

## PROFILE OF Dr.M. ARIVANANDHAN

**Name** : **Dr. M. ARIVANANDHAN**  
**Academic Qualifications** : M.Sc., M.Phil., Ph.D.  
**Present Postion** : **Professor**, Centre for Nanoscience and Technology  
Anna University, Chennai-600 025.  
**Date of Birth** : 21-06-1979

### Education:

<b>Degree</b>	<b>Institution</b>	<b>Period</b>	<b>Branch</b>	<b>Class</b>
Ph.D.	Alagappa University	2003 - 2006	Physics	By Thesis
M.Phil.	Alagappa University	2001 – 2002	Physics	I Class
M.Sc.	Alagappa University	1999 - 2001	Physics	I Class with Distinction
B.Sc.	University of Madras	1996 - 1999	Physics	I Class

### Professional Experience:

<b>Position</b>	<b>Period</b>	<b>Institution</b>	<b>Nature of work</b>
Professor	Nov 2019 - Till Date	Centre for Nanoscience and Technology, Anna University, Chennai	Research & Teaching
Visiting Associate Professor	Nov. 2018 – Jan 2019	ICC-IMR, Tohoku University, Sendai, Japan	Research
Associate Professor	Dec 2014 - Nov 2019	Centre for Nanoscience and Technology, Anna University, Chennai	Research & Teaching
Assistant Professor	April 2013 - Dec.2014	Department of Electronics and Materials Science, Graduate School of Engineering, Shizuoka University, Hamamatsu, Japan	Research & Teaching
Assistant Professor	May 2009- Mar.2013	RIE, Shizuoka University, Hamamatsu, Japan.	Research & Teaching
Researcher	April 2007- March 2009	Institute for Materials Research, Tohoku University, Sendai, Japan.	Research
Senior Research Associate	Jan.2006- March 2007	SSN College of Engineering, Chennai	Research
Teaching Assistant	July 2002 – May 2003	Department of Physics, Alagappa University, Karaikudi	Teaching

### **Research Interest:**

- ◆ *Nanomaterials for Energy conversion and storage*
- ◆ *Thermoelectrics of bulk and Nanomaterials*
- ◆ *Photovoltaics*
- ◆ *Physics of crystals and defects*
- ◆ *Alloy semiconductors*

### **Research and Academic Credentials.**

Number of Publications in International/National Journals	:	<b>192</b>
Number of Papers in referred Conference Proceedings	:	<b>51</b>
Papers presented in International conferences	:	<b>195</b>
Papers presented in National conferences	:	<b>251</b>
Invited Lectures in International/National Conferences	:	<b>103</b>
Member-Editorial Board	:	<b>02</b>
Patents	:	<b>03</b>
Number of Ph.D. Scholars Guided	:	<b>06</b>
No. of Scholars currently working for their Ph.D.	:	<b>07</b>
No. of M.S. By Research Guided	:	<b>01</b>
No. of M.Tech thesis Guided	:	<b>43</b>

### **Sponsored Major Research Projects (Completed/ongoing)**

Title of the project	Role in the project	Funding Agency	Duration		Total Outlay In lakh
			From	To	
"Alloy semiconductor crystal growth under microgravity at International Space Station"	Co-Investigator	Japan Aerospace Exploration Agency (JAXA), Japan.	2009	2014	1160
"A novel way of preparation of high-quality substrate material for highly efficient solar cells"	Principal Investigator	JSPS Grant-in-aid for Young Scientist (B) from MEXT, Japan.	2010	2012	33.8
"Investigation on the effect of crystal orientation on solution growth of InGaSb and InGaAs compound semiconductors"	Co-Investigator	Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.	2010	2013	150
"Growth of homogeneous SiGe alloy semiconductor for	Co-	Indo-Japan Collaborative	2010	2012	10.75

thermoelectric applications "	Investigator	Research Project, funded by JSPS, Japan –DST, India.			
Fabrication of Tandem Structured Thermoelectric Devices using SiGe related alloy Semiconductors	Co-Investigator	Indo-Japan Collaborative Research Project, funded by JSPS, Japan –DST, India.	2012	2014	10.75
Elucidation of the crystal growth and solute transport mechanism for the growth of high-quality alloy semiconductor and fabrication of tandem thermoelectric cell	Co-Investigator	Grant-in-Aid for Scientific Research (B) from MEXT, Japan.	2013	2015	120
Growth of high-quality InGaSb crystal by controlling the convection	Co-Investigator	Grant-in-Aid for Scientific Research (B) from MEXT, Japan.	2013	2015	130
Defect engineering in n-type Si by Ge doping for high-efficiency solar cells	Principal Investigator	Grant-in-Aid for Scientific Research (C) from MEXT, Japan.	2014	2016	35
Development of nano-meso structured cobalt-based novel oxide Thermoelectric materials for electric energy generation from waste heat	Principal Investigator	DST-SERB under Early Career Research (ECR) Award	2016	2019	38.182
Development of highly stable platinum-free nanostructures for dye-sensitized solar cell applications	Co-Principal Investigator	DST-SERB under Extra Mural Research Funding	2017	2020	42.31
Development of NiCo <sub>2</sub> O <sub>4</sub> decorated MoS <sub>2</sub> and rGO nanocomposites based flexible solid-state supercapacitor for energy storage applications	Co-Investigator	STARS, MHRD	2019	2022	49.0
Development of Single crystalline Gallium Oxide (Ga <sub>2</sub> O <sub>3</sub> ) growth technology for power device applications	Co-Investigator	DRDO, New Delhi	2019	2022	144.48
Development of Sn-based novel high entropy alloy for thermoelectric applications	Principal Investigator	GIMRT, Tohoku University, Japan	2019	2020	450000 JPY

Rapid crystallization and grain structure analysis of GeSe based chalcogenides for Thermoelectric applications	Principal Investigator	GIMRT, Tohoku University, Japan	2020	2021	463000 JPY
Investigation on the growth process and defect studies of semiconductor materials for high temperature thermoelectric applications	Principal Investigator	Indo-Japan Collaborative Research Project, funded by JSPS, Japan –DST, India.	2021	2023	4.55
Investigation on the grain structures of rapidly crystallized GeSe and GeTe for thermoelectric applications	Principal Investigator	GIMRT, Tohoku University, Japan	2022	2023	440000 JPY

### **Additional responsibilities:**

1. **Member – Syllabus Sub Committee** for M.Tech Nanoscience & Technology, Anna University
2. **Member - Board of Studies**, Department of Physics, Vels University, Chennai.
3. **Member - Syllabus Sub Committee** for M.Tech Nanoscience & Technology, Constituent Colleges and affiliated Institutions of Anna University, Chennai.
4. **Member - Board of Studies in Physics**, Loyola College, Chennai.
5. **Member - Departmental Consultative Committee**, Anna University.
6. **Editorial Board member** of the Journal “Crystal Structure Theory and Applications”.
7. **Managing Editor**, Science and Technological Research Journal.
8. **Chief Superintendent** for PG Exams 2019, A.C Tech Campus, Anna University.
9. **Faculty Advisor**, M.Tech. Nanoscience and Technology.
10. **Member**, Inspection Committee for Research Centre Recognition, Anna University.
11. **Class Committee Co-ordinator**, M.Tech Nanoscience and Technology.

### **Membership in Professional bodies:**

1. Life Member of the Indian Association for Crystal Growth (IACG).
2. Member of Japan Society of Applied Physics (JSAP).
3. Member of the Japanese Society of Microgravity and Applications (JSMA).
4. Member of Japan Association for Crystal Growth (JACG).
5. Life Member of the Solar Energy Society of India (SESI).
6. Indian Science and Technology Association.

### **Conferences/Seminars/Workshops Organized:**

1. *Organizing Secretary*, Third International Workshop on Advanced Functional Nanomaterials (TIWAN-2015), Centre for Nanoscience and Technology, Anna University, Chennai, 16-18, Dec. 2015.
2. *Co-ordinator*, National seminar on Recent Advances Functional in Nanoscience and Technology”(NANOMEET-2016), Centre for Nanoscience and Technology, Anna University, Chennai, 6-7<sup>th</sup> Oct 2016.
3. *Co-Convener*, National Workshop, and Hands-on Training Program on “Thin Film Solar Cells”, Centre for Nanoscience and Technology, Anna University, 11-12, Nov 2016.
4. *Co-ordinator*, Fourth International Workshop on Advanced Functional Nanomaterials (IWAN-4), Centre for Nanoscience and Technology, Anna University, Chennai, 21-23, March 2017.
5. *Convener*, International Conference on Recent Trends in Applied Science and Technology in Tamil, Centre for Nanoscience and Technology, Anna University, Chennai, 8-9, Sep. 2017.
6. *Co-Convener*, National Workshop and Hands-on Training Program on “Thin Film Solar Cells”, Centre for Nanoscience and Technology, Anna University, 22-23, Sep. 2017.
7. *Co-ordinator*, National seminar on Recent Advances Functional in Nanoscience and Technology” (NANOMEET-2016), Centre for Nanoscience and Technology, Anna University, Chennai, 29-30<sup>th</sup> Nov. 2017.
8. *Organizing Secretary*, Technical Meet on “Sophisticated Analytical and Fabrication Equipment (SAFE) for Academics and MSME”, Centre for Nanoscience and Technology, Anna University, Chennai, 2-3, Nov. 2020

### **Courses handled for M.Tech. Programme:**

#### **Physics and Chemistry of Materials**

- **Processing and Properties of Nanostructured Materials**
- **Semiconductor Nanostructures**
- **Nanomaterials for Energy and Environment**
- **Photonics for Nanotechnology**
- **Mathematical Modeling and Simulation**
- **Lithography and Nanofabrication**

### Awards & Recognition:

- **Distinguished Researcher Award**, Anna University, Sep. 2021.
- **Fellow of Academy of Sciences**, Chennai.
- **ISPA Dr.S. Gunasekaran Award** by Indian Spectro Physics Association, Jan. 2020.
- **Team Coordinator, Erasmus+ project** with University of West Attica, Greece.
- **Young Scientist Award**, 2018, by Academy of Sciences, Chennai.
- **Visiting Associate Professor**, ICC-IMR, Tohoku University, Sendai, Japan, 2018-2019.
- **Young Achiever Award**, Elavenil Science Association, Chennai, March 2018.
- **Highly Cited Research** in Prog. Cryst. Growth Ch., awarded by Elsevier, Dec. 2016.
- Grant-in-aid under **Early Career Research (ECR) Award** (June 2016), DST-SERB, India.
- Grant-in-aid for **Young Scientist C (2014-2016)** from MEXT, Government of Japan.
- Grant-in-aid for **Scientific Research B (2013-2015)** from MEXT, Government of Japan.
- **Young Researcher Award**, Inter Academia 2014, Riga, Latvia, September 2014.
- Grant-in-aid for **JSPS Young Scientist B (2010-2012)** from MEXT, Government of Japan.
- Certified as a **valued reviewer** by the Chief Editor of the Journal of Crystal Growth.
- **Co-Investigator of Japan's KIBO project at International Space Station (2009-2014).**
- **COE Postdoctoral Fellowship**, IMR, Tohoku University, Japan 2007-2009.
- **University Research Fellowship**, Alagappa University, India, 2005.
- **Best Paper Award** in 2<sup>nd</sup> National Symposium on crystal growth of Laser materials, India.
- **Best Paper Award** in 10<sup>th</sup> National conference on Crystal Growth, India.
- Secured **Third Rank** in M.Phil Physics, *Alagappa University, India.*
- Secured **Third Rank** in M.Sc Physics, *Alagappa University, India.*
- **PMT-VOC Merit Scholarship** during M.Sc, *Alagappa University, India.*

### Selected patents

1. Satoshi Uda, **M. Arivanandhan**, Raira Gotoh, Kozo Fujiwara, "High-quality Silicon crystal and method for manufacturing the same" *Japan patent*, Application no. 2009- 064269, date: 17.3.2009; publication No.: 2010- 215455, date: 30.9.2010; Registration no.5419072, date: 2013.11.29.
2. Satoshi Uda, **M. Arivanandhan**, Raira Gotoh, Kozo Fujiwara, Y. Hayakawa "Crystalline Silicon and methods for producing single and polycrystalline Si ingots" *Japan patent*, Application no. 2011- 067402, date: 25.3.2011; publication No.: 2012-201551, date: 22.10.2012; Registration no.5688654, date: 6.2.2015.

## Selected papers:

1. D Sidharth, AS Alagar Nedunchezian, Akilan Rajamani, Anup Shrivastava, Bhuvanesh Srinivasan, P Immanuel, R Rajkumar, N Yalini Devi, **M Arivanandhan**, Chia-Jyi Liu, G Anbalagan, Shankar Ramasamy, Jayavel Ramasamy, Enhanced thermoelectric performance of band structure engineered GeSe<sub>1-x</sub>Te<sub>x</sub> alloys, **Sustainable Energy & Fuels**, 5 (2021) 1734-1746.
2. Enhancing thermoelectric power factor of nanostructured ZnCo<sub>2</sub>O<sub>4</sub> by Bi substitution, A.S. Alagar Nedunchezian, D. Sidharth, R. Rajkumar, N. Yalini Devi, K. Maeda, **M. Arivanandhan**, K. Fujiwara, G. Anbalagan, R. Jayavel, **RSC Advances**, 10, (2020)18769.
3. Enhancing effects of Te substitution on the thermoelectric power factor of nanostructured SnSe<sub>1-x</sub>Te<sub>x</sub>, D Sidharth, AS Nedunchezian Alagar, R Rajkumar, N Devi Yalini, P Rajasekaran, **M Arivanandhan**, K Fujiwara, G Anbalagan, R Jayavel, **Physical Chemistry Chemical Physics**, 21 (2019)15725.
4. Crystallization and re-melting of Si<sub>1-x</sub>Ge<sub>x</sub> alloy semiconductor during rapid cooling, **Mukannan Arivanandhan**, Genki Takakura, D Sidharth, Maeda Kensaku, Keiji Shiga, Haruhiko Morito, Kozo Fujiwara, **Journal of Alloys and Compounds**, 798 (2019) 493.
5. A facile preparation, performance and emission analysis of pongamia oil based novel biodiesel in diesel engine with CeO<sub>2</sub>: Gd nanoparticles, K Dhanasekar, M Sridaran, **M Arivanandhan**, R Jayavel, **Fuel**, 255(2019), 115756.
6. "Templated synthesis of atomically thin platy hematite nanoparticles within a layered silicate exhibiting efficiently photocatalytic activity" Durai Mani, Nao Tsunoji, Yusuke Yumauchi, **Mukannan Arivanandhan**, Ramasamy Jayavel and Yusuke Ide, **Journal of Materials Chemistry A**, 6 (12) (2018) 5166-5171.
7. Fabrication of high quality, thin Ge-on-insulator layers by direct wafer-bonding for nanostructured thermoelectric devices, Veerappan, Manimuthu; **Mukannan, Arivanandhan**; Salleh, Faiz; Shimura, Yosuke; Hayakawa, Yasuhiro; Ikeda, Hiroya, **Semiconductor Science and Technology**, 32 (2017) 035021.
8. "Graphene decorated with MoS<sub>2</sub> nanosheets: a synergetic energy storage composite electrode for supercapacitor applications" R Thangappan, S Kalaiselvam, A Elayaperumal, R Jayavel, **M Arivanandhan**, R Karthikeyan, Y Hayakawa, **Dalton Transactions**, 45, (2016) 2637 -2646.
9. "Investigation of directionally solidified InGaSb ternary alloys from Ga and Sb faces of GaSb(111) under prolonged microgravity at the International Space Station" V. Nirmal Kumar, **M. Arivanandhan**, G. Rajesh, T. Koyama, Y. Momose, K. Sakata, T. Ozawa, Y. Okano, Y. Inatomi and Y. Hayakawa, **Nature Partner Journal (npj): Microgravity**, 2 (2016)16026.
10. "Facile Synthesis of graphene-CeO<sub>2</sub> Nanocomposites with enhanced electrochemical properties for Supercapacitors" T. Saravanan, M. Shanmugam, P. Anandan, M. Azhagurajan, K. Pazhanivel, **M. Arivanandhan**, Y. Hayakawa, R. Jayavel, **Dalton Transactions**, 44 (2015) 9901-9908.