

CURRICULUM VITAE

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Personal Data

Date of Birth : 08/05/1975

Career Objective

I would like to be part of a research and development team with a strong commitment to work and to complete it within the deadlines in an organization that values, and is prepared to reward personal initiative and performance.

Areas of Interest

- Quantification of proteins, GIST labeling, Single Amino Acid Polymorphism (SAAP), and Fragmentation studies of Peptides.
- Electrospray (ESI) and Electron Impact (EI) ionization methods.
- Ion Mobility (IMS), Time of Flight (TOF) mass Spectrometers Designing, and fabrication of Paul Trap (3D-ITMS) and Linear Ion Trap Mass Spectrometers (LITMS).
- Simulation of ion trajectories using SIMION software.
- Developing LABVIEW model for control and data acquisition.
- Micro-fluidic devices for studying the cell responses.
- Determination of structural changes in Bio-molecules using Ion mobility mass spectrometer.

Accomplishments

- Published few technical papers in the internationally reputed journals.
- Under young Scientists in mass spectrometry, presented a technical paper in *Eighth ISMAS Symposium* on mass spectrometry held at IICT, Hyderabad, India.
- Presented few scientific papers in conference proceedings and symposiums.
- Developed complete Software for controlling and acquiring the mass spectrum using National Instruments *LABVIEW* software.
- Designed the ESI Source that has an electro-dynamic ion funnel for IM-MS in Dr. McLean's laboratory, Vanderbilt University.

Technical Expertise

Operating Systems : Unix, Linux, Sun, WindowsXP/Vista/2003 server
Languages : C, MATLAB, Simulink, Maple, LABVIEW,
SIMION, Gaussian98, Gauss View, Molden,
Assembly language programming in Intel's 8051
and VHDL.
Others : MS Office, HTML. AutoCAD

Educational Qualifications

S. No	Degree	Institution	Year	%/CGPA
1	B.Sc Physics	Saraswathi Narayanan College	1992-1995	89.14%
2	M.Sc Material Science	Anna University	1995-1997	8.1/10.0
3	M.Sc (Engg) Instrumentation	IISc	1997-1999	5.5/8.0
4	Ph. D Instrumentation	IISc	1999-2005	6.5/8.0

Research Experience

Period: Nov 2006 -

Working as a Research Associate in Dr. McLean's Laboratory, Chemistry Department, Vanderbilt University, Nashville, TN – 37235, U. S. A. My research work as a Research associate includes

Designed and fabricated the electro-dynamic ion funnel required for constructing an ESI source for the existing IM-MS instrument.

Designed and developed all the electrical and electronics for the ESI Source.

Completely investigated the structural behavior of different charge states of Melittin molecule under different temperatures using IM-MS technique. Breakdown curves for +2, +3, +4 and +5 were constructed based on the ion intensity profiles. Collision cross section values of these charge states of melittin was calculated.

Currently working in microfluidic devices for studying the cell responses to different Bio-chemical.

Period: 2005 – Nov 2006

Worked as a Post Doctoral Research Fellow in Prof. David E. Clemmer's Laboratory, Chemistry Department, Indiana University, Bloomington, Indiana – 47405, U. S. A. My research work as a Post Doctoral Fellow includes

Quantification of proteins using GIST labeling technique, Studies related to the determination of Single Amino Acid Polymorphisms (SAAP) using Split-Field Drift Tube/Ion Mobility Mass Spectrometry (IMS). Isotopically labeled samples chosen for the SAAP studies are 1) Hemoglobin of Bovine and Sheep and 2) Cytochrome C of Bovine and Equine.

Calculation of cross sections of protein molecules using Ion Mobility mass Spectrometers (IMS). Transfer of Structural elements from Compact to Extended States in Unsolvated Ubiquitin.

Period: 1999 – 2005

Research work in: 1) A mathematical model for studying the Coupled ion trajectories and Stability of ions in axial direction was investigated in non-linear Ion trap. MATLAB's Ph. D
SIMULINK package was used for explaining the coupling between the axial and radial directions. The Shift in stability boundaries and coupling of axial motion and radial motion is conformed from the simulation studies by the presence of axial frequency component in radial direction and vice-versa.

2) Designed and developed a Paul trap mass spectrometer along with the turbo molecular pumping system. The ion trap has an r_0 of 7mm and $z_0 \cong 5$ mm according to the relation $r_0^2 = 2z_0^2$. The turbo molecular pumping system can produce a vacuum of 10^{-8} torr. Typical experiments like resonance excitation and nondestructive detection were carried out.

3) Developed a complete program for controlling the ion trap mass spectrometer and acquiring mass spectrum by using National Instrument's LABVIEW software. National Instrument's PC-MIO-16-E-4 DAQ device was used for interfacing the mass spectrometer with the computer.

4) Fragmentation pathways of benzene molecule had been analyzed using ab initio studies and Gaussian98 software and breakdown graphs are constructed for five selected reaction pathways.

Period: 1997 – 1999

Research work in: Investigation of Ion dynamics inside a Non-linear Ion Traps. The research M.Sc(Engg)
work includes mathematical modeling and Simulation of ions inside a nonlinear ion traps. A mathematical model for studying the ion trajectories in axial direction of a non-linear ion trap has been evolved. Based on the

mathematical model an expression for perturbation in ion axial secular frequency to geometric aberration, space charge, dipolar excitation and collisional damping in non-linear Paul trap mass spectrometers has been derived. The perturbed secular frequency of the ion has been obtained by using a modified Lindstedt-Poincare perturbation technique. The expression for perturbed frequency adequately reflects the reported experimental and simulation results.

Project Experiences

- Project in M.Sc** : Preparation and characterization of superconducting compound Sr_2RuO_4 (Done as a Partial fulfillment for the Masters degree in Anna University and was carried out at IGCAR, Kalpakkam, Chennai.)
- Project in M.Sc(Engg)** : Data acquisition system using Intel 8051. (Done as a partial fulfillment of the course *Microcontrollers and it's applications* in CEDT Department IISc)
- Projects in Ph. D** : 1) Coupled Ion Dynamics in Non-Linear Paul Traps. (Done as a partial fulfillment of the course *Modeling and Simulation of dynamical systems* in the Department of mechanical engineering)
- 2) Viterbi encoder and decoder using VHDL (Done as a partial fulfillment of the course *Designing with PLD's and FPGA's* in CEDT Department IISc)

International Publications

1. A Dual-Source Electrospray/MALDI Ion Mobility-Mass Spectrometer for Biomolecular Structural Characterization. (Under Preparation).
2. Collision cross section measurement and structural changes of different charge states of melittin molecule. (Under Preparation)
3. Split-Field Drift Tube/Mass Spectrometry and Isotopic Labeling Techniques for Determination of Single Amino Acid Polymorphisms *J. Proteome Res.*, 5 (2006) 1879 - 1887.
4. Transfer of Structural elements from Compact to Extended States in Unsolvated Ubiquitin, *J. Am. Chem Soc.*, 128 (2006) 11713 – 11719.
5. Transition curves and iso-beta lines in nonlinear Paul traps, *Int. J. Mass. Spectrometry*, 218 (2002) 181-196.
6. A Simulation study of coupled secular oscillations in nonlinear Paul trap mass Spectrometers, *Int. J. Mass. Spectrometry*, 209 (2001) 209.
7. Frequency perturbation in non-linear Paul traps: A Simulation Study of the effect of geometric aberration, Space Charge, Dipolar Excitation, and Damping on ion Axial secular frequency *Int. J. Mass. Spectrometry*, 197 (2000) 263.
8. Field imperfections induced ion axial secular frequency shifts in non-linear ion traps, *Int. J. Mass. Spectrometry*, 189 (1999) 53.

Conference Talks

1. Variation of Axial Frequency shift with Mass and position in non-linear Paul Trap Mass Spectrometry. Presented at Eighth ISMAS Symposium on Mass Spectrometry held at ICT, Hyderabad, 1999.
2. Frequency perturbations in non-linear Paul traps. Presented at the International Symposium on Physics of Trapped atoms and ions, held at IISc, Bangalore, 2000.

Publications in Conference / Symposium

1. Variation of axial Frequency Shifts with Mass and position in non-linear Paul trap Mass Spectrometer, Proceedings of Eighth ISMAS Symposium on Mass Spectrometry, 779-782, 1999.
2. Hexapole and Octopole Resonance in a Combined trap, Proceedings of Eighth ISMAS Symposium on Mass Spectrometer, 745-748, 1999.
3. Coupled Ion dynamics in nonlinear Paul traps, National Symposium on Instrumentation, Bangalore, 21, 2000.
4. Paul trap mass spectrometer instrumentation, National Symposium on Instrumentation, Dehradun, 105, 2001.
5. Development of a High Performance Electrospray – Ion Funnel Interface for Biomolecular Ion Mobility – Mass Spectrometry, FACSS conference, Memphis, 2008.
6. A Dual-Source Electrospray/MALDI Ion Mobility-Mass Spectrometer for Biomolecular Structural Characterization, ASMS conference, Denver, 2008.
7. Ion Mobility Mass Spectrometry of the products of oligomerisation of activated nucleotides with Montmorillonite - ASMS conference, Denver, 2008.
8. New Structural Measurement Strategies Using Ion Mobility-Mass Spectrometry, ASMS conference, Denver, 2008.
9. Conformational Studies of Anhydrous Peptides and Proteins Using Nano electrospray Ion Mobility-Mass Spectrometry - SERMACS conference, Nashville, 2008.
10. Dynamic Biomolecular Measurements of Cellular Response by Ion Mobility-Mass Spectrometry: a New Strategy for Systems Biology - SERMACS conference, Nashville, 2008.

Extra Curricular Activities

1. Department Student's representative from 1999 – 2002.
2. Organiser of KVPY 1999/2000/2001/2002 program.
3. Member of 26th National Symposium on Instrumentation organizing committee, 2000.
4. Member of Indian Vacuum society National Symposium – 2001 organizing committee, 2001.

Hobbies

Listening Indian light Music, watching Cricket and Tennis and occasionally watching Movies.

References

1) Dr. McLean
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4) Prof. R.M. Vasu
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