

**Dr. B. VIDHYA M.SC., PhD**

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**PERMANENT ADDRESS**

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**PRESENT DESIGNATION:**

Assistant Professor, Department of Physics, Karunya University, Karunya Nagar, Coimbatore, Tamil Nadu, India.

**Teaching Experience:**

Assistant professor, Department of Physics, Karunya University- 4 years 3 months (as on 6th April 2015).

**Courses Taught**

- Applied Physics for BTech Programme (1<sup>st</sup> year)
- Engineering Physics for BTech Programme (1<sup>st</sup> year)
- Applied Physics Laboratory
- Thin film technology for Engineers for BTech Programme (4<sup>th</sup> year)
- Physics of Nanomaterials for M.Sc., Physics
- Renewable Energy Sources for M.Sc., Physics.

**Other academic contributions**

- ✓ Member, Board of Studies – Department of Physics, Karunya University.
- ✓ Member, Curriculum Development Committee (CDC) – Department of Physics and Department of Nanoscience and Technology (2013-2014), Karunya University.
- ✓ Coordinator, Science and Humanities Association, School of Science and Humanities, Karunya University, 2011-2012.

**Research Interest:**

**Synthesis and deposition-** Nano materials, Thin film technology, Thin film Solar cells.

**Characterization** - Microscopy techniques (FESEM, HRTEM).

**EDUCATIONAL QUALIFICATION:**

<i>Degree</i>	<i>Branch</i>	<i>University/ Institute &amp; year of graduation</i>	<i>Grade</i>
Ph.D	Doctorate in Science- Specialization in Electrical Engineering	CINVESTAV, Mexico, D.F., Mexico. September 2010.	Grade 9.1
M.Sc	Materials Science	PSG College of Technology, Coimbatore, Tamil Nadu, India. May 2005.	CGPA 9.05 First class with Distinction
B.Sc	Applied Sciences	PSG College of Technology, Coimbatore, Tamil Nadu, India. April 2003.	CGPA 8.82 First class with Distinction

**GENERAL:**

Languages known - English, Tamil, Spanish (basic)

**SEMINARS AND WORKSHOPS ATTENDED:**

<i>Topic</i>	<i>Organized/ conducted by</i>	<i>Duration</i>	<i>State/ Country</i>
<b>One day workshop on Intellectual Property Rights (IPR)</b>	Karunya University	18 <sup>th</sup> November 2011	Tamil Nadu, India
<b>High Impact teaching skills</b>	Wipro Mission 10X	25 <sup>th</sup> to 29 <sup>th</sup> April 2011	Coimbatore, Tamil Nadu, India
<b>High resolution microscope FESEM-AURIGA</b>	Training from Carl Zeiss	13 <sup>th</sup> to 16 <sup>th</sup> July 2010	Mexico D.F., Mexico
<b>Special techniques in transmission</b>	organized by IMP and FEI company	22 <sup>nd</sup> April 2010	Mexico D.F.,

<b>electron microscopy</b>			Mexico
<b>An introduction to modern Raman spectroscopy</b>	UNAM	23 <sup>rd</sup> September 2009	Mexico D.F., Mexico
Short course on “ <b>Nanotechnology: Application and Characterization Techniques</b> ”	Arizona State University	7.11.2007 to 10.11.2007	Phoenix, USA
Regional seminar on “ <b>Recent Trends in Energy vTechnologies</b> ”,	PSG College of Technology	January 31 <sup>st</sup> 2006	Coimbatore, Tamilnadu, India
National workshop on Thin Film Techniques and Applications <b>NAWOTTA-2004</b>	PSG College of Arts and Science	10.9.2004 and 11.9.2004	Coimbatore, Tamil Nadu, India
All India Seminar on <b>NUCLEAR ENERGY</b>	PSG College of Technology	30.12.2003	Coimbatore, Tamilnadu, India

#### CONFERENCE PRESENTATIONS:

<i>Conference</i>	<i>Presentation Title</i>	<i>Duration</i>	<i>State/Country</i>
International Conference on Sustainable Energy Technologies (ICSET- 2014)	Studies on Lattice strain and structural defects in MW- CBD CdZnS thin films	<i>December 11-13, 2014</i>	<i>PSG College of Technology, Coimbatore, Tamil Nadu, India.</i>
International Conference on Nanoscience and Nanotechnology (ICONN - 2013)	Comparative Studies on CIGS films prepared by Screen printing and Spray pyrolysis	<i>March 18- 20, 2013</i>	<i>SRM University, Chennai, Tamil Nadu, India</i>

National Conference on Nanomaterials	Studies on structure of ball-milled TiO <sub>2</sub> , TiO <sub>2</sub> -MWCNT nanocomposites and thermal conductivity of TiO <sub>2</sub> -MWCNT nanofluids	Dec 3-4 2012	Tamil Nadu, India
International Conference on Advanced Materials (ICAM 2011)	Structural and Electrical studies on CuIn <sub>0.75</sub> Ga <sub>0.25</sub> Se <sub>2</sub> deposited by screen printing	December 12-16 2011	PSG college of Technology, Coimbatore, Tamil Nadu, India.
International Conference and Workshop on New Materials and Devices for Photovoltaic Applications	Studies on CIGS nanoparticle precursor and films prepared by low cost non-vacuum technique	Feb 10-12 2011	Madurai Kamaraj University, Tamil Nadu, India.
7 <sup>th</sup> International Conference on Electrical Engineering, Computing Science and Automatic Control	Structural, Photoluminescence and electrical properties of MW-CBD CdZnS thin films	September 2010	Chiapas, Mexico.
6 <sup>th</sup> International Conference on Electrical Engineering, Computing Science and Automatic Control	Effect of Thickness on the Structural, Optical and Electrical Properties of MW-CBD CdZnS Thin Films	November 10-13, 2009	Toluca, Mexico
Advances in semiconducting materials symposium at the VXIII, International Materials Research Congress	Structural Studies of Mechano-chemically synthesized CuIn <sub>x</sub> Ga <sub>1-x</sub> Se <sub>2</sub> nanoparticles	August 2009	Cancun, Mexico.
MRS Fall meeting	Effect of Deposition Temperature on the Structural, Optical and Electrical properties of ZnO:Al deposited by	November 30 to December 4, 2009	Boston, MA USA.

	Pneumatic Spray Pyrolysis		
MRS Fall meeting	Mechano-chemical Synthesis, Deposition and Structural Characterization of CIGS	November 30 to December 4, 2009	Boston, MA USA.
2° Encuentro de Economía de la Energía ELAEE	Studies on Dry and wet mechano chemical synthesis of CuInGaSe <sub>2</sub> nano- particles	March 2009	Santiago, Chile
Advances in semiconducting materials symposium at the VXII, International Materials Research Congress	Studies on the structural and optical properties of microwave assisted – rapid chemical bath deposited CdZnS thin films	August 2009	Cancun, Mexico.
VI encuentro participacion de la Mujer en la Ciencia	Effect of Zn concentration and microwave irradiation time on the structural and optical properties of MW-CBD CdZnS thin films	13-15 May 2009	Leon Guanajuato, Mexico.
3 <sup>rd</sup> Mexican workshop on nanostructures materials	First principles studies on cubic-Cadmium Selenide	June 11 <sup>th</sup> to 3 <sup>th</sup> , 2008	Mexico D.F, Mexico.
Advances in Semiconducting Material symposium at the XVI IMRC	Experimental and simulation studies on hotwall deposited CdS thin films	October 28 <sup>th</sup> to November 1 <sup>st</sup> , 2007	Cancun ,Mexico.
Advances in Semiconducting Materials symposium at the XVI IMRC	Experimental and simulation studies on the chalcopyrite CuInSe <sub>2</sub>	October 28 <sup>th</sup> to November 1 <sup>st</sup> , 2007	Cancun ,Mexico.
regional seminar on “Recent Trends in Energy Technologies”	Studies on hot wall deposited CdS thin films	January 31 <sup>st</sup> 2006	Coimbatore, Tamilnadu, India.
NAWOTTA-2004	Characterisation of CuInSe <sub>2</sub> Films Prepared by Electron	10.9.2004 and	PSG College of Arts and Science,

	Beam Gun Evaporation Technique	11.9.2004	Coimbatore, Tamil Nadu, India.
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### Special Lectures and Invited Talks:

1. Special Lecture on “CIGS Solar cells” during the inauguration of materials science association on 6.08.2011 at PSG College of technology, Coimbatore.
2. Invited Talk on “Nanomaterials in solar cells”, during a national level one day workshop at PSG College of technology, February 2012, Coimbatore.

### PUBLICATIONS IN CONFERENCE PROCEEDINGS:

1. S. Velumani, B. J. Babu, **B. Vidhya**, P. Reyes, A. Angeles and R. Asomoza, “Preparation, deposition of  $\text{Cu}(\text{In}_{1-x}\text{Ga}_x)\text{Se}_2$  nanopowder thin films by non-vacuum processes and its characterization”, 37th IEEE PVSC 2011, Seattle, WA, June 19-24, 2011.
2. “Mechano-chemical synthesis, deposition and structural characterization of CIGS”, Mater. Res. Soc. Symp. Proc. Vol, 1210 - Q03-10, 2010.
3. “Structural, photoluminescence and electrical properties of MW-CBD CdZnS thin films”, 2010 7<sup>th</sup>, International Conference on Electrical Engineering, Computing Science and Automatic Control(CCE), IEEE Catalog Number: CFP10827-ART, ISBN:978-1-4244-7314-4.
4. “Effect of Thickness on the Structural, Optical and electrical Properties of MW-CBD CdZnS Thin Films”, 2009 6<sup>th</sup>, International Conference on Electrical Engineering, Computing Science and Automatic Control (CCE) ISBN: 978-1-4244-4689-6.

### JOURNAL PUBLICATIONS:

1. “Structural Studies of Mechano-chemically synthesized  $\text{CuIn}_x\text{Ga}_{1-x}\text{Se}_2$  nanoparticles”, Materials Science and Engineering B, 174(2010)216-221.
2. “Effect of milling time and heat treatment on the composition of  $\text{CuIn}_{0.75}\text{Ga}_{0.25}\text{Se}_2$  nanoparticle precursors and films”, Journal of nanoparticle research, 13(2011)3033-3034.
3. “Studies on structure of ball-milled  $\text{TiO}_2$ ,  $\text{TiO}_2$ -MWCNT nanocomposites and thermal conductivity of  $\text{TiO}_2$ -MWCNT nanofluids”, International Journal of Nanotechnology and Applications”, volume 6, number 3, 2012.

4. Structural and optical properties of ball-milled TiO<sub>2</sub> and TiO<sub>2</sub>-MWCNT for photocatalytic application", Nanoscience and Nanotechnology Letters, 2013.

## **EDITORIAL:**

Editorial Assistant for international publications special issues

- i) NanoTrends Vol. 4 (2008)
- ii) Advanced Materials Research Vol. 68 (2009)
- iii) Journal of Nano Research Vol. 9 (2010)

### **Reviewer**

- ✓ Materials Science in Semiconductor Processing

### **Awards and Scholarships**

1. Best Oral presentation, "Studies on CIGS nanoparticle precursor and films prepared by low cost non-vacuum technique", International Conference and Workshop on New Materials and Devices for Photovoltaic Applications, February 10-12, 2011, Madurai Kamaraj University, Tamil Nadu, India.
2. Best Oral presentation, "Mechano-chemical synthesis and deposition of CuIn<sub>0.75</sub>Ga<sub>0.25</sub>Se<sub>2</sub> nanoparticles", symposium 9 - VXIII International Materials Research Congress, Cancun, Mexico, August 2010.
3. Scholarship for PhD program from CONACYT- Mexico.
4. "Best All Rounder" award in BSc Applied Sciences, from PSG Tech Alumni association in 2003.

### **Masters' Projects guided**

- ✓ Miss. Anne Ford, "Structural and optical properties of ball-milled TiO<sub>2</sub> and TiO<sub>2</sub>-MWCNT for photocatalytic application", Karunya University, November 2011- April 2012 (completed).
- ✓ Miss. Iduta Theresa, "Effect of phase on the dispersion of TiO<sub>2</sub> particles in water", November 2012- April 2013 (completed).
- ✓ Mr. Vinoth kumar, "Optimization of deposition time for sputter deposited Mo thin films as back contact for SnS solar cells" (on-going)

### Guideship

➤ M.Phil/PhD., Guideship from Karunya University from 07/09/2012.

1. Mrs. Delya, M.Phil in Physics, “ Studies on the properties of spray deposited kesterite CZTS thin films for solar cell applications” (**completed**)
2. Mrs. J.P.Deebasree, PhD in Physics - “Preparation and studies on BiVO<sub>4</sub> for Photocatalytic applications”, (on-going)
3. Mr. V. Mahes , PhD in Physics “Deposition and characterization of CTS thin films for photovoltaic application” (on-going)

### Projects

Karunya Seed money Project, “Optimization of Sputter deposited Mo as back contact for CZTS solar cells” – Rs. 20,000

### Others

\* Coordinator of the annual seminar series “Physics Scientific Tempo-2011”, on 5/12/11 in the Department of Physics, Karunya University, Coimbatore.

### Experimental Knowledge

#### **A. Thin film preparation:**

1. Thermal evaporation
2. Hot wall deposition technique
3. Electron beam gun evaporation technique
4. Sputtering (RF and DC magnetron sputtering)
5. Screen printing
6. Spray pyrolysis

#### **B. Nanoparticles Synthesis**

7. Ball milling – synthesis of nanoparticles and semiconductor alloys (CIGS).
8. Microwave assisted synthesis of nanoparticles

#### **C. Characterization Techniques and analysis**

1. Thickness measurement – profilometer, ellipsometry, Multiple Beam Interferometer technique.
2. UV-Vis Spectrophotometer
3. XRD
4. SEM, FESEM
5. TEM- HRTEM
6. AFM



7. Micro Raman analysis
8. Four probe technique
9. Hall studies, I-V characterization.

#### **Knowledge in simulation software**

1. Materials Studio – CASTEP (Building structures and simulation of structural, optical, elastic and electronic properties).
2. Digital Micrograph – for analysis of HRTEM images (FFT, IFFT, d-spacing, particle size etc...).
3. Diamond- simulation of crystal structures.
4. ES vision- composition mapping analysis.

#### **Other softwares**

1. Origin
2. C,C++
3. Mathcad (basic)
4. P-Spice (basic)

#### **Extracurricular activities**

- ✓ An active member in nature club since 2012, which is a part of Department of extension and continuing education in Karunya University and have become the co-coordinator of the same club since 2013.