. **National symposium** on Acoustics NSA-2007, Department of Physics, K.S.R. College of Arts and Science, Thiruchengodu on 5th -7th December, 2007 Pp 503-509.
7. **G. Velraj**, K. Janaki and V.Hariharan
Gamma irradiation and ESR Spectroscopic methods to determine the age of fossil teeth recently excavated in the Archaeological site.**National Seminar** on Advances in Material Science (NSAMS-2008)' Department of Physics, Manonmaniam Sundaranar University, Tirunelveli, Tamilnadu, India on February, 4-5 2008 Pp 48-49.
8. **G. Velraj** and V.Hariharan
ESR dating of archaeological bone recently excavated in Tamilnadu, India. 10th **State level Technical Seminar** on Physical Sciences. Department of Physics, Meenakshi College for Women, Chennai, Tamilnadu, India on February, 15-16 2008 Pp 34-35.
9. **G.Velraj** and K.Janaki
Analysis of Archaeological Potteries of Sankari Durg using Infrared Spectroscopy **International Conference** on Material Science Research and Nanotechnology (ICMSRN-2008), Department of Physics, Mother Teresa Women's University, Kodaikanal on February 27-29, 2008 Pp. 238-240.
10. **G.Velraj** and A.Mohamed Musthafa
ESR Dating of the Neolithic pottery recently excavated in Banahalli, Karnataka state, India. **International Conference** on Material Science Research and Nanotechnology (ICMSRN-2008), Department of Physics, Mother Teresa Women's University, Kodaikanal, February 27-29, 2008 Pp 387-389.
11. **G.Velraj**, K.Janaki, A.Mohamed Musthafa and R.Palanivel
FT-Raman spectroscopic analysis of archaeological potteries recently excavated in Thiruverkadu, Thiruvalluvar district in Tamilnadu, India. XXIst **International Conference** on Raman Spectroscopy (ICORS-2008), UX Bridge, West London, United Kingdom, August 17- 22, 2008 Pp 939-940.

12. C.Roumana, **G.Velraj**, P.E.Ahilandeswari and M.G.Mohamed Kamil
 Ultrasonic and viscometric investigation of molecular interactions Doxycycline hyclate with Ricinoleic acid. Eighteenth **National Symposium** on Ultrasonics (NSU-XVIII), School of Advanced Sciences, VIT University, Vellore, Tamilnadu, 21-23 December 2009, Pp: 144-148.

13. **G.Velraj** and A. Mohammed Musthafa
 Micro Raman analysis of Iron Age Archaeological pottery shreds recently excavated at Pattanam in Ernakulam district, Kerala, India. **National Laser Symposium** (NLS-2009), Bhabha Atomic Research Center (BARC), Mumbai, 13-16 January, 2010, C11-03.

14. **G.Velraj**, C. Roumana, A.E. Ahilandeswari and M.G. Mohamed Kamil
 Investigation of Molecular Interaction of Bio-Molecules with Anti-Biotic through viscometri and Acoustic studies. **International conference** on recent Trends in Materials and Characterization (RETMAC 2010), organized by Department of Physics, National Institute of Technology, Karnataka, Surathkal, Mangalore on 14-15th February 2010. EP19-P, Pp 217-222.

15. **G.Velraj**, A. Mohammed Musthafa and N.Basaviah
 Mineral Magnetic and Ancient Geomagnetic Field Intensity studies on Kaniyampoondi Archaeological pottery samples recently excavated in Tamilnadu, India. **International conference** on recent Trends in Materials and Characterization (RETMAC 2010), organized by Department of Physics, National Institute of Technology, Karnataka, Surathkal, Mangalore on 14-15th February 2010. EP19-P, Pp 217-222.

16. **G.Velraj** and C. Roumana
 Investigation of molecular Interaction of Myristic acid with Antibiotic through viscometric, acoustic and refractometric studies. **International Conference** on Applied Physics and Mathematics (ICAPM-2010), Interaction Association of Computer Science and Information Technology (IACSIT), **Malaysia** 7-9 May 2010, Pp: 623-628.

17. M.Kandasamy and **G.Velraj**
Ab initio and DFT studies of the molecular Structures and Vibrational P-Fluorobenzoyl Chloride. **International conference** on Recent Frontiers in Applied Spectroscopy (ICORFAS-2010), Department of Physics, Annamalai University, Chidambaram, 22nd – 24th September, (2010) Pp: 78.
18. C.Sridevi, **G.Velraj** and R.Palanivel
Quantum Chemical Calculations and Vibrational Spectroscopic Analysis of 2, 6-Diphenyl-4-Piperidone. **International conference** on Recent Frontiers in Applied Spectroscopy (ICORFAS-2010), Department of Physics, Annamalai University, Chidambaram, 22nd – 24th September, (2010) Pp: 115
19. K.Prabakaran, A.Mohamed Musthafa and **G.Velraj**
Micro-Raman and FT-IR Spectroscopic Studies of Archaeological potteries recently excavated in Tamilnadu, India.**International conference** on Recent Frontiers in Applied Spectroscopy (ICORFAS-2010), Department of Physics, Annamalai University, Chidambaram, 22nd – 24th September,(2010) Pp:192
20. P.Sathya and **G.Velraj**
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21. A. Mohamed Musthafa, K. Prabakaran and **G. Velraj**
Chemical phase identification of archaeological pottery shreds recently excavated at Salamankuppam site in Tamilnadu, India using Micro Raman Spectroscopy. **National laser symposium** – 19 Raja Ramanna center for advanced Technology, RRCAT, Indore 1st – 4th December 2010.
22. S. Suryarajkumar and **G. Velraj**
FTIR, XRD and conductivity studies on nano copper doped polypyrrole composite National conference on Nanoscience and Nanotechnology (NCNN-2011), Organized by National Centre for Nanoscience and Nanotechnology, University of Madras, Maraimalai campus, Chennai-600025, August 25-27, 2011.

23. R. Ramya and **G.Velraj**
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24. S.Ramachandran and **G.Velraj**
FT-IR and FT Raman, molecular geometry, vibrational spectral analysis and Density functional theory calculations for 2-Chloro-5-nitrobenxyl alcohol. **National conference** on exploring the frontiers of vibrational spectroscopy (EXFOVIS - 2011), Department of Physics & Research Centre Womens Cristian College, Nagercoil, Tamilnadu. 1st and 2nd September 2011, Pp -78.
25. R.Ramya and **G.Velraj**
Electron spin resonance dating of archaeological bone samples recently excavated in Tamilnadu, India. **International Conference** on Advanced Materials organized by Department of Physics, Loyola college, Chennai 600 034, Tamilnadu, India on 5th – 7th January 2012.
26. R.Ramya and **G.Velraj**
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27. R.Ramya and **G.Velraj**
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28. R. Hemamalini and **G. Velraj**
XRD, FT-IR and Chemical analysis to Determine the Firing Temperature of the Archaeological Bricks Recently Excavated at Mayiladumparai in Tamilnadu, South India. **National Conference** on advances in Materials Science, organized by Department of Physics, Annamalai University, Tamilnadu, India on 1 – 2 March 2012 Pp -148-155.
29. C.Sridevi and **G.Velraj**
Vibrational and Electronic Spectral Analysis of 5-Chloro -1-methyl -4- Nitroimidazole (CMNI) Using Ab-initio HF and DFT calculation. **National Conference** on advances in Materials Science, organized by Department of Physics, Annamalai University, Tamilnadu, India on 1 – 2 March 2012 Pp 184-187.
30. C.Sridevi, G.Santhi and **G.Velraj**
Investigation of Molecular Structure, Vibrational and Reactivity Analysis of 2-Amino-4h – Chromene 3-carbonitrile (ACC) by ab-initio HF and DFT calculation. **National conference** on Emerging Trends in chemical sciences. Gnanamani College of technology 18th April 2012.
31. A.Mohamed Musthafa, **G. Velraj**, N. Basavaiah, Awadhesh Kumar Rai and Gulab Singh Maurya
LIBS, EDXRF analysis and Paleointensity measurements on ancient pottery Samples recently excavated in Tamilnadu, India. **National Laser Symposium** (NLS-21), Bhabha Atomic Research Center (BARC), Mumbai, 6-9 February, 2013, CP10-16.
32. S. Ramachandran and **G. Velraj**
Spectroscopic and Density Functional Theory calculation of 4-(2-pyridyl) Benzaldehyde. **National Laser Symposium** (NLS-21), Bhabha Atomic Research Center (BARC), Mumbai, 6-9 February, 2013, CP10-39.
33. **G. Velraj**, R. Hemamalini, S. Tamilarasu, N. Basavaiah
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34. D.Seetha and **G.Velraj**
Spectroscopic Analysis of Archaeological Artifacts recently excavated from Kodumanal, Tamilnadu, India. **Proceedings** National conference in Advanced Materials and its Applications (NCAMA-2014), Organized by Engineering Physics Section, Faculty of Engineering and Technology, Annamalai University, Annamalainagar on April 4-5, 2014.
35. C.Roumana and **G.Velraj**
Study on Molecular Interaction of Saturated Biomolecule with Antibiotic through Ultrasonic and Viscometric Techniques. **Proceedings** National conference in Advanced Materials and its Applications (NCAMA-2014), Organized by Engineering Physics Section, Faculty of Engineering and Technology, Annamalai University, Annamalainagar on April 4-5, 2014.
36. **G.Velraj**, S.Ramachandran and T.Kavitha
Spectroscopic Analysis of 1,3-Diphenyl pyrazole-4-propionic acid: Through Experimental and Quantum Chemical Approaches. **Proceedings** National conference in Advanced Materials and its Applications (NCAMA-2014), Organized by Engineering Physics Section, Faculty of Engineering and Technology, Annamalai University, Annamalainagar on April 4-5, 2014.
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Molecular structure, Vibrational spectroscopic and Homo-Lumo studies of 3-(2-Furyl) propionic acid based on DFT calculations. **Proceedings** National conference in Advanced Materials and its Applications (NCAMA-2014), Organized by Engineering Physics Section, Faculty of Engineering and Technology, Annamalai University, Annamalainagar on April 4-5, 2014.
38. P.Bhavan Palani, K.Sainul Abidin, R.Kannan, M..Sivakumar and **G.Velraj**
Enhanced proton conductivity by the influence of modified Montmorillonite on Poly(Vinyl Alcohol) based Blend Composite Membranes. **Proceedings** National conference in Advanced Materials and its Applications (NCAMA-2014), Organized by Engineering Physics Section, Faculty of Engineering and Technology, Annamalai University, Annamalainagar on April 4-5, 2014.

39. P.Sathya, S. Meyvel and **G. Velraj**
Compositional and Technological features of fired brick samples excavated from Gangaikondacholapuram, Tamilnadu (India)
Proceedings National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai from July 18-19, 2014. CP 29, Pp-65.

List of papers presented in conferences (abstract only)

1. Palanivel.R Sethupathi.R Rakkappan.C and **Velraj.G**
FT-IR Spectroscopic analysis of M- and P- Aminophenol.
National Conference on Spectrophysics (**NCONS-2000**), Pachaiyappa's Collage, Chennai, 9th – 11th, August 2000.
2. R.Palanivel and **G.Velraj**
Fourier Transform Infrared spectroscopic analysis of Archaeological pottery shreds excavated in Tamilnadu. **National seminar** on Emerging Trends in molecular physics (**NASETMP – 2004**) organized by Department of Physics, Annamalai University, Tamilnadu. 8th and 9th March, 2004.
3. R.Palanivel and **G.Velraj**
SEM and EDX studies on some ancient potteries excavated in different archaeological sites in Tamilnadu. **National seminar** on Modern Trends in Applied Spectroscopy (**NASMTAS – 2004**). Department of Physics (Faculty of Engineering and Technology), Annamalai University, Tamilnadu. 25th and 26th March, 2004.
4. M.G.Mohamed Kamil, **G.Velraj** and M.Roumaisa
Acoustical Investigation of Molecular interactions in Antibiotic Cefadroxil.13th **National Symposium** on Ultrasonic. Department of Physics, Bundelkhand University, India, September 2004.
5. R.Palanivel, **G.Velraj**, R.Sethupathy and M.E.Raja Saravanan
Vibrational spectral studies of Para, Meta and ortho-amino benzoamide.**National conference** on Recent Advances in Materials Science (**NCMS – 2006**), Department of Physics, Periyar University, Salem. 16th & 17th February, 2006.

6. R.Palanivel and **G.Velraj**
Spectroscopic, Porosimetry and Microscopic studies to estimate the firing temperature of the archaeological fired clay materials. **National conference** on Recent Advances in Materials Science (**NCMS – 2006**), Department of Physics, Periyar University, Salem. 16th & 17th February, 2006.
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FTIR, FT-Raman and XRD analysis of clay mineral identification of some ancient fired clay materials. **National conference** on Recent Advances in Materials Science (**NCMS – 2006**), Department of Physics, Periyar University, Salem. 16th & 17th February, 2006.
8. **G.Velraj** and R.Hemamalini
FT-IR and the Ultraviolet spectroscopic studies of the homoeopathic mother tincture – acid phosphoricum. **National conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
9. **G.Velraj** and M.Vigneswari
Firing temperature determination of ancient potteries recently excavated at, Adichanallur, Tirunelveli District in Tamilnadu. **National conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
10. **G.Velraj** and R.Hemamalini
Laser Raman and the Ultraviolet spectroscopic studies of the Homoeopathic mother tincture – acid phosphoricum. **National conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
11. **G.Velraj** and S.Dharmalingam
Fourier transform Infrared Spectral analysis of Para chlorophenol. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.

12. **G.Velraj** and K.Janaki
Vibrational spectral characteristics of ancient potteries recently excavated in Tamilnadu, INDIA using FT-IR Spectroscopy. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
13. **G.Velraj** and K.Janaki
Firing temperature determination of archaeological potteries recently excavated sites in Tamilnadu, INDIA using FT-IR spectroscopy. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
14. **G.Velraj** and K.Janaki
FT-IR spectroscopy and chemical analysis to estimate the Fe concentration in ancient potteries to determine the method of firing at time of manufacture. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS-2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
15. **G.Velraj** and R.Hemamalini
FT-IR and Laser Raman spectroscopic studies of the homoeopathic medicine (Coculus). **National conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
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Vibrational spectral characteristics of para - bromo phenol. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
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Vibrational characteristics of para-iodophenol using FT-IR spectroscopy. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.

19. N.Krishnamoorthy, A.Mohamed Musthafa, **G.Velraj** and T.Sridharan
Estimation of lower limit of firing temperature of ancient potteries excavated in Nannambra, Kerala State using FT-IR and ESR spectroscopy.**National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
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Half band width calculation in FT-IR spectroscopy of the archaeological potteries to estimate the firing temperature at the time of manufacture. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
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FT-IR Spectral Studies of Archaeological Artefacts of Tamilnadu. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
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FT-IR Spectroscopic studies of Scale deposits in the PVC pipes of Borewell. **National Conference** on Recent Advances in Vibrational Spectroscopy (**NCVS – 2007**), Department of Physics, Periyar University, Salem. 29th & 30th January, 2007.
23. **G.Velraj**, K.Janaki, A.Mohamed Musthafa and R.Palanivel
FT-IR and Porosimetry studies to estimate the firing temperature of Maligaimedu pottery shreds excavated in Tamilnadu, India. **National conference** on Spectroscopy, Department of Physics, Mar Thoma College, Thiruvalla, Kerala State. 15th & 16th March, 2007.
24. **G.Velraj** and K.Janaki
Spectroscopic and Chemical analysis of Archaeological potteries to determine the atmospheric condition adopted by artisans at the time of manufacture.**National conference** on Spectroscopy, Department of Physics, Mar Thoma College, Thiruvalla, Kerala State. 15th & 16th March, 2007.

25. **G.Velraj** , A.Mohamed Musthafa and S.Venkateswaran
Mineral identification in PVC pipes scale deposits of crystalline aquifers in Salem and Namakkal district, Tamilnadu-Using Spectroscopic method. **National seminar** on “HYDROCARE 2007”, Department of Earth Sciences, Annamalai University, Annamalai nagar, 22nd & 23rd March 2007.
26. **G.Velraj**, R.Palanivel, K.Janaki and A. Mohamed Musthafa
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FT-IR and SEM with EDX studies to identify the minerals present in PVC pipe scale deposits in Salem District, Tamil Nadu. **National Conference** on recent advances in Molecular Structure (**NCMS-2007**), Department of Physics, Aarupadai Veedu Institute of Technology, Vinayaka Missions University, Paiyanoor, 19th & 20th July, 2007.
28. **G.Velraj**, K.Janaki and A. Mohamed Musthafa
Scanning electron microscopic studies on fresh fracture surface of the archaeological potteries. **National conference** on Advances in Surface and interface analysis, NASIA-2007, Department of chemistry, Periyar University, Salem, 13th & 14th December, 2007
29. **G.Velraj** and R. Hemamalini
X-Ray diffraction study to determine the clay minerals present in the archaeological pottery shreds recently excavated at Banahalli, Kolar District, Karnataka State. **National Seminar** on Recent Advances in Material Science (RAMS) '08 Department of Physics, Sri Sarada College for Women (Autonomous), Salem, 10th January, 2008.
30. **G.Velraj** and K.Janaki
Characterization of potteries from Melchittamur by a combined FT-IR and Chemical analysis. **National Seminar** on Recent Advances in Material Science (RAMS) '08 Department of Physics, Sri Sarada College for Women (Autonomous), Salem, 10th January, 2008.

31. **G.Velraj** and K.Janaki
Estimation of firing temperature of Archaeological pottery shreds recently excavated in Salamankuppam, Tamilnadu, India. **National Seminar** on Recent Advances in Material Science (RAMS) '08 Department of Physics, Sri Sarada College for Women (Autonomous), Salem, 10th January, 2008.
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Scanning Electron Microscope and porosity measurements on firing temperature determination of archaeological potteries. **National Seminar** on Recent Advances in Material Science (RAMS) '08 Department of Physics, Sri Sarada College for Women (Autonomous), Salem, 10th January, 2008.
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Clay Minerals Identification of Potteries from Ariyalur Using FT-IR Spectroscopy and X-ray diffraction studies. **National Conference** on Recent Advances in Physics (NCRAP-2008), Indian Spectrophysics Association (ISPA) and Spectrophysics Research Laboratory, Department of Physics, Pachaiyappa's College, Chennai, 1st and 2nd February, 2008.
34. R. Palanivel. **G.Velraj** and S.Meyvel
SEM-EDS characterization studies of archaeological pottery artifacts. **National Conference** on Recent Advances in Physics (NCRAP-2008), Indian Spectrophysics Association (ISPA) and Spectrophysics Research Laboratory, Department of Physics, Pachaiyappa's College, Chennai, 1st and 2nd February, 2008.
35. **G.Velraj** and R.Hemamalini
Gamma irradiation and spectroscopic methods to determine the age of the ancient bone samples recently excavated at Kottappuram fort in Kerala, India. **National Conference** on Recent Advances in Physics (NCRAP-2008), Indian Spectrophysics Association (ISPA) and Spectrophysics Research Laboratory, Department of Physics, Pachaiyappa's College, Chennai, 1st and 2nd February, 2008.
36. **G.Velraj** and K.Janaki
Potteries from Kaniyampoondi Archaeological site studied by FT-IR Spectroscopy. **National Conference** on advanced Materials Devices and Technologies (NCAMDT- 2008), Department of Physics, Sri Venkateswara University, Tirupathi, February 20-22, 2008.

37. **G.Velraj**, K.Janaki and A.Mohamed Musthafa
Apparent porosity study of Archaeological pottery shreds excavated recently from Tittagudi in Tamilnadu, India. **National Conference** on advanced Materials Devices and Technologies (NCAMDT- 2008), Department of Physics, Sri Venkateswara University, Tirupathi, February 20-22, 2008.
38. **G.Velraj** and P.Sathya
Application of FT-IR Spectroscopy in analysis of archaeological tiles.**State level seminar** on recent advances in Spectroscopy (RAINS 2009), Department of Physics, Kandhasamy Kandar's college, Vellure, January 23 & 24, 2009.
39. **G.Velraj** and P.Sathya
Mineralogical evaluation of ancient bricks using FT-IR spectroscopy.**State level seminar** on recent advances in Spectroscopy (RAINS 2009), Department of Physics, Kandhasamy Kandar's college, Vellure, January 23 & 24, 2009.
40. **G.Velraj** and R.Hemamalini
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41. **G.Velraj**, C.Roumana, P.E.Ahilandeswari and M.G.Mohamed Kamil
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42. **G.Velraj** and S.Umapathy
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43. **G.Velraj** and P.Sathya
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44. **G.Velraj**, K.Janaki and A.Mohamed Musthafa
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45. C.Roumana, **G.Velraj**, P.E.Akilandeswari and M.G. Mohamed Kamil
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46. **G.Velraj**, C.Roumana and E.Sukanya
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47. **G.Velraj** and V.Mekala
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48. P. Sathya and **G. Velraj**
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49. **G.Velraj** and R.Ramya
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50. **G.Velraj** and R.Hemamalini
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51. **G.Velraj** and P.Sathya
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52. **G.Velraj** and Hemamalini
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53. C.Shanmuga Priya, S.Nithya, **G.Velraj**, A.N.Kannappa
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54. **G.Velraj** and Hemamalini
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55. **G.Velraj**, A.Mohamed Musthafa, S.Ramachandran, K.Prabhakaran and N. Basavaiah
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56. **G.Velraj, C.Roumana, R.Sutha, P.E.Akilandeswari and M.G.Mohamed Kamil** Investigation of miscibility of the Polymer blends in Solution. (Oral Award).**National Conference** on Recent Advances in Spectroscopy & Electronics, Department of Physics & Electronics and Communications, Muthayammal College of Arts and Science, Rasipuram, 5th & 6th February 2010, P -57.
57. **G.Velraj and K.Radha**
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58. **G.Velraj and P. Sathya**
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59. **G.Velraj and Hemamalini**
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60. **G.Velraj, A.Mugammed Musthafa and M.Vegnaswari (Oral)**
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61. **G Velraj and R.Hemamalini**
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62. **G.Velraj** and C.Roumana, P.E.Akilandeswari and M.G.Mohamed kamil
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63. **G.Velraj** and P.Sathya
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64. C.Roumana and **G.Velraj**
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65. R. Hemamalini, R. Ramya and **G.Velraj**
 X-Ray diffraction and FT-IR spectral analysis to determine the firing temperature of the archaeological bricks recently excavated at Kottappuram in Kerala, South India. **International conference** on Recent Frontiers in Applied Spectroscopy (ICORFAS-2010), Department of Physics, Annamalai University, Chidambaram, 22nd – 24th September, (2010), Pp:202.
66. **G. Velraj** and K. Janaki
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67. **G. Velraj** and K. Janaki
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68. A.M. Musthafa, **G. Velraj** and N. Basavaiah
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69. R.Hemamalini and **G. Velraj**
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70. **G. Velraj** and P. Sathya
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71. C. Roumana and **G. Velraj**
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72. A. Mohamed Musthafa, S. Ramachandran, **G. Velraj** and N. Basavaiah
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74. P.Sathya and **G.Velraj**
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76. C. Roumana and **G. Velraj**
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77. R. Hemamalini and **G. Velraj**
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100. C.Shanmugapriya and **G.Velraj**
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101. C.Shanmugapriya and **G.Velraj**
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105. **G.Velraj** and S.Soundharam
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108. R. Hemamalini, K. Sivakami and **G. Velraj**
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109. D. Archana and **G. Velraj**
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Vibrational Spectral studies and DFT calculations of 3-(4-Fluorobenzoyl) Propionic Acid. **National conference** on Recent Advances in Physics 2012 (NCRAP-2012) Organized by Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai on 20-21, July 2012.
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119. R. Ramya and **G. Velraj**
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120. R. Anmaneyan and **G. Velraj**
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121. D. Archana and **G. Velraj**
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122. S. Ramachandran and **G. Velraj**
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123. S. Aadheeswari and **G. Velraj**
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Molecular structure, spectroscopic and HOMO-LUMO analysis of 4-(4-chlorophenyl)-4-hydroxypiperidine. **International conference** on biological and Inorganic Chemistry (ICBIC 2013), Department of Chemistry, Periyar University, Salem, Tamilnadu on 20-22, February, 2013.
127. C. Sridevi and **G.Velraj**
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128. C. Shanmuga priya and **G.Velraj**
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129. S. Soundram and **G.Velraj**
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131. M. Kandhasamy and **G.Velraj**
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133. M. Kandhasamy and **G.Velraj**
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135. D. Seetha and **G.Velraj**
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136. C. Sridevi and **G.Velraj**
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137. D. Seetha and **G.Velraj**
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138. **G. Velraj**, S.Tamilarasu, P.Priya, R.Acharya, N.Basavaiah
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142. **G.Velraj** and G. Sowmiya
Synthesis Cherecterization of Polyaniline and Nano Copper Doped Composites.**National Conference** on Advanced Functional Materials (NCAFM- 2014), organized by Department of Physics, Bharathiar University, Coimbatore, January 30-31, 2014.
143. Hemamalini.R, A. Komathi, S. Santhi and **G.Velraj**
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144. S.Ramachandran, T.Kavitha, T.Sangeetha and **G.Velraj**
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145. G.Sowmiya, G.Rajarajewsari and **G.Velraj**
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146. H.Kayalvizhi, S. Ramachandran and **G. Velraj** FT-IR, FT-Raman and DFT Studies of 3- (4-Fluorophenyl) Propionic Acid. **National Seminar** on Materials for Advanced Technology, (SMAT 2014), Organized by Department of Physics, Periyar University, Salem, Tamilnadu on 21st February 2014.
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149. C. Shanmugapriya and **G.Velraj**
Enhanced Electrical conductivity of Conducting Polymer-Nanometal Composites. **International conference** on Materials and Characterization Techniques, organized by Center for Crystal Growth, School of Advanced Sciences, VIT University, Vellore on 10-12 March 2014.

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152. C.Sridevi and **G.Velraj**
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154. S.Tamilarasu, R.Acharya, A.V.R.Reddy, K.K.Swain, N.Basavaiah and **G.Velraj**
Provenance study and firing temperature of Archaeological Brick Samples recently excavated from Gangaikondacholapuram, Tamilnadu, India. National conference in Advanced Materials and its Applications (NCAMA-2014), Organized by Engineering Physics Section, Faculty of Engineering and Technology, Annamalai University, Annamalainagar on April 4-5, 2014.

155. R.Hemamalini, A.Komathi, S.Santhi and **G.Velraj**
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156. T.Kavitha, S. Ramachandran and G. Velraj
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157. C.Shanmugapriya and **G.Velraj**
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158. D. Seetha and **G.Velraj**
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159. S.Tamilarasu, R.Ramya and **G.Velraj**
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162. **G.Velraj**, S. Ramachandran and T. Kavitha
FT-IR, FT-Raman, UV-Vis, Ab initio calculations and spectral assignments of 3-(4-fluorophenyl) propionic acid, 5th International Conference on Perspectives in Vibrational Spectroscopy (ICOPVS 2014) Organized by the Department of Physics, Mar Ivanios College, Thiruvananthapuram from July 8 to 12th 2014.
163. S. Soundaram and **G.Velraj**
FT-IR, FT-Raman, NMR and DFT studies of 4-amino-N-[2-pyridinyl] benzene sulfonamide (APBSA) 5th International Conference on Perspectives in Vibrational Spectroscopy (ICOPVS 2014) Organized by the Department of Physics, Mar Ivanios College, Thiruvananthapuram from July 8 to 12th 2014
164. R. Hemamalini and **G. Velraj**
Spectroscopic and chemical analysis of smelting slag and slag inclusions in iron Artifacts of Kottapuram fort, South India National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai from July 18-19, 2014
165. G. Sowmiya and **G.Velraj**
Synthesis and Enhanced electrical conductivity studies of conducting polymers and its nano composites National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai from July 18-19, 2014
166. D. Seetha and **G. Velraj**
Multivariate statistical analysis of Archaeological potteries recently Excavated from Tamilnadu National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai from July 18-19, 2014

167. **G. Velraj**, S. Tamilarasu, R. Acharya, A.V. Reddy, K.K. Swain and N.Basavaiah
Investigation of Provenance studies and Firing Temperature using FT-IR and Nuclear analytical techniques National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai from July 18-19, 2014
168. C. Shanmugapriya and **G. Velraj**
Spectroscopic studies and Electrical conductivity measurements on nano metal doped conducting polymer National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai from July 18-19, 2014
169. **G. Velraj**, T. Kavitha and S. Ramachandran
Density Functional theory investigations of 3-(4-Fluorophenyl) Propionic acid and 3-(2-Furyl) Propionic acid National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai from July 18-19, 2014

Books / Study materials written:

1. *Scientific research and methodology* study material
M.Phil Physics, Periyar Institute of Distance Education (PRIDE), Periyar University, Salem-11
2. *Analog, Digital and Optical communication*
M.Sc. Telecommunications, Periyar Institute of Distance Education (PRIDE), Periyar University, Salem-11.
3. *Digital and optical Communications Engineering* Study material
M.Sc., Electronics, Periyar Institute of Distance Education (PRIDE), Periyar University, Salem-11
4. *Spectroscopy and Nuclear Physics* Study material
M.Sc. Physics, Periyar Institute of Distance Education (PRIDE), Periyar University, Salem-11
5. *Electronics Study material*
B.Sc. Physics, Periyar Institute of Distance Education (PRIDE), Periyar University, Salem-11

6. *Optics and Spectroscopy Study material*
B.Sc. Physics, Periyar Institute of Distance Education
(PRIDE), Periyar University, Salem-11
7. *Practicals I & III Study material*
B.Sc. Physics, Periyar Institute of Distance Education
(PRIDE), Periyar University, Salem-11

Books/Chapters in the edited books Published

1. Advances in Life Sciences by Dr.Arvind Kumar
Porosity measurement to estimate the Firing Temperature of Ancient Potteries ISBN No: 81-7648-554-3 (2004) Chapter-11
Pages 93-96 Publishers: A.P.H. Publishing Corporation, New Delhi.
2. Environment New Challenges by Dr.Arvind Kumar & Preeti
FT-IR Spectroscopic Analysis of some Archaeological pottery shreds recently excavated from Adichanallur in Tamilnadu.
ISBN10 No: 81-7035-519-2 (2008) Chapter-55 Pages 363-369
Publishers: Daya Publishing House, Delhi.
3. Ecotechnology and Environmental Issues by Dr. Arvind Kumar & Er. Kumar Prasun Ramakrishnan.
Minerals Identification in PVC Pipe Scale Deposits in Salem District, Tamil Nadu Using FT-IR Spectroscopy and SEM-EDX
ISBN No: 81-7035-617-2, 978-81-7035-617-2 (2009) Chapter-5
Pages 56-65 Publishers : Daya Publishing House, Delhi.
4. Environmental Engineering by Dr.Arvind Kumar & Dr. Shishir Suman Mishra.
Estimation of Firing Temperature of Archaeological Pottery Shreds Recently Excavated in Salamankuppam, Tamilnadu, India. ISBN No: 81-7035-644-X, 978-81-7035-644-8 (2010)
Chapter-16 Pages 117-123 Publishers : Daya Publishing House, Delhi.
5. Environmental Engineering by Dr.Arvind Kumar & Dr. Shishir Suman Mishra.
Characterization of Potteries from Melchittamur by a Combined FT-IR and Chemical Analysis. ISBN No: 81-7035-644-X, 978-81-7035-644-8 (2010) Chapter-20 Pages 156-162. Publishers : Daya Publishing House, Delhi.

6. Environmental Engineering by Dr.Arvind Kumar & Dr. Shishir Suman Mishra.
ESR dating of the Neolithic Pottery Recently Excavated in Banahalli, Karnataka state, India.ISBN No: 81-7035-644-X, 978-81-7035-644-8 (2010).Chapter-27 Pages 216-219 Publishers : Daya Publishing House, Delhi.
7. Environmental Engineering by Dr.Arvind Kumar & Dr. Shishir Suman Mishra.Microscopic and Porosimetry Studies to Estimate the Firing Temperature of Archaeological Potteries of Perur Site in Tamilnadu, India.ISBN No: 81-7035-644-X, 978-81-7035-644-8 (2010).Chapter-38 Pages 298-307 Publishers : Daya Publishing House, Delhi.

Participation in Conferences/seminars/symposia

1. One Day seminar on Luminescence and its Applications Department of Physics, Annamalai University, Tamil Nadu. 21st August, 2000.
2. International Symposium on clays in relation to environment and industry (ISCREI – 2000). Department of Geology, Annamalai University, Tamil Nadu. 25-27 November, 2000.
3. National Laser Symposium (NLS 2000). Laser Science and Technology Centre, Metcalfe House, New Delhi –54. 13 – 15 December, 2000.
4. National seminar on Emerging Trends in molecular physics (NASETMP – 2004). Department of Physics, Annamalai University, Tamilnadu. 8th and 9th March, 2004.
5. National seminar on Modern Trends in Applied Spectroscopy (NASMTAS – 2004). Department of Physics (Faculty of Engineering and Technology), Annamalai University, Tamilnadu. 25th and 26th March, 2004.
6. Symposium on Centenary celebration of Enstein's discoveries, Department of Physics, Periyar University, Salem. 28th March, 2005.
7. National conference on Recent Advances in Materials Science (NCMS – 2006), Department of Physics, Periyar University, Salem. 16th & 17th February, 2006.

8. National conference on Application Oriented Materials (NCAOM-2006), Department of Physics, SRM College of Arts & Science, SRM Deemed University, Chennai. 21st & 22nd April, 2006.
9. National Conference on Recent Advancements in Materials Science (RAMS-2006), P.G & Research Department of Physics, Ramakrishna Mission Vivekananda College (Autonomous), Chennai. 29th & 30th December, 2006.
10. State level seminar on recent advances in Spectroscopy (RAINS 2009), Department of Physics, Kandhasamy Kandar's college, Vellure, January 23 & 24, 2009.
11. National level conference on emerging trends in the research field of Physics. Department of Physics, Erode Arts College (Auto), Rangampalayam, 6th March 2009.
12. National Seminar and Exhibition on "Non Destructive Evaluation- NDE 2009", ISNT, Trichirappalli, 10-12th December 2009.
13. Eighteenth National Symposium on Ultrasonics (NSU-XVIII), School of Advanced Sciences, VIT University, Vellore, Tamilnadu, 21-23 December 2009.
14. International Conference on Recent Trends in Materials and Characterization (RETMAC 2010), Department of Physics, National Institute of Technology Karnataka, Surathkal, Mangalore, India 14th & 15th February 2010.
15. International conference and Exposition (PITTCON2010), Orange County Convention Centre, Orlando, Florida, USA, 28th February-5th March 2010.
16. International Conference on Applied Physics and Mathematics (ICAPM-2010), Interaction Association of Computer Science and Information Technology (IACSIT), Malaysia 7-9 May 2010.
17. International conference on Recent Frontiers in Applied Spectroscopy (ICORFAS-2010), Department of Physics, Annamalai University, Annamalainagar, India, 22nd – 24th September, ,(2010).
18. International conference on food and Nutraceuticals for Nutrition and Health-Technology and Delivery, Department of food Science, Periyar University, Salem, Tamilnadu, India, 20th -22nd January 2011.

19. National Seminar on Frontiers in Organic synthesis and Medical Chemistry (FOSMC-2011), Department of Chemistry, Periyar University, Salem, Tamilnadu. 17th & 18th February, 2011.
20. Humboldt Kolleg and International Conference Resent Advancements in Earth Resources Research: The Road to the Future (Earth- Future) Department of Geology, Periyar University, Salem, India on 7-9, September 2011.
21. International Symposium on Functional Foods and Health (ISFAH – 2011), Department of Food Science, Periyar University, Salem, India. On 18th and 19th November- 2011.
22. International conference on advanced materials (ICAM-2012), Department of Physics, Loyola College, Chennai – 600 034, 5th – 7th January 2012. Tamilnadu, India.
23. National Conference on Advanced Nanomaterials (ANM-2012), Organized by Centre for Nanoscience and Nanotechnology, Periyar University, Salem on 6-7 February 2012.
24. International conference on biological and Inorganic Chemistry (ICBIC 2013), Department of Chemistry, Periyar University, Salem, Tamilnadu, 20-22, February, 2013.
25. National seminar on Nanoscience and Nanotechnology, Organized by Dept. of Physics, Chemistry and Biotechnology, Badmavani College of Arts and Science for Women, Salem-11, on 2nd March 2013.
26. International conference on Materials and Characterization Techniques, organized by Center for Crystal Growth, School of Advanced Sciences, VIT University, Vellore, 10-12 March 2014.
27. National Conference in Advanced Materials and its Applications (NCAMA 2014), Organized by Engineering Physics, Faculty of Engineering and Technology, Annamalai University, Annamalainagar during 4th & 5th April 2014.
28. International Conference on Advances in New materials (ICAN 2014) organized by Department of Inorganic Chemistry, University of Madras, Chennai on June 20-21st 2014
29. National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai during July 18-19, 2014.

Workshops / Trainings Attended

1. XI Workshop on Research Methodology. Department of Economics, Annamalai University, Tamil Nadu. 13-17 November, 2000.
2. One Day workshop on Trace Element Analysis. Defense Science Centre, New Delhi. 12th December, 2000.
3. Mini Workshop on Computer Simulations of Ion – Matter Interactions. Nuclear Science Centre, New Delhi 26th March, 2001.
4. Computer Architecture – Ph.D. Teaching program. Nuclear Science Centre, New Delhi. 3-27 April, 2000.
5. Measurement Techniques Nuclear Science Centre, New Delhi 19th March – 6th April, 2001.
6. Workshop on Recent Trends in Physical Sciences Research, Department of Physics, Periyar University, Salem. 29th & 30th August, 2005.
7. National Workshop on Geosciences, Georesources and IPR Regime: Familiarization and Practice (GEO-IPR'2006), Department of Geology and Commerce, Periyar University, Salem. 5th & 6th October, 2006.
8. Workshop on “Physics with Homemade Equipment and Innovative Experiments” Inter University Accelerator Center, New Delhi 24th -29th September, 2007.
9. One day training workshop on Phoenix, Department of Information Technology and Computer Applications, Sona College of Technology, Salem, On 8th October 2007.
10. Workshop on “The facilities of UGC-DAE Consortium for Scientific Research” during September 16–17, 2009 held at the Centre for high pressure research, school of Physics, Bharathidasan University, Tiruchirappalli – 620 024.
11. One day IUAC Acquaintance programme on Accelerator based Science and Technology, Department of Physics, University, VIT University, Vellore, on 20th October 2009.

12. One day workshop on Improving Voluntary Blood Donation conducted by Indian Red Cross society Tamilnadu Branch organized by Youth Red Cross Zonal Office, Periyar University, Salem, 16th March 2011.
13. Workshop on Functional Materials (WFM-2012) Organized by Department of Physics, Periyar University, Salem on 14th march 2012.
14. One day Seminar on Recent Trends in Superconductivity (RTC – 2012), Organized by Department of Physics, Periyar University, Salem on 22nd March 2012.
15. National Workshop on Electronic Circuit Design and PCB Fabrication (NWECD-2012) Organized by Department of Physics, Periyar University, Salem on 27th March 2012.
16. National Workshop on Convergence of Youth Programmes in Rural Development, Organized by Rajiv Gandhi National Institute of Youth development, Sriperumbudur, on 28th September 2012.
17. Workshop on Scientific Applications of Powder XRD, Organized by Centre for Instrumentation and Maintenance Facility (CIMF), Periyar University, Salem- 636 011, 4th February 2013.
18. Two days Special Workshop on The Need of Organized Efforts, Organized by the centre for Swami Vivekananda Studies, Periyar University, Salem -636011, 13 & 14th March 2014.

Invited Talks delivered / Series of Lectures / Chaired a Session

1. “Geo-Physics”
Workshop on Recent Trends in Physical Sciences Research, Department of Physics, Periyar University, Salem. 29th & 30th August, 2005.
2. “Spectroscopy as a tool to Archaeology”
Seminar on Recent advances in Science and Technology, Department of Physics, Harur Muthu Arts and Science College, Harur. 31st July 2007.
3. “FT-IR Microspectroscopy”
Department of Inorganic and Physical Chemistry, Indian Institute of Science Bangalore, 9th September 2008.

4. "Introduction to FT-IR Microspectroscopy"
National level conference on emerging trends in the research field of Physics. Department of Physics, Erode Arts College (Auto), Rangampalayam, 6th March 2009.
5. "Phoenix and Spectroscopy"
One Day Workshop on Recent Developments in Physics and Electronics. Department of Physics and Department of Electronics & Communication, Salem Sowdeswari College, 27th January 2010.
6. "Emerging Trends in Electronics"
Special Lecture programme by Department of Physics, Muthayammal College of Arts and Science, Rasipuram, 12th October 2010.
7. "Introduction to Phoenix"
Workshop on Physics Experiments through Computer Interfacing (WPECI-2010) , Department of Physics, Periyar University, Salem. 9th & 10th December, 2010.
8. "Learning Electronics through Experiments"
Special Lecture programme by Department of Physics, KSR College of Arts and Science, Thiruchengodu, 29th December 2010.
9. "Emerging trends in Spectroscopy"
Special Lecture programme by Department of Physics, KSR College of Arts and Science, Thiruchengodu, 29th December 2010.
10. 'Introduction to FT-IR Microspectroscopy'
Physics Association Inauguration Function by Department of Physics, Sarada College, Salem, Tamilnadu, India on 13th January 2012.
11. 'Basic Electronics'
Physics Association Inauguration Function by Department of Physics, Kandhasamy Kandar College, Tamilnadu, India on 19th January 2012.
12. 'An Introduction to FT-IR Microspectroscopy and It's Applications'
National Conference on Spectrophysics (NCONS-2102) organized by PG & Research Department of Physics Pachaiyappa's college and Women's Christian College, Chennai on 7 – 8 March 2012.

13. 'FTIR Microspectroscopy & Its Applications'
National conference on Recent Advances in Physics 2012 (NCRAP-2012) Organized by Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai on 20-21, July 2012.
14. "Nano Science and its applications"
National seminar on Nanoscience and Nanotechnology, Organized by Dept. of Physics, Chemistry and Biotechnology, Badmavani College of Arts and Science for Women, Salem-11, on 2nd March 2013.
15. "Recent trends and Future perspective of Science and Technology"
Science and Humanities Association Inauguration Organized by Department of Science and Humanities, CMS College of Engineering, Namakkal on 9th March 2013.
16. "Fourier Transform Infrared Spectroscopy as an investigative tool to Super foods and Food products"
Organized by International Institute of Food and Nutritional Sciences (IIFANS), New Delhi & Department of Food and Nutrition, Bharathidasan Govt. College for Women, Puducherry, 3-4, May 2013.
17. "The developments of FT-IR spectroscopy in imaging technology and its applications"
International Conference on Recent Advances in Physics 2013 (ICRAP-2013) Organized by Department of PG & Research Department of Physics, Sri Vidyamandir Arts & Science College, Uthangarai, Krishnagiri, Tamilnadu, India on 12-13, August 2013.
18. "Applications of Nanotechnology in the field of Materials science Research"
National level seminar on new recent trends in nano-materials, Organized by Department of Physics, Sri Sakthikailaash Women's College, Salem, Tamilnadu on 21st September 2013.
19. "Applications of FT-IR Spectroscopy-Food Science and Polymer Science"
One day National seminar on Recent Developments in Material Science (RDIMS-14), Organized by Dept. of Physics, Chemistry and Biotechnology, Badmavani College of Arts and Science for Women, Salem-11, on 24th January 2014.

20. "Applications of Nano Technology in the field of Material Science Research"
National level Seminar on Recent developments in Nano Science and Technology, organized by PG Department of Physics, Vishwa Bharathi Arts & Science College, Morappur, Dharmapuri on 26th February 2014.
21. Chaired an Oral Presentation session in the National Conference in Advanced Materials and its Applications (NCAMA 2014), Organized by Engineering Physics, Faculty of Engineering and Technology, Annamalai University, Annamalainagar during 4th & 5th April 2014
22. "Applications of FT-IR Microscopy in the field of Material Science Research"
National Conference on Advanced Materials (NCAM 2014) organized by the PG and Research Department of Physics, Sri Vidya Mandir Arts and Science College, Uthangarai during July 18-19, 2014.

- Teaching Experience:**
1. Lecturer in Physics, (U.G)
The New College, Chennai-600 014
From 16th July, 2003 to 15th July 2004.
 2. Lecturer in Physics (B.E/ B.Tech.)
Department of Appl.Sci. & Humanities
Madras Institute of Technology (MIT)
Anna University, Chennai –600 044.
From 15th July 2004 to 1st Dec.2004.
 3. Lecturer in Physics (formerly)
Assistant Professor
Department of Physics
Periyar University, Salem – 11.
From 2nd Dec. 2004 to Till date.

Academic other Experience

1. Member Board of studies P.G. (CBCS) Department of Physics, Periyar University, Salem-636 011.
2. Member Board of studies U.G & P.G. (CBCS) Department of Physics, Erode Arts and Science College, Erode. Bharathiar University, Coimbatore.
3. Member Board of studies (CBCS) Department of Physics, Viveganandha College, Thiruchengodu, Periyar University, Salem-636 011.
4. Member Board of Examiner Periyar University, Salem
5. Member Board of Examiner Annamalai University, Chidambaram
6. Member Board of Examiner Allagappa University, Karaikudi
7. Member Board of Examiner S.V. University, Thirupathy
8. Member Board of Examiner Gandhigram Rural University, Gandhigram
9. Member Board of Examiner Kanchi Mamunivar P.G. Center, Pondy
10. Member Board of Examiner Karpagam University, Coimbatore.
11. Member Board of Examiner Pondicherry University, Puducherry

Extracurricular Responds

1. NSS Officer (2003-04) MIT-Anna University Chennai
2. NSS Officer, (Unit-II) Periyar University, Salem-11