

CURRICULUM VITAE

Dr. C. Thirmal

4-59, Ramulapally,
Mdl: Saidapur, Dist: Karimnagar,
Telangana, India-505468,
e-mail: thiruphysics03@gmail.com
Mobile No: +91 9884796997.



Personal information

Date of Birth : 06-08-1986
Nationality : Indian
Languages known : Telugu, Hindi and English

Educational qualifications

- 2011-2016** : Ph.D.
Thesis title - *“Investigations on ferroelectric polyvinylidene fluoride and diisopropylammonium bromide towards multifunctional applications”*
Thesis advisor: Dr. P. Murugavel
Course work CGPA: **8.93**
Department of Physics,
IIT-Madras, Chennai,
Tamil Nadu, India - 600 036.
- 2008-2010** : M. Sc in *Physics (university 3rd rank)*
Specialization: *Electronics and Instrumentation*
Percentage of Marks: **80.25**
University college of Science,
Department of physics,
Osmania University,
Hyderabad, Telangana, India.
- 2005-2008** : B. Sc (*distinction-college 2nd rank*)
Major subjects: Mathematics, Physics, Chemistry
Percentage of Marks: **84.16**
Bhargavi degree college (affiliated to Kakatiya University),
Hanamkonda, Telangana, India.
- 2003-2005** : Intermediate (XI-XII)

Major Subjects: Mathematics, Physics, Chemistry

Percentage of Marks: 92.4

Geetanjali Junior College,
Hanamkonda, Telangana, India.

Teaching Experience

- 2007-2008** : High school physics teacher (Part time)
Vivekananda High school,
Hanamkonda.
- 2012-2015** : Teaching assistant for the engineering physics lab, and for
the MSc subject-Solid State Physics, XRD operation cum
training to MSc and MTech students
Department of Physics, IIT- Madras.
-

Research Experience

- Materials synthesis** : *Organic thin films* - by casting, dip coating, spin coating,
thermal evaporation
Ceramic oxide nanoparticles - by sol gel technique,
Ceramic oxide thin films –by solution processed spin
coating technique, RF magnetron sputtering
- Characterization techniques** : X-ray diffraction, differential scanning calorimetry,
dielectric and ferroelectric related experiments, I-V
characterization of thin films, nanoindentation,
Piezoresponse force microscopy
- Analysis** : Material's dielectric and impedance spectroscopic
properties through equivalent circuit analysis,
structural analysis of materials by rietveld refinement,
crystallization kinetics analysis, and the analysis of
ferroelectric properties thorough piezoresponce force
microscopy, understanding photovoltaics through
impedance spectroscopy, P-E loop and switching current
measurements
- Post PhD experience** : **1. Pre-postdoctoral fellow: January-July-2016 (after
submission of thesis)-At IIT Madras**
Project title: "Study of ferroelectric and photovoltaic
properties of solution processed BiFeO₃ based thin films"
2. Research Associate: September (2016)-august (2017)
(After award of degree)-At IIT-Delhi
Project title: synthesis and characterization of non-lead
based multiferroic systems

Nature of work: Synthesis and characterization (XRD, P-E loop, Strain-electric field) of ferroelectric ceramics and thin films fabrication by RF magnetron sputtering

Technical Experiences related to research

List of softwares used : GSAS for rietveld refinement, Z-VIEW for Impedance analysis, Rigaku-Global fit software for X-ray reflectivity analysis, Origin-8 for plotting and curvefitting, MS office, DFT calculations by MedeA-VASP.

Trainings attended :

- i) “Refresher course in experimental Physics” conducted by Osmania University, 26th June - 11th July, 2009.
- ii) “CSR lecture series” held at UGC-DAE ,University campus, Indore, Madhyapradesh, India during 15-26th september 2014.
- iii) “Short course on spectroscopic ellipsometry” conducted by John-Woollam during October, 16-17th, 2014.

Major instruments handled :

- i) X-ray diffractometers PANalytical and RIGAKU
- ii) LCZ meter (Numetriq-N4L)
- iii) Differential Scanning Calorimetry (NETZSCH)
- v) Thermal Evaporator (Hindhig vacc)
- vi) Electrometer (Keithley)
- vii) P-E loop tracer (Radiant technology)
- Viii) Scanning Probe Microscope (SPM) in AFM and PFM modes (PARKS systems)
- ix) RF magnetron sputtering

Major instruments developed :

- i) A sample holder for the thin film dielectric measurements
- ii) A sample holder for measuring magnetoelectric coefficient with furnace attached
- iii) The ferroelectric loop measurement set up for thin films (under construction)
- iv) Spray coating system for thin film fabrication
- v) Dip coating set up for thick film fabrication
- vi) Probe station

Research experience: Ferroelectrics, photovoltaics, dielectric and impedance spectroscopy and magnetoelectrics in bulk and thin films.

Believed in : Regularity, sincerity, and hardworking

National level examination

- GATE-2011 (Physics) - All India Rank-201

Scholarships

- (1) Economically Backward Class (EBC) scholarship for meritorious students for the years 2009 and 2010 by the state government
- (2) Junior Research Fellow (HTRA)-18th July, 2011-17th July, 2013 from MHRD, Government of India
- (3) Senior Research Fellow (HTRA)-18th July, 2013-13th January 2016 from MHRD, Government of India
- (4) Pre-post doctoral fellowship-14th January 2016 to till date from IIT Madras

Awards

- (1) Best poster award in National Science Day 2009, conducted by department of Physics, Osmania University
- (2) Best poster award in National Science Day 2010, conducted by department of Physics, Osmania University

List of Publications

1. **C Thirmal**, P P Biswas, Y J Shin, T W Noh, N. V. Giridharan, A Venimadhav, and P Murugavel, Study of ferroelectric characteristics of diisopropylammonium bromide films. *J. Appl. Phys.*, 120, 124107 (2016).
2. **C. Thirmal**, P. Panda, R. Ramaseshan, and P. Murugavel, Non-isothermal crystallization kinetics and nanomechanical properties of polyvinylidene fluoride - La_{0.7}Sr_{0.3}MnO₃ nanocomposite films. *Adv. Sci. Eng. Med.* 8, 483-489 (2016).
3. **C. Thirmal**, P. Murugavel and V. Subramanian, Synthesis and characterization of PVDF-La_{0.7}Sr_{0.3}MnO₃ nanocomposite films. *AIP conf. proc.*, **1655**, 050011 (2015).
4. **C. Thirmal**, P. Murugavel and V. Subramanian, Impedance spectroscopic analysis of the organic ferroelectric diisopropylammonium bromide (DIPAB). *Curr. Appl. Phys.*, **14**, 688 (2014).
5. **C. Thirmal**, C. Nayek, P. Murugavel and V. Subramanian, Magnetic, dielectric and magnetodielectric properties of PVDF-La_{0.7}Sr_{0.3}MnO₃ polymer nanocomposite film. *AIP Adv.*, **3**, 112109 (2013).
6. R. Dhama, C. Nayek, **C. Thirmal**, P. Murugavel, Enhanced magnetic properties in low doped La_{1-x}Ba_xMnO₃ (x = 0, 0.1 and 0.2) nanoparticles, *J. Magn. Magn. Mater*, **364**, 125-128 (2014).
7. C. Nayek, **C. Thirmal**, A. Pal, P. Murugavel, Study of enhanced magnetism in Lu doped multiferroic bismuth ferrite, *Mater. Sci. Eng. B.*, **199** 121-124 (2015).

8. C. Nayek, A. Tamilselvan, **C. Thirimal**, P. Murugavel and S. Balakumar, Origin of enhanced magnetization in rare earth doped multiferroic bismuth ferrite, *J. Appl. Phys.*, **115**, 073902 (2014).
 9. P. P. Biswas, **C. Thirimal**, D. Dhayanithi, N.V. Giridharan, P. Subramanian, and P. Murugavel, Photovoltaic and photo-capacitance effects in ferroelectric BiFeO₃ thin film, *Appl. Phys. Lett.*, **110**, 192906 (2017).
 10. S. Sahoo, T .R. Ravindran, S. Chandra, R. M. Sarguna, B. K. Das, T. N. Sairam, V . Sivasubramanian, **C. Thirimal**, P . Murugavel, Vibrational spectroscopic and computational studies on diisopropylammonium bromide, *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, **184**, 211-219 (2017).
 11. G. Suresh, G. Mallikarjunachari, Sanjay Jatav, **C. Thirimal**, M. S. Ramachandra Rao and Dillip K. Satapathy, Evolution of Morphology, Ferroelectric and Mechanical Properties in Poly(vinylidene fluoride) - Poly(vinylidene fluoride-trifluoroethylene) Blends, *J. Appl. Polym. Sci.* **45955**, 1-13 (2017).
-

Patent: Fabrication of eco-friendly organic ferroelectric diisopropylammonium bromide films (*Indian patent filed: 201641006148*)

Workshops/symposiums attended

- i. **C. Thirimal**, International workshop on crystal growth and characterization of advanced materials and devices, Crystal Growth Centre, Anna University, Chennai, Tamil Nadu, India, December 16-19, 2012.
- ii. **C. Thirimal**, International workshop on coatings and surfaces in biomedical engineering, IIT-Madras, Chennai, Tamil Nadu, India, February 16-19, 2014.
- iii. **C. Thirimal**, International workshop on electronic materials technology, Crystal Growth Centre, Anna University, Chennai, Tamil Nadu, India, March 13-15, 2014.
- iv. **C. Thirimal**, A national symposium on advances in Ferro-Piezoelectrics, RIC, IITM-Research Park, Chennai, Tamil Nadu, India, March 20-21, 2014.

Presentations in conferences

a) Oral presentation

- i. **C. Thirimal**, and P. Murugavel, Investigation of magnetoelectric effect in polyvinylidene fluoride-La_{0.7}Sr_{0.3}MnO₃ nanocomposite films, The 2nd international conference on Polymer Materials Science held at Bangkok, Thailand, January 14-16, 2016.

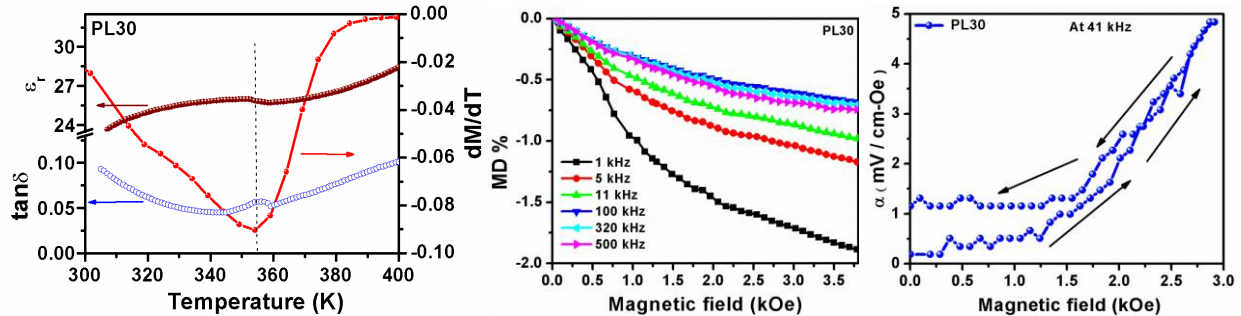
- ii. **C. Thirral**, and P. Murugavel, A new organic ferroelectric Diisopropylammonium Bromide – an alternative to oxides? , 19th National Seminar on Ferroelectrics and Dielectrics, held at MANIT-Bhopal, December 19-21, 2016

b) Poster presentation

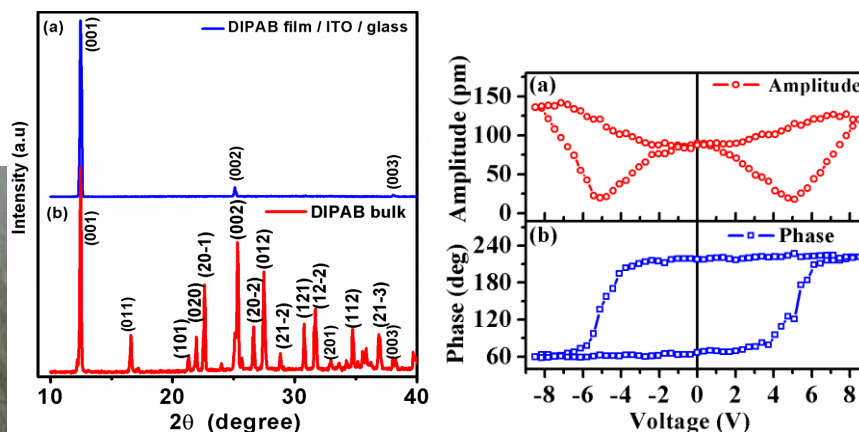
- i. **C. Thirral**, C. Nayek, V. Subramanian and P. Murugavel, Investigation of magnetoelectric effect in PVDF-La_{0.7}Sr_{0.3}MnO₃ nanocomposite films, IUMRS-International Conference in Asia-2013, IISc, Bangalore, India, December 16-20, 2013.
- ii. **C. Thirral**, V. Subramanian and P. Murugavel, Impedance spectroscopic analysis of diisopropylammonium bromide, In-house symposium-2014, department of Physics, IITM, Chennai, Tamil Nadu, India, 2014.
- iii. **C. Thirral**, P. Murugavel and V. Subramanian, Synthesis and characterization of PVDF-La_{0.7}Sr_{0.3}MnO₃ nanocomposite films, 59th DAE solid state physics symposium, VIT University, Vellore, Tamil Nadu, India, December 16-20, 2014.
- iv. **C. Thirral** and P. Murugavel, Investigation of ferroelectric switching characteristics of diisopropylammonium bromide films, In-house symposium-2015, department of Physics, IITM, Chennai, Tamil Nadu, India, 2015.

Research highlights: A graphical abstract:

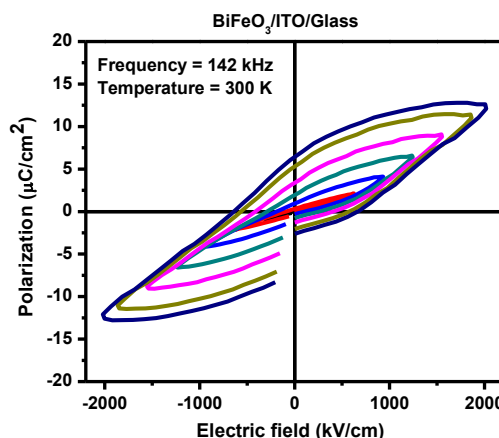
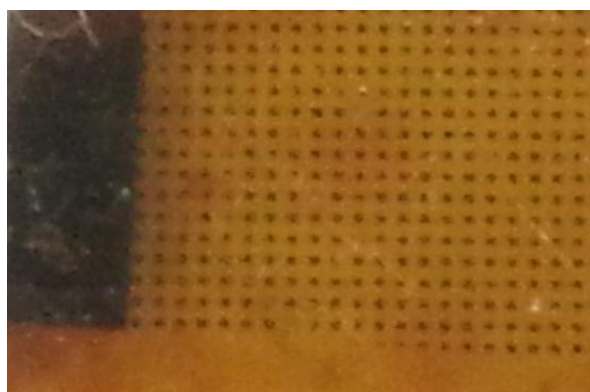
Flexible organic magnetoelectric PVDF-LSMO polymer nanocomposite films:



C-axis oriented transparent organic ferroelectric DIPAB films:



Au/BiFeO₃/ITO/Glass ferroelectric thin film by solution assisted spin coating:



Affiliations and Professional Activities

- Annual member of Tamilnadu Science Forum (2015)
- Served as evaluator for the 4th Youth Science Festival-2015 conducted by Tamilnadu Science Forum

Social activities

- National Service Scheme (NSS) volunteer during 2005-2008, and participated in “District level inter-collegiate 10 day special camp” at Kadipikonda village from Dec 6th-15th, 2006
- Participated in the short term training program on “ Indian Sign Language for the College Students” on March 6th , 2009 conducted by Ali yavar jung national institute for the hearing handicapped

Referees

1. Dr. P. Murugavel, (PhD Guide)
Associate professor,
Department of Physics,
IIT Madras, Chennai,
Tamil Nadu, India 600 036.
e-mail: muruga@iitm.ac.in
2. Dr. R. Nirmala, (PhD Doctoral committee member)
Associate professor,
Department of Physics,
IIT Madras, Chennai,
Tamil Nadu, India 600 036.
e-mail: nirmala@iitm.ac.in
3. Prof. P. N. Santhosh, (Incharge Guide for 1 year)
Professor,
Department of Physics,
IIT Madras, Chennai,
Tamil Nadu, India 600 036.
e-mail: santhosh@iitm.ac.in