

# Information Booklet 2015



**T R Anantharaman Education  
and Research Foundation  
Hyderabad**

## About TRAERF

Welcome to T R Anantharaman Education and Research Foundation (TRAERF). This Foundation has been established in 2009 in memory of Late Professor T R Anantharaman, a doyen of Metallurgy, by some of his students and well-wishers. It is dedicated to the cause of improving the quality of higher education and research in engineering, particularly in metallurgical and materials engineering.

One of the major activities of TRAERF is to award **Summer Internships** to selected number of top ranking students of B.Tech. Metallurgical / Materials Engineering from tier-2 academic institutions in the country. The aim is to allow them to undergo summer training with a distinguished faculty member or a research scientist in a reputed institution. This activity has received widespread attention from engineering institutions in the country.

Further, to perpetuate the memory of Prof Anantharaman at Dept of Metallurgical Engg, BHU - his "Karma Bhumi"- **Merit Scholarships** are awarded by TRAERF every year to the first ranking student in the 2<sup>nd</sup> year of B Tech.

In another hugely successful initiative, TRAERF has combined with the celebrated Sir Dorabji Tata Trust, Mumbai to award **Faculty Fellowships** to selected young faculty members from tier-2 institutions to spend upto 4 months with a Mentor, who is an eminent teacher / researcher in a reputed institution abroad. This initiative is aimed at creating a pool of high quality teachers in metallurgy and materials science.

TRAERF frequently gets together with various other institutions and Societies to organise **Seminars and Workshops** on topics of relevance to improving teaching standards in the country.

Progress made in conducting these activities is described briefly in this Booklet. More details are available from our website (*presently undergoing updation but expected to be fully up by the end of this year*)

The Foundation is presently supported entirely by voluntary contributions made by the Members of the Board of TRAERF as well as other well-wishers. As more and more funds become available to the Foundation, many more such activities will be undertaken to realize fully the Foundation's objectives.

### **T R Anantharaman Education and Research Foundation**

*Registered Office:* H. No. 8-9-140, Plot No.140 Dhatunagar, Kanchanbagh,  
Hyderabad – 500058

*Telephones:*+91-40-66614475, 65556393, 24341440

*Website:* [www.tra-erf.org](http://www.tra-erf.org)

## TRAERF's Objectives

1. To motivate meritorious undergraduate students of engineering to pursue a research career in engineering, through a scheme of awarding Summer Fellowships at reputed institutions and other incentives.
2. To award Scholarships to first rankers among 1st, 2nd and 3rd year students pursuing B.Tech. Metallurgical Engineering in selected institutions
3. To award Prof T R Anantharaman Prizes for Science Communication by recognizing articles published by young Indians in IIM News, Current Science, Nanotech Insights etc.
4. To organize a "Professor T R Anantharaman Memorial Lecture" to be delivered by an eminent person every year on his birthday namely, November 25
5. To provide partial or full financial support to students pursuing Ph. D. research in any Materials Science related subject to enable them to present their original research work in International Conferences abroad.
6. To award Visiting Scientist positions for a period of up to four months to faculty members from the less endowed institutions to carry out research at premier institutions like the Indian Institute of Science, the various Indian Institutes of Technology including BHU and reputed institutions abroad.
7. To establish an Endowment Chair (named as the "Professor T R Anantharaman Endowment Chair") in one or more premier institutions in India for the purpose of carrying out research in frontier areas of Materials Science and Technology and to pay monthly Honorarium .
8. To organize one or more International Conferences periodically in the name of Professor T R Anantharaman on research topics of current relevance.
9. To provide financial support for basic research projects in the fields of Science and Engineering.
10. To sponsor research and outreach activities related to History of Indian science and technology and Materials heritage of India
11. To sponsor research activities aimed at a deeper understanding of Indian Philosophy and Yoga.
12. To organise publication of Professor T R Anantharaman's unpublished writings and speeches on topics in metallurgy, materials science, philosophy and yoga.
13. To maintain a Library of Professor T R Anantharaman memorabilia such as his speeches, photos, audio & video recordings, available with family members, friends and various institutions.
14. To take up any other activity that would perpetuate the memory of Professor T R Anantharaman, as may be decided by the Board of Trustees from time to time.

**TRAERF's Achievements:** Some of the achievements of TRAERF during the last five years of its endeavour to fulfil the above objectives are listed in the following pages.

## 1. Sir Dorabji Tata-TR Anantharaman (SDT-TRA) Faculty Fellowships

Launched in 2013 in collaboration with Sir Dorabji Tata Trust (SDTT), this flagship Program of TRAERF provides Faculty Fellowships to talented young teachers (in the age group 30-40) of metallurgy and materials engineering. Following a highly rigorous selection procedure, teachers selected to receive the Fellowship are paid a stipend of US\$ 3000/- pm (payable by Sir Dorabji Tata Trust) to meet living expenses during the tenure of the Fellowship in addition to international travel (payable by TRAERF). Recipients of this coveted Fellowship include 5 young faculty members from different NITs and two from Universities.

### Receipients of SDT-TRA Faculty Fellowships

Year	Name	Institute	Mentor and Institution
2013	Dr. K. Sivaprasad	NIT, Trichy	Prof Rajiv Mishra, Uty of North Texas, USA
2013	Dr. M.K. Chopkar	NIT, Raipur	Prof S Chandrasekharan & Prof M A Dayananda, Purdue Uty, USA
2014	Dr A R Ballal	VNIT, Nagpur	Prof Rishi Raj, Uty of Colorado, USA
2014	Dr. S.K. Sahoo	NIT, Rourkela	Prof A D Rolett, Carnegie Mellon Uty, USA
2015	Dr. V. Sajith	NIT, Calicut	Prof P M Ajayan, Rice Uty, USA
2015	Dr. (Ms) Amrita Kundu	Jadavpur University, Kolkata	Prof D P Field, Washington State Uty, USA
*2011	Dr.Rampada Manna	IT-BHU, Varanasi	Prof HKDH Bhadeshia, Cambridge Uty, UK

\* (supported by a one-off TATA Steel – TRAERF Fellowship, awarded prior to SDT-TRA Fellowship Program)



Dr K Siva Prasad



Dr M K Chopkar



Dr A R Ballal



Dr S K Sahoo



Dr V Sajith



Dr (Ms) A Kundu



\*Dr R Manna

## 2. TRAERF Summer Internship Awards

These are awarded to high ranking students of Metallurgy/Materials Science belonging to less endowed institutions in India. They are selected from among the nominees proposed by the Heads of these institutions. Each of the selected students is awarded a one-time grant (Rs. 16,000 at present) and a Travel Allowance for summer training of 2 months duration with an expert in reputed institutions. This initiative of TRAERF is intended to motivate meritorious undergraduate students of metallurgical engineering to improve their learning and research skills.

### *Institution-wise distribution of TRAERF Summer Internship recipients:*

Institution	No. of recipients (2011 - 2015)	Mentoring Institutions
NITs – various (7)	12	Siegen University, Germany
IIT-BHU, Varanasi	8	
Mahatma Gandhi Inst Tech (MGIT), Hyderabad	6	IISc, Bangalore; IIT-M, Chennai; IIT-B, Mumbai and UOH, Hyderabad
JNTUs – various (2)	5	ARCI, Hyderabad; BARC, Mumbai; DMRL, Hyderabad; IGCAR, alppakkam; NAL, Bangalore; NML, Jamshedpur and RCMA, Hyderabad
Andhra Uty, Visakhapatnam	3	
PSG College of Technology, Coimbatore	1	



2011: Ms. Sai Priya of MGIT, Hyderabad receiving Summer Internship from Dr P Rama Rao, President, TRAERF for training in Germany. Also present: Dr J Vijlava Kumar, Dean R&D, MGIT



2011: Ms. Akhila Reddy of JNTU, Hyderabad receiving Summer Internship from Dr G Malakondaiah, Director, DMRL, Hyderabad for training in DMRL. Also present (LtoR after Dr Malakondaiah); Dr D N Reddy, Vice Chancellor, JNTU- H and Dr P Rama Rao, President, TRAERF

### 3. TRAERF Merit Scholarship

This is given (one per year) to the 1st ranking student of 2nd year B.Tech. Metallurgical Engg of IIT-BHU, Varanasi, A one-time grant of Rs. 10,000/- and a Certificate of Merit are awarded on the occasion of the METALLURGY DAY during March-April.

#### Recipients of TRAERF Merit Scholarships:

2011: Mr. Ram Pratap Singh  
2012: Ms. Pranjali Sharma  
2013: Mr. Kartik R Laddha  
2014: Mr. Shubham Bansal  
2015: Mr. Prabhutosh Kumar

2011: Mr Ram Pratap Singh of Met Engg, IIT-BHU receiving TRAERF Merit Scholarship from Prof G N Agarwal, Dean, IIT-BHU



### 4. Conferences and Seminars

To benefit students and faculty as well as working engineers of metallurgy and materials science, TRAERF aims to organize events such as Seminars / Workshops / Lecture Series every year on topics of current relevance to India. To encourage undergraduate students of engineering to benefit from these events, they are permitted to register free of charge.

#### Major Events organised under the aegis of TRAERF during 2011-2015

- Two-day Workshop on "INDUSTRIAL CORROSION AND ITS CONTROL" at Department of Metallurgical Engineering and Materials Science, IIT-Bombay, Mumbai (September 16-17, 2011)
- Five-day School on "SURFACE ENGINEERING TECHNOLOGIES: RESEARCH AND APPLICATIONS" (SETRA-2012) at ARCI, Hyderabad, (August 27-31, 2012)
- Two-day National Seminar on "EVALUATION AND PREVENTION OF CORROSION FAILURES" (EPCF, 2012) at SEST, University of Hyderabad, Hyderabad, (November 29-30, 2012)
- Two-part Lecture Series on "EXPERIMENTAL EVALUATION OF ELASTIC MODULUS" by Dr. P Rama Rao and Dr. V Chandrasekharan at DMRL, Hyderabad, (December 10-11, 2012)
- Three-day National Workshop on "FATIGUE, FRACTURE AND LIFE EXTENSION (FFLE-2014)" at DMRL and RCMA, Hyderabad (January 29-31, 2014)
- Two-day National Seminar on "METALLURGY FOR NON-METALLURGISTS" (MNM-2015) at Mahatma Gandhi Institute of Technology, Hyderabad (January 29-30, 2015)





Delegates attending the Workshop FFLE-2014



A delegate at FFLE-2014 Group Capt. DV Murali, VSM, CO- AFLE (Koraput) expressing his views



Dr P Rama Rao inaugurating the MNM -2015 Seminar

## 5. BOOK RELEASE (scheduled for October/November 2015)

### Notes on Thermodynamics of Materials

*dedicated to the memory of Prof T R Anantharaman*

**by Joydip Joardar, Shrikant Lele and Palle Rama Rao**

#### A brief description of the contents of the book

The present book is called **Notes on Thermodynamics of Materials (NTM)** as it attempts to put together a refresher text that could serve as an aid to a majority of students in grasping the essentials of what numerous authors present in their scholarly tomes. **NTM** is Notes simply because the intention is not to discuss comprehensively a whole range of topics that normally constitute the subject matter of text books on thermodynamics. Intended as complementary to the Notes, milestones in the progress of thermodynamics as well as references to useful literature have been provided.

Historically, it is application that has driven the development of the science of thermodynamics. Drawing inspiration from the hoary past, the **NTM** uses an application of a basic tenet as a tool to help the reader understand the significance of the related concept, which at first reading might seem vague. It is hoped that this approach renders it easier to understand the concepts underlying thermodynamics of materials.

Using this approach the following topics are covered in 9 chapters:

- The laws of thermodynamics and their applications (Chapters 1&2)
- The atomistic approach to thermodynamics with illustrative applications (Chapter 3)
- Phase rule, phase stability, phase diagrams and phase transformations (Chapters 4 to 6)
- Vacancies in metals and their role in sintering and diffusion creep (Chapter 7)
- Computational thermodynamics and its usefulness in the design of new alloys (Chapter 8)
- In the 9th and the last chapter entitled "Non-conventional Thermodynamics", the topics of nano-thermodynamics and beyond-equilibrium thermodynamics are touched upon.



## Appeal to Donors

### **To all those who have known and are familiar with the persona of Prof TRA and his work in diverse fields**

As you are aware, Professor T.R. Anantharaman laid a strong foundation for metallurgical education and research in independent India. To carry forward his work his students and colleagues have initiated a trust, now known as TR ANANTHARAMAN EDUCATION AND RESEARCH FOUNDATION (TRA-ERF).

***I am happy to inform you that (i) Donations to TRAERF are exempt from Income Tax U/S 80G (5) (vi) of the IT Act 1961 and (ii) We have been given permission under the Foreign Currency Regulation Act (FCRA) to receive donations in foreign currency. A List of Donors so far is given on the next page.***

Initial funds for the Trust have been provided by a few members of the Trust Board and its well-wishers. This stands at a sum of nearly Rs.40 lakh. Many other students of Professor TRA and well wishers of this initiative have expressed their desire to contribute to the Trust funds.

An initial target of Rs. 100 lakh for individual donors and an equal amount from Government and corporate donors will allow us to set up a reasonable corpus the proceeds of which can be utilized to meet the aims of the Trust designed to promote education and research in selected fields. As you may have noted it devolves upon every one of us to contribute to nurturing skilled human resources for which a need is extensively felt by the country in every one of the technical fields.

I welcome any suggestions you may have for advancing these aims.

I request you kindly to help the stated cause with your valuable donations.

***All contributions in the form of a crossed cheque or draft drawn in the name of "T R Anantharaman Education and Research Foundation" may please be sent to the following address:***

Dr. P. Rama Rao  
President, T R Anantharaman Education and Research Foundation  
H.No. 8-3-1022, Plot No.22,  
Flat No.301, "Naimisam", Srinagar Colony,  
Hyderabad-500073, Telangana,  
Tel: +91-40-66614475, Mobile: +919849765123

Yours truly

**P Rama Rao**

## List of Donors till September 2015

### Individuals

- Dr P Rama Rao, ARCI, Hyderabad
- Dr S Ranganathan, IISc & NIAS, Bangalore
- Dr K. Chattopadhyay, IISc, Bangalore
- Dr G Malakondaiah, DMRL, Hyderabad
- Dr K Bhanu Sankara Rao, UOH & MGIT, Hyderabad
- Dr V V Kutumbarao, DMRL, Hyderabad
- Dr Partha Ghosal, DMRL, Hyderabad
- Dr N Eswara Prasad, Director, RCMA (Mat), Hyderabad
- *From Department of Metallurgical Engg., IIT - BHU, Varanasi:*
  1. Dr Vakil Singh
  2. Dr A K Ghose
  3. Dr S N Ojha
  4. Dr T R Mankhand
  5. Dr GVS Sastry
  6. Dr R K Mandal
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  18. Mr Gangeswar Singh
- *From Department of Metallurgical and Materials Engg, MGIT, Hyderabad:*
  1. Dr J Viplava Kumar
  2. Dr P V S Lakshminarayana
  3. Technical Association
- Swarna Bharathi Institute of Science & Technology, Khammam
- Dr Baldev Raj, Coimbatore (formerly Director, IGCAR, Kalpakkam)
- Dr Pradip, Chief Scientist & Head, PEIL, TRDDC, Pune
- Dr L K Singhal, Jindal Stainless Ltd., Hisar, Haryana
- Dr Shrikant Lele, Pune (formerly Director, IT-BHU)

- Mr A Kailasam, formerly DMRL, Hyderabad
- Dr V Chandrasekharan, ARCI, Hyderabad
- Dr R Gopalan, ARCI, Chennai
- Dr B S Murty, IIT Madras, Chennai
- Dr V S Raja, IIT Bombay, Mumbai
- Dr P P Sinha, VSSC, Trivandrum
- Dr K M Chowdary, Hyderabad
- Dr K G Satyanarayana, Bangalore
- Dr M K S Cherukuru, Pune
- Dr O Prabhakar, Chennai
- Mr Amitabh Deva, Managing Director, Deva Metal Powdes Pvt Ltd., Varanasi
- Dr K Siva Prasad, NIT, Tiruchirapalli
- Dr S K Sahoo, NIT, Rourkela

### Seminars and Workshops

- International Winter School AAMT-2010, MGIT, Hyderabad
- Five-day School SETRA 2012, ARCI, Hyderabad
- Two-day Conference EPCF 2012, UoH, Hyderabad
- Three-day Workshop FFLE-2014, DMRL and RCMA, Hyderabad.
- Thermal Spray Engineering School

### Corporates

- GAIL Training Institute, Mumbai
- GM Global R&D - India Science Lab, GMTCI, Bangalore
- Godrej & Boyce, Mumbai
- Mahindra & Mahindra, Mumbai
- Mazagon Dock Limited, Mumbai
- SEW Foundation, Hyderabad
- **Sir Dorabji Tata Trust, Mumbai**
- **TATA Steel Limited, Jamshedpur**
- Vasu Chemicals, Mumbai

### From outside India

1. Dr Alok Singh, NIMS, Japan
2. Dr P M Ajayan, Rice University, Houston, TX, USA
3. Dr S Ranganath, Chula Vista, CA, USA
4. Dr C Suryanarayana, University of Central Florida, Orlando, USA
5. Dr Rao Tummala, Georgia Tech, Atlanta, USA (**in foreign currency**)

## TRAERF Board

- **Dr P Rama Rao**, recipient of “**Padma Vibhushan**” awarded by the Govt of India, is the *President* of the Foundation. He held several top posts such as Chairman of Atomic Energy Regulatory Board (AERB), Mumbai, Secretary to the Govt of India in the Dept of Science and Technology (DST), and Dept of Ocean Development (DOD), New Delhi, Vice Chancellor, Central University of Hyderabad (UoH) and Director, Defence Metallurgical Research Laboratory (DMRL), Hyderabad. He served as the President of several professional bodies in science and engineering in the country. He is presently the Chairman of the Board of Governors of the Advanced Research Centre International (ARCI), Hyderabad, Chairman of the Councils of Jawaharlal Nehru Centre for Advanced Scientific Research and Indian Institute of Science, Bangalore. He is a member of the Atomic Energy Commission, Govt of India and is a Fellow of several reputed national and international societies and bodies – FNAE, FNA, FASc., FNAsc., Foreign Associate of NAE(US), FREngg(UK) and FTWAS.
- **Dr S Ranganathan**, Distinguished Fellow & NASI Platinum Jubilee Senior Scientist, is associated with the Dept of Materials Engg, Indian Institute of Science & National Institute of Advanced Studies, Bangalore. He has made internationally acclaimed contributions in the fields of Field Ion Microscopy, nanostructured materials, quasicrystals and bulk metallic glasses which have won him several awards. He held the posts Chairman of the Mechanical Sciences Division of Indian Institute of Science, and President of the Indian Institute of Metals, Kolkata. He is a Fellow of IASc, INSA, INAE and TWAS.
- **Dr G Sundararajan**, Director, International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad since 1997 was previously at DMRL during 1982-97. He has made notable contributions in the areas of tribological behaviour of several materials. As Director At ARCI, he has made wide ranging contributions to the development, demonstration and commercialization of materials-based technologies. Winner of several awards, he is a Fellow of IASc, INSA, INAE & ASM.
- **Dr G Malakondaiah**, *Treasurer of TRAERF*, is a reputed researcher with many original contributions to his credit. He has held the posts of Director of the Defence Metallurgical Research Laboratory, Hyderabad, and the Chief Controller of R&D for Materials at DRDO HQs., New Delhi. He is a Fellow of INAE.
- **Dr K Chattopadhyay** is an outstanding researcher of international repute. He was formerly the Chairman of the Department of Materials Engineering and Chairman of the Mechanical Sciences Division at the Indian Institute of Science, Bangalore. He is intimately connected with some of the space research programmes. He has won several awards. He is a Fellow of IASc, INSA and INAE.
- **Dr K Bhanu Sankara Rao**, Steel Chair Professor at Mahatma Gandhi Institute of Technology, Hyderabad was associated with IGCAR, Kalpakkam for 32 years, where he provided excellent R&D support in metallurgy for the development of Fast Breeder Reactor Technologies in India. Winner of several awards, he has been editor of International Materials Reviews (1995-2008), Energy Materials (since 2004) and Chief Editor of Transactions of The Indian Institute of Metals (since 2004). He is a Fellow of ASM, INAE, IASc and IIM.
- **Dr V V Kutumbarao**, *Secretary of TRAERF*, has been associated with engineering education and research for over four decades as Head of the Dept of Met. Engg, BHU, as Director of the Jawaharlal Nehru Aluminium RD&D Centre, Nagpur and as Pro-Vice Chancellor of Gitam University, Visakhapatnam. He has gained recognition for his contributions to the study of high temperature mechanical behaviour of materials and as an able academic and research administrator. He is a Fellow of INAE, IIM and IE(I).

# Professor T. R. Anantharaman

## (1927 - 2009)



The “TRA”  
known to most  
of his students  
and friends

*Professor Tanjore Ramachandra Anantharaman was born in Tamil Nadu, India, on November 25, 1927. He obtained his B.Sc. (Hons.) degree in Chemistry from Madras University in 1947, D.I.I.Sc. in Metallurgy from the Indian Institute of Science, Bangalore in 1950 and M.Sc. in Metallurgical Chemistry from Madras University in 1951. He received the D.Phil. (Oxon) degree in 1954 and was later awarded the D.Sc. (Oxon) degree in 1990 in recognition of his outstanding research contributions to many areas of Metallurgy and Materials Science. Professor Anantharaman held many prestigious positions in his professional career spanning nearly six decades. He was also a Visiting Scientist/Visiting Professor in Germany, UK, USA and Belgium, and participated in several international conferences in USA, Japan, France, Switzerland, Russia, China and the Czech Republic. Professor Anantharaman is arguably the best known metallurgist of India. His contributions to metallurgical education and research have been most significant, prolific and unparalleled. In recognition of his outstanding contributions to the Science of Metals, Professor Anantharaman has received numerous national and international awards.*