



Prof. M.S. Ramachandra Rao, *FInstP*
Prof. R. Srinivasan Institute Chair Professor
Department of Physics,
Quantum Centre of Excellence for Diamond and Emergent Materials (QuCenDiEM)
India Centre for Lab-Grown Diamond (InCent-LGD)
Nano Functional Materials Technology Centre
DST-Solar Energy Harnessing centre (DSEHC) and
Materials Science Research Centre,
Indian Institute of Technology (IIT) Madras, Chennai, India.
[*FInstP*: Fellow of Institute of Physics (IoP), UK]



<u>Academic Background:</u>	
B.Sc. (Physics)	Government College, Rajahmundry (1981)
M.Sc. (Physics)	Indian Institute of Technology (IIT), Kharagpur (1983)
Ph.D. (Expt. SSP)	Indian Institute of Technology (IIT), Kharagpur (1988)
<u>Employment:</u>	
Assistant Professor	IIT Madras (1995-2004)
Associate Professor	IIT Madras (2004-2006)
Professor	IIT Madras (2006 - present)
Senior Professor	IIT Madras (from July 01, 2013)
Chair Professor	IIT Madras (from May 2018)

Other Employment/post-doc/fellowship/visiting position details (before and after joining IIT as a faculty):

Research Scientist	Solid State Physics labs, CNRS Bellevue, France ('90 –'91).
Research Associate	Materials Science Research Centre, IIT Madras ('91 – '93).
Visiting Fellow (1993-'94)	Solid State Electronics Group, Tata Institute of Fundamental Research (TIFR), Bombay.
Alexander von Humboldt Fellow	II. Physikalisches Institut, University of Cologne, Germany (1999).
Visiting Faculty (2003-'04)	Centre for Superconductivity, Department of Physics, University of Maryland, College Park, MD, USA.
JSPS Fellow (May – July, 2007)	Department of Electrical Engineering, Kyushu University, Japan.
Visiting Faculty (2008 – '12)	Department of Electrical Engineering, Kyushu University, Japan [Short visits].
DAAD STAR Professor (2010)	: Walther Meissner Institute (WMI), Garching, Germany.
Visiting Faculty and BoG member	: IISER, Trivandrum (2015-2021).
Visiting Faculty	: Information Science and Department of Electrical Engineering, Kyushu University, Japan (December 2015 to February 2016).

Visiting Faculty	: Dept. of Physics, Shibaura Institute of Technology (SIT), Tokyo.
Erasmus Mundus Professor (2007 – present)	University of Montpellier, France; University of Rennes, France; Technical University of Munich, Germany [Duties: Teaching Master’s students, conduct collaborative research and supervision of students].

Editorial Board Member (from India (2005 – December 2014)) of Journal of Physics D: Applied Physics, Institute of Physics (IoP), UK.

Section Editor (2015-2020) of “Condensed matter, interfaces and quantum materials”; J. Phys.D. Appl. Phys. Institute of Physics (IoP), UK.

Established the following centres:

- [1]. Nano functional Materials Technology Centre (NFMTC)” [Grant from DST and Industry].
- [2]. Quantum Centre of Excellence for Diamond and Emergent Materials (QuCenDiEM).
- [3]. DST-Solar Energy Harnessing Centre (DSEHC) [Grant from Solar Energy Mission].
- [4]. India Centre for Lab-grown Diamond (Incent-LGD) [Grant (Rs. 242. 00 Crores)from Government of India].

MRSI (Materials Research Society of India) Council Member (2015-2019).

MRSI (Materials Research Society of India) One of the Vice-Presidents (from 2019).

MRSI Chairman, Chennai Chapter (since 2018).

Research Areas:

Quantum Materials, Correlated oxides, Superconductivity, Nanomaterials, Nanostructured thin films - Electronic, optical and magnetic properties; Magnetic nanoparticles and magnetic tunnel junctions, spintronics; Nanocrystalline diamond coatings for wear-resistance and bio-medical applications; Superconductivity in born doped diamond (BDD) and growth of NV-centres in doped diamond; Exploring high microwave inductance in granular superconducting BDD quantum information applications; Large area PZT and PMN-PT films for power harvesting and MEMS applications; ZnO nanostructures and quantum structures for light emission; Oxide-2D interfaces; Diamon-based devices: Diamontronics.

Incubated a company in IITM Research Park (Kapindra). He company deals with diamond coating for industrial/defence/space applications. It is in the process of developing a product for water purification using diamond coated electrodes
[\[https://in.linkedin.com/company/kapindra\]](https://in.linkedin.com/company/kapindra).

Team won the 1st prize in the DRDO Dare-to-Dream nationwide contest for their proposal to use diamond coatings in hypersonic technologies.

<https://www.indiatoday.in/education-today/news/story/iit-madras-incubated-start-up-kapindra-develops-novel-diamond-coatings-1645041-2020-02-10>

→ Team received a 2nd Dare-to-Dream award (July2021).

Publications : 365 (in international journals)
200 papers presented in national and international conferences.

Patents : **Total: National 24 + International ((In different countries including PCT other than India) 6 = 30**

Incubated a company in Research Park on the technology developed with diamond coatings.
Approval received for incubating two more companies.

Teaching : **30 years of teaching experience** at undergraduate, postgraduate and Ph.D. level courses at IIT Madras. [Taught in the US and France].

Projects : **Sponsored 52 (Completed), 08 (On-Going); Total: 60**
[Established good research facilities to carry out competent research in the areas of Nano- and Diamond based technologies. Physics of advanced materials, thin films and hetero-structures].
Technology Transfers: 5

Invited Talks : 125 (since 2015).

Guidance: Ph.D. : 45 (completed) and 11 (on going);
M.Tech/M.Sc./B.Tech./MS : 70 (completed)

Awards and honours:

- [1]. Alexander von Humboldt Fellow, Germany;
- [2]. JSPS fellow, Japan; DST
- [3]. FInstP (Fellow of the Institute of Physics (IOP), UK)
- [4]. Board Member, J.PhysD. Appl. Phys., IOPP, US (since 2006)
- [5]. Section editor; 'Condensed Matter: Advanced and Quantum Materials', JPhysD, IOPP, UK (since 2018)
- [6]. Visiting Faculty, IISER, Trivandrum (2015-2019)
- [7]. Visiting faculty, Shibaura Institute of Technology (SIT), Tokyo (since 2018)
- [8]. Visiting Professor in the Erasmus-Mundus Master's program (Univ.Montpellier, France TUM, Germany, Univ. Rennes, France and Univ. of Torino, Italy) [since 2006]
- [9]. MRSI (Materials Research Society of India) medal for achievements in the fields of Superconductivity and Materials Science (2018)
- [10]. Council Member and Vice President (1/7), Materials Research Society of India (since 2015; '18)
- [11]. Chairman, MRSI, Chennai Chapter (since 2018)

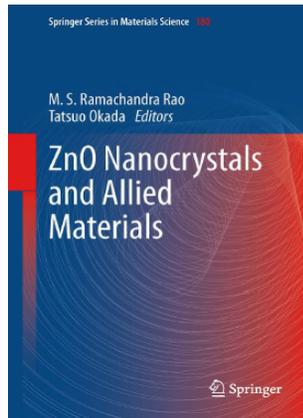
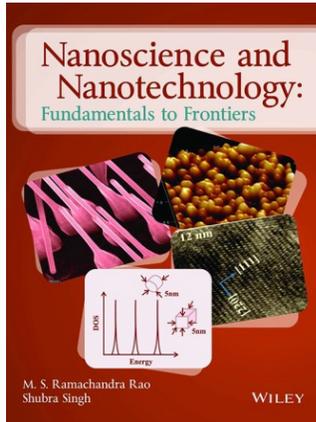
- [12]. DAAD STAR Professor at Walther Meissner Institute, Garching, Germany (2010).
- [13]. Prof. R. Srinivasan Institute Chair Professor (since 2019)
- [14]. Dare-to-Dream 1st prize winner in the National level contest on the proposed work using novel diamond coatings for thermal management in defence and aerospace applications (2019).
- [15]. Chairman, Department of Physics, IIT Madras (2015-2018)
- [16]. Established Nanotechnology Centre (NFMTC) with a big grant from DST and Industry
- [17]. Head, Solar Energy Harnessing Centre (DSEHC) funded by DST
- [18]. Head, Quantum Centre for Diamond and Emergent Materials (QuCenDiEM) – pCoE.
- [19]. Incubated a company (Kapindra) in IIT Madras Research park.
- [20]. Director (Technical), Kapindra Precision Engineering Pvt. Ltd. (a company incubated at the Research Park of IIT Madras).
- [21]. Council Member, IIT Madras Research Park (since 2019).
- [22]. Hostel Blues for excellence in academics and sports, IIT Kharagpur (1987).
- [23]. Dare-to-dream award winner (2021) [National level award in the competition on Technology Innovation (initiated by the Prime Minister of India)].
- [24]. **Invited by the Nobel Committee for Physics as a nominator to send nominations for the coveted prize (about 1000 physicists are chosen from around the world) [Received the honour twice (2009 and 2021)].**
25. Life time Achievement Award for Excellence in Research and Innovation, awarded by ICONN (International Conference on Nanoscience and Nanotechnology) Committee, held at SRM University, Chennai (March 2025).

J. Phys. D. Special Issues/roadmaps (as an editor/guest-editor):

1. **Carbon-based Nanoscience and Nanotechnology: Where are we, where are we heading?** *J. Phys. D: Appl. Phys.* 43 (2010) 37030. doi: [10.1088/0022-3727/43/37/370301](https://doi.org/10.1088/0022-3727/43/37/370301).
2. **Three decades of scanning tunnelling microscopy that changed the course of surface science.** *J. Phys. D: Appl. Phys.* 44 (2011) 460301. doi: [10.1088/0022-3727/44/46/460301](https://doi.org/10.1088/0022-3727/44/46/460301).
3. **25 years of pulsed laser deposition.** *J. Phys. D: Appl. Phys.* 47 (2014) 030301 doi: [10.1088/0022-3727/47/3030301](https://doi.org/10.1088/0022-3727/47/3030301).
4. **100 years of crystallography: new dimensions offered by large scale facilities** doi: [10.1088/0022-3727/48/50/500301](https://doi.org/10.1088/0022-3727/48/50/500301).
5. **The 2016 Oxide Electronic Materials and Oxide Interfaces Roadmap: J.PhysD.** *Appl.Phys.* 49 (2016) 433001. doi: [10.1088/0022-3727/49/43/433001](https://doi.org/10.1088/0022-3727/49/43/433001).

Books : “Nanoscience and Nanotechnology: Fundamentals to Frontiers” (Wiley) – Text book. ISBN: [9788126542017](https://doi.org/10.1002/9781118126542)

“ZnO nanostructures and Allied Materials” (Springer). ISBN: [978-81-322-1159-4](https://doi.org/10.1007/978-81-322-1159-4)



A brief statement on some impact contributions:
[Taken from a citation]

Prof. MSR Rao (Humboldt and JSPS fellow) contributed immensely to experimental CMP and nanoscience. His earlier work highlights that Pr-ion in Bi-2212 had no additional effect on the T_c suppression unlike Pr in YBCO (*Phys.Rev.B. 50 (1994) 6929*) and that Abrikosov-Gorkov pair breaking was not responsible for T_c suppression. He contributed to the applications of high T_c films (*Appl.Phys.Lett. 68 (1996) 1720*) at TIFR. At IIT Madras, he worked on correlated effects in manganites, and demonstrated the effect of internal field due to Ho^{3+} substitution in LCMO (*Philosophical Magazine 83 (2003) 1631*). He demonstrated the importance of using an alternative insulating barrier in the study of MTJs (*J.Phys.D. Appl.Phys. 35 (2002) 287*). His recent pioneering work includes stabilization of p-type conductivity in ZnO (*Phys.Rev.B. 80 (2009) 45210; APL 96 (2010) 232504*). He works on industry problems using diamond coatings and his recent work in realizing superconductivity in boron doped diamond is commendable (*Phys. Rev. B 95 (2017) 174519; Appl.Phys.Lett. 118 (2021) 102102*). All this led to the creation of a ‘Quantum Centre’ (qucendiem.org) with focus on creating NV-centres in diamond for qubit-study. One of the good attributes of Prof. Rao is that he is a very good teacher (IIT and abroad).

His work on diamond has societal implications and it has led to incubation of a company (M/s Kapindra) in IIT Madras Research Park.

Highlighting of the best honour received (taken from a citation):

Apart from the Science and Technology contributions of Prof. M.S.R. Rao and various awards and honours, he has had the honour of being invited by the **Physics Nobel Committee** to be a nominator (about 1000 physicists selected from all over the world).