

# P A Praveen

Senior Research Fellow

## contact

### Current Address

School of Physics  
Bharathidasan University  
Tiruchirappalli - 620 024

### Permanent Address

42/59 Kolandanur  
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+91 (960) 097 3793

### Web

prvnpa4@gmail.com  
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## programming

♥ Fortran

Python, C++ & HTML5

## mol packages

♥ MOPAC, dalton

Gaussian & AutoDock

## other packages

LaTeX, Gimp

Gnuplot, Inkscape,  
Tgif, Origin, ImageJ  
& Libre Office Suite

## experiments

Hydrothermal  
deposition, Melt &  
Solution growth,  
Dielectric &  
Hall measurements,  
PXRD, Raman,  
Z-Scan & SHG

## education

2013–2018	<b>Ph. D in Physics</b>	Bharathidasan University   Tiruchirappalli
	Benzimidazole based metal organic nanostructures for nonlinear optical applications	
2011–2013	<b>Free Lancer</b>	Bharathidasan University   Tiruchirappalli
	Improvising optical properties of organic thin films by metal dopants (Crystal Growth Laboratory, Dept. of Physics)	
2009–2011	<b>Post Graduation in Physics</b>	Bharathidasan University   Tiruchirappalli
	First Class with CGPA 7.5	
2006–2009	<b>Under Graduation in Physics</b>	Periyar University   Salem
	First Class with 80%	
2004–2006	<b>Higher Secondary</b>	M.H.S. School   Karur
	First Class with 65%	
2004–2006	<b>Secondary Schooling</b>	M.H.S. School   Karur
	First Class with 89%	

## research

### Doctral Work

2013–Now	<b>METAL ORGANIC THIN FILMS FOR NLO APPLICATIONS</b>	
	Studied the variation in optical and thermal stability of the benzimidazole ligand with the incorporation of first row transition metal ions. Bis type benzimidazole metal complexes are used for the investigation. The potentiality of the complexes were verified computationally prior to the experimental fabrication. Synthesized materials shown better optical transmittance, high thermal stability, enhanced SHG efficiency and good third non-linear susceptibilities.	
	<b>Important achievements:</b>	
	<ul style="list-style-type: none"><li>Developed an improved version of chemical solution processing unit</li><li>Physisorption based chemical deposition theory have been successfully developed</li><li>Metal organic thin films of benzimidazole were deposited for the first time</li></ul>	

- PM6 and PM7 methods are validated for polarizability calculations
- Solid state calculation were carried out for polarizability calculations on metal complex/polymer composites for the first time
- All the samples were demonstrated to have either one of the applications such as optical limiting, optical switching or laser assisted anti-cancer activity

## Free Lancing Period

2011–2013 **METAL DOPED BENZIMIDAZOLE THIN FILMS FOR NLO APPLICATIONS**  
 Benzimidazole thin films shown low transmittance value due to the optical scattering effect. The optical transmittance quality of the films was increased by doping manganese ions in the organic medium. Fabricated films shows better optical transmittance with improved third order nonlinear susceptibility.

## Post Graduation Project

2010–2011 **PREPARATION & CHARACTERIZATION OF BENZIMIDAZOLE THIN FILMS FOR NLO APPLICATIONS**  
 Benzimidazole thin films were deposited and its third order nonlinear susceptibility values were calculated for the first time. Nanocrystalline thin films were deposited by chemical bath deposition method and characterized. It is found that the crystalline size and surface homogeneity plays a vital role in linear optical transmittance and third order nonlinear optical properties.

## Project Assistance

2017–2018 **THEORETICAL ANALYSIS OF FIRST ROW TRANSITION METAL SUBSTITUTED ZIF STRUCTURES** M. Sc., Project  
 This work explores the geometry and electronic structure of six different first row transition metal ions and their polarizability, hyperpolarizability and spin density properties.

2016–2017 **COPPER BASED METAL ORGANIC FRAMEWORKS FOR NONLINEAR OPTICAL APPLICATIONS** M. Phil., Project  
 In this work Cu-MOF nanoparticles were deposited by solvothermal method. The structural and optical properties of the samples were analysed by both theoretically as well as by experimentally. Obtained results confirmed the potentiality of the samples towards NLO applications.

- 2016–2017 **THEORETICAL & EXPERIMENTAL ANALYSIS OF CADMIUM BASED ZEOLITIC IMIDAZOLE FRAMEWORKS** M. Sc., Project  
 This work discusses the deposition and characterization of one of the well known MOF's, Cadmium Imidazolate Framework (CIF) thinfilms by solvothermal method. The computational analysis confirms the better potentiality of CIF than ZIF and the experimental analysis confirmed that the samples have good third order nonlinear optical properties.
- 2015–2016 **PREPARATION & CHARACTERIZATION OF ZIF-8 THIN FILMS FOR NON-LINEAR OPTICAL APPLICATIONS** M. Sc., Project  
 Characteristics such as the straight forward synthesis, predictable structure and pore sites make MOF's as an attractive candidate for photonic applications. This work discusses the deposition and characterization of one of the well known MOFs, Zeolitic Imidazole Framework (ZIF-8) thin films by solvothermal method and reports the linear and nonlinear optical properties of deposited films.
- 2014–2015 **UNDOPED & Pd DOPED ZnO NANOPARTICLES FOR THIRD ORDER NON-LINEAR OPTICAL APPLICATIONS** M. Sc., Project  
 Undoped and Pd doped ZnO nanoparticles were synthesized by simple chemical precipitation method. SEM images and powder XRD analysis confirms the nanocrystalline nature of the synthesized particles. SHG and Z-Scan analysis shows the Pd doped ZnO nanoparticles have better nonlinear optical properties than that of the undoped of ZnO particles.
- 2013–2014 **SYNTHESIS & CHARACTERIZATION NOVEL QUINOLINE DERIVATIVE FOR NLO APPLICATIONS** M. Sc., Project  
 One of the quinoline derivatives bis-quinoline-perchlorate was computationally designed and synthesized. The product was confirmed by FTIR and powder XRD analysis. Linear optical and dielectric studies suggests the potentiality of the material towards nonlinear optical applications. Theoretical third order nonlinear optical properties are also ensured the same.

## awards

- 2016 **BSR Scholarship (SRF)** UGC, New Delhi  
 Awarded a senior research fellowship for meritorious scholars to carry over the research work extended for the period of three years
- 2014 **BSR Scholarship (JRF)** UGC, New Delhi  
 Awarded a junior research fellowship for meritorious scholars to carry over the research work for the period of two years
- 2009 **Class Topper** Under Graduation  
 Secured class topper position in the under graduation programme.
- 2008 **Class Topper** Under Graduation  
 Named as the top scorer of the second year of under graduation students.

## presentations

- Feb, 2018 **One Day Workshop on  $\LaTeX$**  Dr. SNSR College of Arts & Science  
Served as a resource person and taught  $\LaTeX$  fundamentals and report compilation
- Mar, 2017 **21<sup>st</sup> National Seminar on Crystal Growth and Applications** National College, Tiruchirappalli  
Presented a talk on role of annealing on third order nonlinear optical properties of Mn-BMZ thin films and named as best paper
- Dec, 2016 **61<sup>st</sup> DAE Solid State Physics Symposium** KIIT University, Bhubaneswar  
Presented a poster on theoretical and experimental analysis of optical properties of novel Zn based benzimidazole metal complexes
- Dec, 2016 **National Conference on Computational and Experimental Physics of Functional Materials** K.S.R College of Arts and Science for Women, Tiruchengode  
Presented a talk on role of annealing on third order nonlinear optical properties of Mn-BMZ thin films and named as best paper
- Dec, 2015 **60<sup>th</sup> DAE Solid State Physics Symposium** Amity University, Noida  
Presented a poster on theoretical evaluation of role of substituents on linear and nonlinear polarizabilities of benzimidazole based metal complexes.
- Dec, 2015 **DST SERB School on Modern Optics** Indian Institute of Technology, Patna  
Presented a poster on metal-organic thin films for thermo-optical limiting and switching applications.
- Dec, 2014 **59<sup>th</sup> DAE Solid State Physics Symposium** VIT University, Vellore  
Presented a poster on validation of PM6 and PM7 semiempirical methods towards the polarizability and hyperpolarizability calculations.
- Nov, 2014 **DST SERB School on DFT and Beyond** M. S. University, Vadodara  
Presented a talk from part of my research work, focused on the deposition and characterization of Co(II) benzimidazole metal complex films and acquired a third prize in the competition.
- Dec, 2013 **58<sup>th</sup> DAE Solid State Physics Symposium** Thapar University, Patiala  
Presented a poster on role of Mn dopants on the linear and nonlinear optical properties of benzimidazole thin films

## training programs

- Feb, 2018 **Asia Pacific Academy of Materials Special Lecture Series** Special Lecture Series  
Centre for High Pressure Research, Bharathidasan University, Tiruchirappalli

Jan, 2016	<b>Green Energy Technologies</b> Department of Environmental Management, Bharathidasan University, Tiruchirappalli	Workshop
Dec, 2015	<b>Modern Optics and Its Applications</b> Department of Physics, Indian Institute of Technology, Patna	SERB School
Jan, 2015	<b>Strongly Correlated Materials</b> Centre for High Pressure Research, Bharathidasan University, Tiruchirappalli	International Workshop
Nov, 2014	<b>Density Functional Theory and Beyond</b> Department of Physics, M. S. University, Vadodara	SERB School
Aug, 2014	<b>Resources and Technologies for Scholarly Information</b> Department of Library and Information Science, Bharathidasan University, Tiruchirappalli	Workshop
Mar, 2014	<b>Recent Advances in Materials Chemistry</b> Department of Chemistry, Anna University, Tiruchirappalli	Workshop
Feb, 2014	<b>Advances in Nanotechnology</b> Centre for Nanoscience and Nanotechnology, Bharathidasan University, Tiruchirappalli	Workshop
Jan, 2014	<b>A Training Program on Research Writing</b> Centre for Technical and Academic Writing, Bharathidasan University, Tiruchirappalli	Workshop
Oct, 2013	<b>Photocatalysis for Sustainability</b> Department of Chemistry, Anna University, Tiruchirappalli	Workshop
Feb, 2013	<b>Scientific Applications of Powder XRD</b> Centre for Instrumentation and Maintenance Facility, Periyar University, Salem	Workshop
Dec, 2013	<b>Recent Trends in Materials Research</b> Department of Physics, National Institute of Technology, Tiruchirappalli	Workshop
Mar, 2008	<b>Recent Developments in Nanomaterials Research</b> Department of Physics, Periyar University, Salem	Workshop

## conferences

Feb, 2018	<b>29<sup>st</sup> National Symposium on Advances in Functional &amp; Exotic Materials</b> Symposium Centre for High Pressure Research, Bharathidasan University, Tiruchirappalli
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Dec, 2016	<b>61<sup>st</sup> DAE Solid State Physics Symposium</b> KIIT University, Bhubaneswar	Symposium
Dec, 2016	<b>National conference on Computational and Experimental Physics of Functional Materials</b> K.S.R College of Arts and Science for Women, Tiruchengode	Symposium
Dec, 2015	<b>60<sup>th</sup> DAE Solid State Physics Symposium</b> Amity University, Noida	Symposium
Dec, 2014	<b>59<sup>th</sup> DAE Solid State Physics Symposium</b> VIT University, Vellore	Symposium
Feb, 2014	<b>Recent Advances in Materials Science</b> Department of Physics, Bharathidasan University, Tiruchirappalli	Seminar
Feb, 2014	<b>Recent Trends in Novel Materials</b> Centre for High Pressure Research, Bharathidasan University, Tiruchirappalli	Seminar
Dec, 2013	<b>58<sup>th</sup> DAE Solid State Physics Symposium</b> Thapar University, Patiala	Symposium
Jan, 2009	<b>Recent Advances in Spectroscopy</b> Department of Physics, Kandaswami Kandari's College, Namakkal	Seminar

## online courses

Mar, 2018	<b>HTML Fundamentals Course</b> Certificate issued by SoloLearn
Mar, 2018	<b>Conference skills for researchers</b> Certificate issued by Elsevier Researcher Academy
Mar, 2018	<b>How to promote your research for maximum impact</b> Certificate issued by Elsevier Researcher Academy
Mar, 2018	<b>Social media for researchers</b> Certificate issued by Elsevier Researcher Academy
Apr, 2018	<b>What is open science?</b> Certificate issued by Elsevier Researcher Academy
Apr, 2018	<b>Beginners guide to writing a manuscript in <math>\LaTeX</math></b> Certificate issued by Elsevier Researcher Academy
Apr, 2018	<b>Funding hacks for researchers</b> Certificate issued by Elsevier Researcher Academy
Apr, 2018	<b>C++ Tutorial Course</b> Certificate issued by SoloLearn
Apr, 2018	<b>PHP Tutorial Course</b> Certificate issued by SoloLearn

## academic positions

2018	<b>Joint Secretary and Joint Treasurer</b>	Physics Forum School of Physics, Bharathidasan University, Tiruchirappalli
2018	<b>Recognized Reviewer</b>	Elsevier Publications Reviewer of Spectrochimica acta part a molecular and biomolecular spectroscopy
2018	<b>Tutor</b>	Materials Science Laboratory Department of Physics, Bharathidasan University, Tiruchirappalli
2011	<b>Class Representative</b>	M. Sc., (II Year) School of Physics, Bharathidasan University, Tiruchirappalli
2009	<b>Secretary</b>	Physics Association Department of Physics, Kandasami Kandars College, Namakkal
2008	<b>Joint-Secretary</b>	Physics Association Department of Physics, Kandasami Kandars College, Namakkal

## academic activities

2018	<b>Organizing Secretary</b>	National Science Day Celebrations Organized the National Science Day celebrations in School of Physics, Bharathidasan University and managing the entire event
2017	<b>Organizing Committee Member</b>	National Science Day Celebrations Organized the National Science Day celebrations in School of Physics, Bharathidasan University. Played a significant role in setting up questions for quiz program and the creation of an entertainment event and managing events
2016	<b>University Rank Exam</b>	PG Admission I was one of the member of university rank exam Committee and played a role exam arrangements.
2016	<b>Team Member</b>	PG Admission I was one of the member of verification committee played a role in scrutinizing the applications.
2015	<b>Team Member</b>	IQAC - Academic Audit Served in the Internal Quality Assessment Cell of Bharathidasan University during the academic audit, 2015 and assisted in collecting and processing the technical data

- 2015 **Organizing Committee Member** National Science Day Celebrations  
With two other colleagues organized the National Science Day celebrations in School of Physics, Bharathidasan University. Played a significant role in setting up questions for quiz program and the creation of an entertainment event
- 2015 **Team Member** PG Admission  
I was one of the member of verification committee played a role in scrutinizing the applications.
- 2014 **Team Member** PG Admission  
I was one of the member of verification committee played a role in scrutinizing the applications.
- 2014 **Team Member** Seminar on Recent Advances in Materials Science  
I'm as one of the member of local organizing committee played a vital role in website, abstract book, certificates, CD wrappers, memento and Flex board design. I'm also assisted with the stage arrangements and presentation operations. Delivered a welcome address to the gathering at valedictory session.
- 2010 **Organizing Secretary** National Science Day Celebrations  
With one another colleague, organized the National Science Day celebrations in School of Physics, Bharathidasan University. Played a role in finalizing the quiz questions, supervising the events and in certificate design.
- 2009 **Team Member** Seminar on Recent Advances in Spectroscopy  
I was one of the member of organizing committee played a vital role in abstract book design. Also assisted with stage arrangement and presentation operations.

## extra-curricular activities

- 2016 **Hostel Committee Member** Research Scholar's Hostels  
Served as a member of hostel committee, which is the sole responsible for the functioning of research scholars hostels, carrying the duties include website maintenance, workers management and maintenance of hostel records.
- 2015 **Web Site Design** Research Scholar's Hostels  
Designed a fully functioning website for the research scholars hostels, which includes the form downloads, online enquiry system, online mess bill payment option, and online mess bill and monthly expenditure viewing facility.



2015	<b>Android App Design</b>	Research Scholar's Hostels
	Designed two versions of fully functioning android applications which substitutes the requirement of using website in smart phones. Considering the lower and higher end devices, the application was designed as lite and pro versions.	
2014	<b>Web Site Design</b>	RAMS Conference
	Designed a fully functioning website contains the details of the conference, list of speakers and an online application facility.	
2014	<b>Organizer</b>	Badmiton Event
	Organized an badmiton event for the research scholars in Porunai and Vaigai hostels of Bharathidasan University, Tiruchirappalli.	
2013	<b>Hostel Committee Member</b>	Research Scholar's Hostels
	Served as a member of hostel committee and carried out the works include the workers management and maintenaning the food quality.	

## professional activites

- Co-founder of a digital publication eInk Solutions
- Chief editor of more than 125 ebooks

## interests

**Research:** Modeling, fabrication and characterization of photonic materials, molecular mechanics and drug design

**Professional:** Digital Publications, Web Design, Android App Creation, Automation Processes, Infographics, Data Analysis

**Personal:** Photography, Blogging, Badmiton, Chess, Cooking, Travel, Carnatic fusion

## publications

### articles



1. Theoretical and experimental evaluation of structural and optical properties of novel zinc- benzimidazole metal complex doped in polystyrene matrices, P. A. Praveen, R. Ramesh Babu, AIP Conference Proceedings 1832 (2017) 140038.
2. Role of annealing on the structural and optical properties of nanostructured diaceto bis- benzimidazole Mn(II) complex thin films, P.A. Praveen, R. Ramesh Babu, K. Ramamurthi, Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 173 (2017) 800.
3. Theoretical and experimental investigations on linear and nonlinear optical response

- of metal complexes doped PMMA films, P. A. Praveen, R. Ramesh Babu, K. Ramamurthi, *Mater. Res. Express* 4 (2017) 025024.
4. Effect of substituents on polarizability and hyperpolarizability values of benzimidazole metal complexes, P. A. Praveen, R. Ramesh Babu, *AIP Conference Proceedings* 1731 (2016) 090013.
  5. Validation of PM6 and PM7 semiempirical methods on polarizability calculations, P. A. Praveen, R. Ramesh Babu, K. Ramamurthi, *AIP Conference Proceedings* 1665 (2015) 609.
  6. Spectral, morphological, linear and nonlinear optical properties of nanostructured benzimidazole metal complex thin films, P.A. Praveen, R. Ramesh Babu, K. Jothivenkatachalam, K. Ramamurthi, *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* 150 (2015) 280.
  7. Low power optical limiting studies on nanocrystalline benzimidazole thin films prepared by modified liquid phase growth technique, P.A. Praveen, S. P. Prabhakaran, R. Ramesh Babu, K. Sethuraman, K. Ramamurthi, *Bulletin of Materials Science* 38 (3) (2015) 645.
  8. Linear and nonlinear optical properties of Mn doped benzimidazole thin films, P. A. Praveen, R. Ramesh Babu, S. P. Prabhakaran, K. Ramamurthi, *AIP Conference Proceedings* 1591 (1) (2014) 991.
  9. Laser assisted anticancer activity of benzimidazole based metal organic nanoparticles, P.A. Praveen, R. Ramesh Babu, P. Balaji, A. Murugadas, M.A. Akbarsha, *Journal of Photochemistry & Photobiology, B: Biology* 180 (2018) 218.



## books

1. Semiempirical Modeling and Experimental Evaluation of Benzimidazole Based Metal-Organic Complexes for Nonlinear Optical Applications, P. A. Praveen, R. Ramesh Babu, Springer, In Press, In the book *Theoretical Materials Design: Optimization, Simulation and Experimental Realization*.
2. *Gravitational Waves Explained*, P. A. Praveen, *el Trendz* (2018) Tiruchirappalli.



## references

Supervisor **Dr. R. Ramesh Babu**  +91 994 206 0925,  rampap2k@yahoo.co.in  
Assistant Professor, Department of Physics  
Bharathidasan University, Tiruchirappalli

He taught me 'Solid State Physics' during my post graduation and also assisted me in the PG project. Presently, I'm pursuing doctoral studies under his guidance.

Collaborater **Prof. K. Ramamurthi**  +91 994 267 5899,  krmurthin@yahoo.co.in  
Professor and Former Head of School of Physics, Bharathidasan University  
Department of Physics and Nanotechnology  
SRM University, Kancheepuram

He was our former head of the department and the supervisor of my PG project. For my doctrol studies he assists me in different ways and co-authored four of my manuscripts.

Teacher **Dr. K. Ravichandran**  +91 984 062 1125,  kravichandran05@gmail.com  
Assistant Professor, Department of Physics  
Kandaswami Kandar's College, Namakkal

He taught me 'Solid state physics and Magnetism' during my under graduation. I had worked under him to organize a national level conferene.

## declaration

I hereby declare that all the details furnished above are true to the best of my knowledge and belief.

**P. A. Praveen**