

Kalpakkam & Chennai Chapters of
The Indian Institute of Metals
cordially invite you to



The Indian Institute of Metals
Metallurgy Materials Engineering



05.10.1940 - 31.08.2008

Dr. Placid Rodriguez Memorial Lecture - 2025

by

Dr. RAGHVENDRA TEWARI

Distinguished Scientist & Director, Materials Group

Head, Materials Science Division

Bhabha Atomic Research Centre, Mumbai

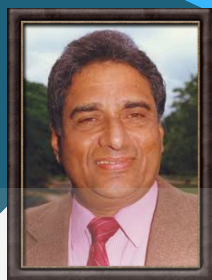
Senior Professor, Homi Bhabha National Institute, Mumbai

Changing Role of Materials for Advanced Nuclear Reactors in India

11:00 HRS | MONDAY 06 OCTOBER 2025
SARABHAI AUDITORIUM | GOOGLE MEET

DR. PLACID RODRIGUEZ MEMORIAL LECTURE - 2025

Organised by Kalpakkam & Chennai Chapters of
The Indian Institute of Metals



About PRML

To perpetuate the strong scientific spirit and the value system which Dr. Placid Rodriguez practiced during his life time, “Dr. Placid Rodriguez Memorial Lecture” was instituted by The Indian Institute of Metals (IIM), in 2009, under the pioneering leadership of [Late] Dr. Baldev Raj, then Director, IGCAR, Kalpakkam and former President, IIM. Since then, this event is being organised annually by the Kalpakkam and Chennai chapters of The IIM.

Dr. Placid Rodriguez, born in Quilon, Kerala on October 5, 1940, obtained his B.Sc. from Kerala University, B.E.(Metallurgy) from the Indian Institute of Science, Bangalore, M.S. from University of Tennessee, USA, Ph.D. from IISc and MBA from IGNOU. He joined the Department of Atomic Energy in 1960 and moved to The Indira Gandhi Centre for Atomic Research, (then known as Reactor Research Centre) in 1974. He established one of the leading metallurgical research laboratory at Kalpakkam. He was Director of IGCAR, Kalpakkam from 1992 to 2000. Subsequently he served as the Chairman, Recruitment and Assessment Centre, DRDO, Delhi and Raja Ramanna Fellow and AICTE-INAE Distinguished Visiting Professor at IIT, Madras.

Dr. Placid Rodriguez had an exemplary career of four decades, leading research in metallurgy, materials development for fast reactor programme of our country, shaping up human resources in defence programme and academic institutions. Dr. Placid Rodriguez has been a member of Editorial Board of several reputed international journals in Metallurgy and Materials Science and was the Chief Editor of Transactions of The Indian Institute of Metals. Dr. Placid Rodriguez served as the President of many leading national, professional institutes. Dr. Placid Rodriguez has been a recipient of many national and international awards. He has been a Fellow of many prestigious Academies of our country.

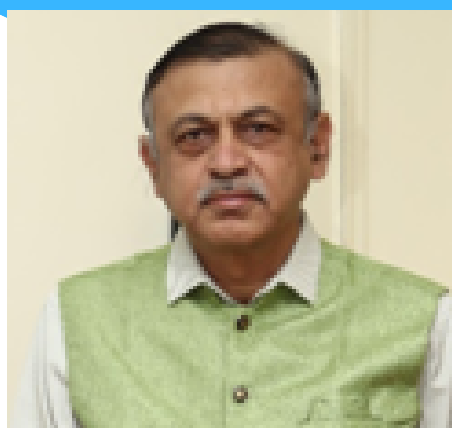
Dr. Placid Rodriguez passed away in Chennai on 31st August, 2008.

Previous Placid Rodriguez Memorial Lectures have been delivered by

- **Prof. Atul Chokshi**, Indian Institute of Science, Bangalore (2009)
- **Prof. Seeram Ramakrishna**, National University of Singapore (2010)
- **Dr. Srikanth**, Director, NML, Jamshedpur. (2011)
- **Prof. B.S. Murty**, IIT Madras, Chennai (2012)
- **Prof. Indranil Manna**, Director, IIT Kanpur (2013)
- **Dr. Amol A. Gokhale**, Director, DMRL Hyderabad (2014)
- **Dr. G. K. Dey**, Associate Director, Materials Group, BARC, Mumbai (2015)
- **Dr. A.K. Bhaduri**, Director, IGCAR, Kalpakkam (2016)
- **Dr. U. Kamachi Mudali**, Chairman & Chief Executive, HWB, Mumbai (2017)
- **Dr. Samir V. Kamat**, Director General, (Naval Systems) DRDO (2018)
- **Shri. S. Somnath**, Director, VSSC, ISRO, Trivandrum (2019)
- **Dr. Surya R. Kalidindi**, Georgia Institute of Technology, Atlanta, USA (2020)
- **Dr. B. Venkatraman**, Director, IGCAR Kalpakkam (2021)
- **Dr. Debashish Bhattacharjee**, TATA Steel (2022)
- **Dr. Komal Kapoor**, Chairman & Chief Executive, NFC, Hyderabad (2023)
- **Dr. S.K.Jha**, Chairman & Managing Director, MIDHANI, Hyderabad (2024)

DR. PLACID RODRIGUEZ MEMORIAL LECTURE - 2025

Curriculum Vitae



Dr. Raghvendra Tewari

Distinguished Scientist & Director, Materials Group

Head, Materials Science Division

Bhabha Atomic Research Centre, Mumbai

Senior Professor, Homi Bhabha National Institute, Mumbai

• **Field of specialization:**

Physical Metallurgy, Refractory metal alloys, Transmission electron microscopy, Materials For nuclear reactors, Alloy Designing

- **Structural materials for generation four (Gen-IV) reactors, MSBR (molten salt breeder reactor), CHTR (compact high temperature reactor) have been developed by him.**
- **For fusion reactors, he has developed of Pb-Li based eutectic alloy as a coolant material. India is the one of the countries which makes this alloy**
- **Instrumental in developing first indigenous scanning electron microscope for the country and installation and usage of first probe corrected microscope in India.**
- **Current president of Electron Microscope society of India.**

National/International Awards, Prizes, Certificates, Fellowships (Name, year, Agency)

- **Rolls Royce Research fellowship (2003-2004) University of Cincinnati, US**
- **SRC Fellowship (2011) From DAE**
- **Fellowship of Electron Microscope Society (2014) from EMSI**
- **G D Birla Gold Medal IIM (2023)**
- **Fellowship of Indian Academy of Engineers (2024)**

Publications: ~400 technical papers in peer reviewed Journals; 8 book chapters; 4 patents

Changing Role of Materials for Advanced Nuclear Reactors in India

Dr. Raghvendra Tewari

Distinguished Scientist & Director, Materials Group

Head, Materials Science Division, Bhabha Atomic Research Centre, Mumbai

Senior Professor, Homi Bhabha National Institute, Mumbai

Abstract

With India's annual growth rate at nearly 7%, strategizing energy supply becomes crucial to sustaining the momentum. The Government of India's commitment of achieving net-zero carbon emissions by 2070 adds further urgency to this challenge. Rising energy demand, coupled with growing dependence on nuclear power, calls for smaller, more efficient, and intrinsically safe reactors. The road map of generating 100 GW energy through the nuclear route is an ambitious target. To achieve this target multi-thronged approach is needed. In addition, a new program, called Generation-IV reactor, has also been initiated. The aim of this program is to broaden the opportunity of nuclear energy utilization by including non-aqueous coolants in nuclear energy systems design. The program of Gen-IV reactors calls for new nuclear energy systems which will significantly improve safety and reliability, sustainability, extended reactor life (60 years or more), proliferation-resistance, to name a few.

Achieving these objectives places unprecedented demands on structural materials. A new set of materials which can sustain higher temperatures, higher neutron doses, and extremely corrosive or oxidative environments need to be developed. While common temperature ranges may suggest a common solution for all reactors, variations in neutron energy spectra and coolant chemistries across Gen-IV reactors necessitates tailored materials for each type of reactors. Modifications of existing alloys and the design of new classes of advanced materials are both essential to meet these stringent requirements.

As India moves beyond the framework of Bhabha's three-stage nuclear programme, a holistic materials development strategy is required; encompassing the entire chain from ore extraction to nuclear waste disposal. This approach demands secure access to diverse mineral resources and development of economically viable and ecological-friendly extraction technologies. Elements such as rare earths and lithium, once considered exotic, are now strategic commodities. However, growing environmental constraints rule out conventional mining practices, necessitating the adoption of innovative extraction, processing, and fabrication methods to accelerate commercialization. In addition, a different strategy for the processing and fabrications of metals or alloys has to be adopted for quick commercialization of new technologies. Present talk discusses all these issues and also throws light about the new technologies being developed in BARC addressing aforementioned issues.

DR. PLACID RODRIGUEZ MEMORIAL LECTURE - 2025

PROGRAMME

DATE	06 October 2025 (Monday)
VENUE	Sarabhai Auditorium, IGCAR, Kalpakkam
TIME	11:00 hrs
GOOGLE MEET	<u>Click Here</u>

Welcome Address

Dr. M. Vasudevan

Associate Director
Materials Development & Technology Group
MMG, IGCAR, Kalpakkam

About Dr. Placid Rodriguez Memorial Lecture Series

Prof. M. Kamaraj

HAG, E.G. Ramachandran Institute Chair
Dept. of Metallurgical & Materials Engg.,
IIT Madras

Chief Guest Address

Shri. C.G. Karhadkar

Distinguished Scientist & Director
IGCAR, Kalpakkam

Introducing PRML Speaker

Dr. V. Karthik

Chairman, IIM Kalpakkam
Head, HMTD & PIED, MMG, IGCAR

Dr. Placid Rodriguez
Memorial Lecture 2025

Dr. Raghvendra Tewari

Distinguished Scientist
Director, Materials Group
BARC, Mumbai

**Changing Role of Materials for Advanced
Nuclear Reactors in India**

Vote of Thanks

Dr. Diptimayee Samantaray

Secretary, IIM Kalpakkam Chapter
Head, HMTS, HMTD, IGCAR

High Tea at 10:30 h in HBB Foyer

• **PRML Committee**