Dr.SabarinathanVenkatachalam

Assistant Professor
Department of Physics, Manonmaniam Sundaranar University
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EDUCATION

Ph.D. in Physics-Materials Science, 2009, University of Madras, Department of Nuclear Physics, Chennai, INDIA
M.Sc. in Physics, 2002, University of Madras, Department of Nuclear Physics, Chennai, INDIA
B.Sc. in Physics, 1999, Bharathidasan University, Bishop Heber College, Trichy, INDIA

AREA OF SPECIALIZATION

"Energy Materials; Biomaterials; Glass Chemistry; Solid State NMR; Crystal Growth"

TEACHING/RESEARCHEXPERIENCE

1 MANONMANIAM SUNDARANAR UNIVERSITY, Tirunelveli, India
Assistant Professor ***Nov 02, 2016 onwards***

2 UNIVERSITÄT AUGSBURG, Augsburg, Germany *May 2013- Sep 2016*
Staff Scientist/postdoc with Prof. Leo van Wüllen

3 NATIONAL SUN YAT-SEN UNIVERSITY, Kaohsiung, Taiwan *Sep 2011-March 2013*
Postdoc fellow with Dr. Shangwu Ding

4 WESTFÄLISCHE WILHELMS-UNIVERSITÄT**,***Münster, Germany Aug 2010- Aug 2011*
Postdoc fellowwith Prof. Leo van Wüllen

5 LUDWIG-MAXIMILIANS-UNIVERSITÄT**,***München, Germany July 2009 – July 2010*
Postdoc fellow with Dr. Dr. Jörn Schmedt *auf der Günne*

6 NATIONAL CHEMICAL LABORATORY*, Pune, India Aug 2008- June 2009*
Senior Research fellow with Dr. S. Ganapathy

7 UNIVERSITY OF MADRAS*, Chennai, India May 2005-Aug 2008*
Junior and Senior Research fellow with Dr. S. Ramasamy

AWARDS AND FELLOWSHIPS

May 2013 – Sep 2016 Deutsche Forschungsgemeinschaft,DFG(German research foundation), Germany

Oct 2011- Mar 2013, National Science Council Fellowship, Taiwan (ROC)

July 2009- Aug 2011 Deutsche Forschungsgemeinschaft,DFG(German research foundation post-doc fellowship), Germany

Aug 2008- June 2009 'Senior Research Fellow', CSIR-Emeritus Scientist Scheme, Government of India

2004- 2007 'Senior Research Fellow', Department of Science and Technology, NSTI Project, Government of India

2002 'Prof. V. Devanathan Endowment Medal' – for the performance in M. Sc. (Physics) Degree Examination conducted by Department of Nuclear Physics and Department of Theoretical Physics, University of Madras

2001 'University of Madras's Merit Scholarship'–for TopRanker in first year M. Sc.

RESEARCH/WORK KNOWLEDGE

1 Synthesized all kinds of –phosphate, -borate, -silicate transparent glasses via melt-quench and sol-gel techniques. In particular, I have more experienced with Li-ion battery electrolyte materials (LAGP) and resolved structural information. Study on a series of phosphate model glasses, which give indications for an unexpected "self-polarization" of chain structures. Evolving structural transformations via in-situ and ex-situ high temperature NMR experiments.

2 Pursued research in the area of "Nanomaterials (metal oxide-Sn,In,Al)", with special emphasis on the preparation of new and novel systems in the range 3 to 70 nm. Applied modern SSNMR methods for studying the chemical shielding (^{119}Sn) and the EFG (^{27}Al) interactions in nanomaterials at 7.0 Tesla field. Studied the effects of grain size on ^{119}Sn chemical shielding and ^{27}Al electric field gradients.

3 Aging and degradation of proton exchange membrane, Nafion, for fuel cells investigated with SSNMR and micro-imaging. Revealed that water can penetrate into normally inaccessible regions in Nafion after a period of spinning rates.

4 Developing new tools for glass preparation, double roller quenching apparatus (DRQA) to achieve very thin glass fibers.

Analytical skill experience:

1. SSNMR:
    a. Experience with the advance Solid state NMR instruments: ***Bruker (from 4.7 to 9.39 T) and Varian (11.7 T)*** and using recent *Bruker's topspin 3.1, Varian's vnmj, and some simulation softerware like DMFIT, QUASAR, Simpson.*
    b. *Handling all kinds of ssnmr probe: Bruker's 1.3mm, 2.5mm, 4 mm, 7 mm, LASER 7mm(high temp); Varian's 1.6mm, 5 mm; Doty 5mm(high temp.); In-build probe MAT and Static automatic sample change probe.*
    c. *Pulse sequence: routine one-dimensional sequence, modern sequences like, REDOR, REAPDOR, MQMAS, RFDR, J-resolved, HETCOR, DUMBO, CP-MAS etc.,*
    d. *Probed diverse nucleus viz., ^{1}H, ^{2}H, ^{6}Li, ^{7}Li, ^{11}B, ^{13}C, ^{15}N, ^{17}O, ^{19}F, ^{23}Na, ^{27}Al, ^{29}Si, ^{31}P, ^{63}Cu, ^{79}Br, ^{119}Sn, ^{207}Pb*
    e. *NMR Micro imaging experiments*
2. Other Instruments Handled
    a. *X-ray diffraction , TG-DSC, Impedance spectroscopy, Vibrating sample magnetometer*
    b. *All kind ovens: vacuum furnace, box furnace (1500 °C), muffle furnace*
    c. *Glove box*
    d. *Used: HR-TEM, SEM, FTIR, UV-Vis, Resistivity*
3. Involved in the development and installation of RF/DC magnetron sputtering unit with existing UHV chamber
4. Computer programming knowledge
    a. *Operating Systems: Windows 98/2000/NT/XP*
    b. *Language: Working knowledge in FORTRAN (basic level)*
    c. *Packages: DMFIT, QUASAR, Mathematica (basic level), ORIGIN, MS Office, Coraldraw.*
    d. *Diploma in Office Automation*
5. Other technical Instruments exposure
    <u>Nanomaterial Synthesis:</u> *Inert gas condensation – Joule Heating ; RF/DC Sputtering; High Energy Ball Milling; Chemical Precipitation*

TEACHING EXPERIANCES

1. Teaching cum research assistant for Master student (one semester) 2005 – University of Madras
2. Tutorials -Functionality of Materials Science for Advanced Materials Students (AMS) (winter semester 2013/14) – University Augsburg, Germany
3. Tutorials – Method course Structure determination in Solid state NMR for Master students (winter semester 2013/14) -University Augsburg, Germany
4. Tutorials –Method course Structure determination in Solid state NMR for Master students (summer semester 2014/15)-University Augsburg, Germany
5. Tutorials –Method course Structure determination in Solid state NMR for Master students (winter semester 2015/16)-University Augsburg, Germany

PUBLICATIONS

1. Inorganic double helices in semiconducting MaterialDaniela Pfister, Claudia Ott, Konrad Schäfer, Birgit Gerke, Rainer Pöttgen, Oliver Janka, Maximilian Baumgartner, Richard Weihrich, Anastasia Efimova, Andrea Hohmann, Peer Schmidt, **Sabarinathan Venkatachalam**, Leo van Wüllen, Tom Nilges, Advanced Materials (2016)DOI: 10.1002/adma.201603135

2. Study of the glass-to crystal transformation of the NASCION-type solid electrolyte $Li_{1+x}Al_xGe_{2-x}(PO4)_3$, Zhongqing Liu**, Sabarinathan Venkatachalam**, Holger kirchhain, Leo vanWüllen, Solid State Ionics 295 (2016) 32

3. High-temperature MAS-NMR at high spinning speeds
Holger Kirchhain, Julian Holzinger, Adrian Mainka, Andreas Spörhase, **Sabarinathan Venkatachalam**, Achim Wixforth, Leo vanWüllen, Solid State Nuclear Magnetic Resonance 78 (2016)- 37

4. Structure and high temperature behaviour of sodium aluminophosphate glasses,
Leo van Wüllen, **S Venkatachalam**, *Phys. Chem. Glasses: Eur. J. Glass Sci. Technol. B*, August 2016, **57** (4), 173.

5. Relationships between fragility and structure through viscosity and high temperature NMR measurements in Li2O-ZnO-P2O5 phosphate glasses,
L. Muñoz-Senovilla, **Sabarinathan Venkatachalam**, F. Muñoz, L. Van Wüllen , J. Non-crystaline Solids 428 (2015) 54.

6. Structure, phase separation and Li dynamics in sol–gel-derived Li1 + xAlxGe2 − x(PO4)3
Zhongqing Liu, **Sabarinathan Venkatachalam**, Leo van Wüllen, Solid State Ionics,Volume 276 (2015) 47–55

7. The structure of a borosilicate and phosphosilicate glasses and its evolution at temperatures above the glass transition temperature: lessons from in situ MAS NMR
Sabarinathan Venkatachalam, Schröder. C , Sebastian Wegner, Leo van Wüllen
Physics and Chemistry of Glasses - European Journal of Glass Science and Technology Part B – (2014) 55, 280-287.

8. Incorporation of niobium into bridged silsesquioxane based silica networks
Rogier Besselink, **Sabarinathan Venkatachalam**, Leo van Wüllen, Johan E. ten Elshof, J Sol-Gel Sci Technol. (2014) 70:473–481

9. Synthesis and Characterization of an Azobenzene-Functionalized Ethene-Bridged PMO
Lydia Gräfenstein, **Sabarinathan Venkatachalam**, Leo van Wüllen, Wolfgang Bensch, Z. Anorg. Allg. Chem. 2014, 640, (3-4), 561–564

10. Multinuclear Solid State Nuclear Magnetic Resonance Investigation of Water Penetration in Proton Exchange Membrane Nafion-117 by Mechanical Spinning.

Venkatachalam Sabarinathan, Zhen Wu, Ren-Hao Cheng, Shangwu Ding, J Phys Chem B 117(2013)6558-65

11. "Perturbations to 27Al Electric Field Gradients in Nanocrystalline alpha-Al2O3 studied by High resolution solid state NMR"
V. Sabarinathan, S. Ramasamy,S, Ganapathy, J. Phys. Chem. B., 114 (2010) 1775-1781.

12. "Oxidation Behavior of In95Sn5 Solid Solution",
S. Ramasamy, **V. Sabarinathan**, Nipun Agarwal and David J. Smith, J. Vacuum Science and Tech:B, 26(5) (2008) 1670.

13. 119Sn Magic Angle Spinning NMR of Nanocrystalline SnO2",
V. Sabarinathan, C. Vinod Chandran, S. Ramasamy, S. Ganapathy, Journal of Nanoscience and Nanotechnology, 8 (2008) 321-328

14. "Investigations on the growth of Zinc Oxide crystals from molten hydrous KOH solution and on the impedance analysis of Zinc Oxide crystals",
R. Thangavel, **V. Sabarinathan**, S. Ramasamy and J. Kumar, Materials Letter 61 (2007) 4090-4093

15. "Recent study of nanomaterials prepared by inert gas condensation using ultra high vacuum chamber", S Ramasamy, D J Smith, P Thangadurai, K Ravichandran, T Prakash, K Padma Prasad and **V. Sabarinathan**, PRAMANA journal of physics, 65(5) (2005) 881

16. "Conductivity Behaviour of a Cubic/Tetragonal Phase Stabilized Nanocrystalline La2O3-ZrO2", P. Thangadurai, **V. Sabarinathan**, A. Chandra Bose and S. Ramasamy, J. Phys. Chem. Of Solids, 65 (2004) 1905.

CONFERENCE PROCEEDINGS/PAPERS

1. "Dielectric relaxation studies in nanocrystalline La2O3–ZrO2 using modulus formalism", P. Thangadurai, K. Padma prasad, **V. Sabarinathan**, A. Chandra Bose and S. Ramasamy, DAE- Solid State Physics Symposium at Guru Nanak Dev University, Amrister, Dec'26-30, 2004

2. "Cubic phase stabilization of nanocrystalline ZrO2 doped with La2O3 and its electrical conductivity studies", P. Thangadurai, **V. Sabarinathan**, A. Chandra Bose and S. Ramasamy, 46th DAE- Solid State Physics Symposium at Jiwaji University, Gwalior, Dec' 26-30, 2003

3. "Electrical Properties studies of Nanostructured □ -Al2O3.", **V. Sabarinathan**, A. Chandra Bose, P. Thangadurai and S. Ramasamy, Solid State Physics (India), 45, 2002, pp. 111.

WORKSHOP / ORIENTATION

1. NMR workshop, "Homi Bhabha centenary school on Relaxation in NMR and related aspectes", February 16-20, 2009 held at TIFR, Mumbai, India.

2. A One-day Orientation programme for Newly Recruited Teachers of Manonmaniam Sundaranar University (Under UGC-XII Plan), Tirunelveli 627 012, India.

CONFERENCE PRESENTATIONS/ ATTENDED / INVITED

1. 3rd Intensive Discussion on Growth of Nitride Semiconductors (IDGN-3), Jan 16-18, 2017, IMR, Tohoku University, Sendai, Japan (INVITED TALK)

2. Microstructural and Electrical Properties of Nanocrystalline Relaxor Ferroelectric PMN-PT, K.Padma Prasad, E.Viswanathan, V. Sabarinathan, and S. Ramasamy; Internalational workshop on Advanced Functional Materials and Devices, 8-12, Jan 2017, MS University, Tirunelveli 627 012, India.

3. High temperature in-situ and ex-situ high temperature SSNMR studies of Sodium Aluminum Metaphosphate Glasses
   S. Venkatachalam, L. van Wüllen; 37th FGMR Joint Discussion Meeting of the German and British Magnetic Resonance Societies and Priority Program 1601 Darmstadt, Germany September 7th to 10th, 2015

4. 36th Discussion Meeting of the GDCh-Division of "Magnetic Resonance", Methods and Applications, September 29th - October 2nd, 2014, Berlin, Germany

5. The structure of glasses and its evolution above Tg – crystallisation, phase separation and species exchange: lessons from in situ MAS-NMR,
   van Wüllen, Leo; ***Venkatachalam Sabarinathan***; Engelmayer, Manual.; "The 8th International Conference on BORATE GLASSES, CRYSTALS AND MELTS, -The International Conference on PHOSPHATE GLASSES" June 30-July 4, 2014, Pardubice, Czech Republic

6. Influence of the structure on viscosity in phosphate glasses
   Muñoz-Senovilla L., **Venkatachalam Sabarinathan**., Muñoz F., Van Wüllen L. "The 8th International Conference on BORATE GLASSES, CRYSTALS AND MELTS, -The International Conference on PHOSPHATE GLASSES" June 30-July 4, 2014, Pardubice, Czech Republic

7. Theoretical and NMR/micro-MRI investigations of macromolecular crowding effect on MRI contrast agents
   Shangwu Ding; Ren-Hao Cheng; Jie-Min Chen; **Venkatachalam Sabarinathan**; Cheng-Yu Shi; Chao-Wei Chen; You-Chun Hsin, "54 th Experimental Nuclear Magnetic Resonance Conference" April 14 – 19, 2013, Pacific Grove, California

8. NMR spectroscopic and imaging characterization of mechanical and electrochemical degradations of Nafion over different time scales
   Ren-Hao Cheng; **Venkatachalam Sabarinathan**; Cheng-Yu Shi; Shangwu Ding "54 th Experimental Nuclear Magnetic Resonance Conference" April 14 – 19, 2013, Pacific Grove, California

9. Theoretical analysis and NMR investigation of the crowding effect of macromolecules on MRI contrast agents
   Shangwu Ding, Ren-Hao Cheng, Jie-Min Chen, **Venkatachalam Sabarinathan**, Cheng-Yu Shi, Chao-Wei Chen,You-Chun Hsin, "Proceedings of 2012 Annual Conference of Chinese Chemical Society", Tainan, Taiwan (ROC) December 1-2, 2012

10. Aging of Nafion at High Temperature Studied with Solid-State NMR Spectroscopy, Micro-imaging and Impedance Spectroscopy
    Venkatachalam Sabarinathan, Shangwu Ding, "Proceedings of 2012 Annual Conference of Chinese Chemical Society, Tainan, Taiwan (ROC) December 1-2, 2012.

11. Mechanical Spinning Induced Water Penetration in Proton Exchange Membrane Nafion 117
    Venkatachalam Sabarinathan, Ren-Hao Cheng , Zhen Wu , Shangwu Ding, "High-field NMR symposium in materials and biomedical applications and Annual meeting of Taiwan Magnetic Resonance Society in 2012", Feb 13-14, 2012, Department of Chemistry, National Taiwan University, Taipei, Taiwan.

12. "Quantitative Lineshape Analysis for 1D- and 2D-Spectra, of Amorphous Materials" Jörn Schmedt auf der Guenne, **Sabarinathan Venkatachalam**, Johannes Weber, and Yamini Avadhut, Deutsche Physikalische Gesellschaft – Verhandlungen, Regensburg, March 21-26, 2010

13. "Simulation of Electric Field Gradients in Satellite Transition MAS and Multiple Quantum MAS NMR Spectra of disordered materials", **V. Sabarinathan**, S. Ganapathy, (Feb 02-05, 2009), Special symposium on Magnetic Resonance and Bimolecular mimetics and 15th National magnetic resonance society meeting, held at Indian institute of chemical Technology (IICT), Hyderabad, India.

14. "27Al Solid State NMR of Nano-crystalline a-Alumina", **V. Sabarinathan**, S. Ganapathy, and S. Ramasamy, 14th National Magnetic Resonance Society Meeting and Symposium on advanced MR applications (Jan 16-19,2008), Organized by Institute of Nuclear Medicine & Allied Sciences, and Defense research & Development Organization (DRDO), Delhi, India.

15. "Upgradation of Existing UHV Chamber with RF/DC Magnetron Sputtering Gun, Synthesis and Characterization of Nanostructured Materials", S. Ramasamy, **V. Sabarinathan**, b. Purniah, S. Ganapathy, P. Thangadurai and K. Padma Prasad, National Review and Coordination Meeting on Nanoscience and Nanotechnology (Feb 21-23, 2007), Hyderabad, India

16. International Conference on Nanoscience and Nanotechnology, Centre for Nanoscience and Nanotechnology, University of Madras, Chennai, India, August 26-28, 2006

17. "119Sn MAS NMR in Nanocrystalline Sn" **V. Sabarinathan**, S. Ramasamy, C. Vinod Chandran and S. Ganapathy, Eighth International Conference of Nanostructured Materials (nano2006), Indian Institute of Science, Bangalore, India, August 21-25, 2006

18. "Nanocrystalline Functional Ceramics and their Applications", S. Ramasamy, T. Prakash, K. Padma Prasad and **V. Sabarinathan**, All India Seminar on Vistas of Nano Applications (Jan.6 -7, 2006), Bangalore, India)

19. "Structural and Electrical properties of Nanocrystalline ZnO Materials", **V. Sabarinathan**, and S. Ramasamy, ICONSAT2006, New Delhi. International Conference on Nano Science and Technology 'ICONSAT 2006' (Mar. 16 – 18, 2006), Indian Institute of Technology Delhi, New Delhi, India.

20. National Seminar on Advanced Materials Science, Department of Physics Manonmaniam Sundaranar University, Tirunelveli, India March 27-28, 2006

21. "Chemically Prepared Nanocrystalline Tin Oxide Studied by XRD, FT-IR and DSC", **V. Sabarinathan** and S. Ramasamy, International Workshop on Nanoscience and Technology, Anna University, Chennai 600 025. Feb, 13-17, 2006. Organized by Anna University, Chennai, India and International Center for Theoretical Physics (ICTP), Italy.

22. 50th DAE Solid State Physics Symposium, BARC, Mumbai, Dec' 5 - 9, 2005

23. "Preparation and Microstructural studies of Indium tin Solid Solution", S. Ramasamy, **V. Sabarinathan**, David J. Smith and P. Thangadurai. International Symposium on Frontiers in Design of Materials 'FDM 2005', (Nov. 12 -16, 2005), Indian Institute of Technology Madras, Chennai, India

24. "Recent study of nanomaterials prepared by inert gas condensation using ultra high vacuum chamber", S. Ramasamy, D.J. Smith, P. Thangadurai, K. Ravichandran, T. Prakash, K. Padma Prasad and **V. Sabarinathan**, Ist National Conference on Nanoscience and Technology, (Mar. 7 – 8, 2005), National Chemical Laboratory, Pune, India

25. International Conference on Nanoscience and Technology, Kolkata, India, Dec'17-20, 2003.

26. One - Day National conference on Recent Trends in Condensed Matter Physics (NCCM) at University of Madras, Guindy Campus, Chennai, July 6, 2002.

27. DAE-Solid State Physics Symposium at BARC, Mumbai, Dec' 26-30, 2001.