

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



05.10.1940 - 31.08.2008

Dr. Placid Rodriguez Memorial Lecture - 2024

by

Dr. S. K. Jha

Chairman & Managing Director

Mishra Dhatu Nigam Limited (MIDHANI), Hyderabad

**Creation of Centre of Excellence in
Metallurgy and Material Science**

22nd October 2024 | 15:00 hrs |

Seminar Room, Second Floor, Krishna Chivukula Block (KCB222)

Dept. of Metallurgical & Materials Engg.,

IIT Madras, Chennai

PRML 2024

Dr. Placid Rodriguez Memorial Lecture - 2024



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



IIM
The Indian Institute of Metals
Metallurgy Materials Engineering

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, NIAS, Bangalore 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, NFC, Hyderabad (2023)

Curriculum Vitae



Dr. S. K. Jha

Chairman & Managing Director

Mishra Dhatu Nigam Limited (MIDHANI), Hyderabad



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Dr. Sanjay Kumar Jha graduated from NIT Jamshedpur in the year 1987 and has completed his PhD in engineering sciences from Homi Bhabha National Institute (HBNI), BARC. He started his career with Department of Atomic Energy (DAE) after completing one-year training in Nuclear science and engineering from prestigious training school of Bhabha Atomic Research Center (BARC), Bombay. He has served for more than 27 years & involved in technology development for processing of nuclear materials for India's Nuclear Power program and strategic materials used in Missile, Space and Defense projects.

Dr. Jha has taken over as Chairman and Managing Director of Mishra Dhatu Nigam Limited (MIDHANI), on 01 May 2020, earlier he was Director (Production & Marketing) of MIDHANI from 05 July 2016. He is Director & CEO of Utkarsha Aluminium Dhatu Nigam Limited.

Dr S. K. Jha is Board Member of Nuclear Fuel Complex (NFC), Dept of Atomic Energy, Director, Indian Iron & Steel Sector Skill Council and Member, Technical Evaluation Group, SRTMI, Ministry of Steel and Member, CSIR - IMMT, Institute of Minerals and Materials Technology.

He is a Life member of Indian institute of Metals, Indian Nuclear Society, ISNT and aeronautical Society of India. He is also President Magnetic Society of India and Chairman for Indian Institute of Metals, Hyderabad Chapter. He has international exposure through business relationship with Organisations across the globe.

He is recipient of many awards and accolades. The most notable amongst them being, IIM Tata Gold Medal for his outstanding contribution in the field of Metallurgical Science in India for the year 2020 and award for Excellence in Science technology for the year 2006 from Department of Atomic Energy (DAE).

He has co-authored report on materials for fast breeder reactor for IAEA (Vienna). He has also published more than 35 articles in National/international journals.



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Dr. S. K. Jha

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Abstract

In the ever-evolving landscape of global scenario, it is essential for India to have growth in defense, aerospace, space and energy security. The advanced alloys/ materials play a pivotal role for the progress of critical sectors such as energy, nuclear, Défense, space, and aerospace. Materials used in these sectors have to perform under severe conditions it requires exceptional mechanical properties, high corrosion resistance, better thermal stability, resistance against cyclic loading, stable metallurgical properties, fracture toughness to withstand varieties of stress developed in during service etc. The ongoing thrust for indigenization of materials in India for different national programs in strategic sectors such as nuclear, defense, space and aerospace,

MIDHANI has made significant contribution in development and supply of custom-made advanced alloys in collaboration with organisations working in R&D and academic institutions. Nuclear, defense, space and aerospace programs require number of Iron based superalloys, Nickel based Superalloys, Cobalt-based speralloys, Titanium Alloys and Special Steels produced with well-defined melting technology and manufactured using robust thermomechanical processing. Optimised processing techniques are crucial for the performance alloys of used in many systems and subsystem related to many applications such as gas turbines of aeroengines, space launch vehicles, Nuclear power reactors, advanced missiles, submarines and various other strategic equipments.

Requirement of Nickel based superalloys and Cobalt based superalloys in aerospace applications especially in development of aeroengines and similar type of high temperature gas turbines led to development of various grades of alloys in MIDHANI. These alloys have been also used in development of various types of equipments used in space launch vehicles and recently alloys used for Gaganyan mission of ISRO.

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Applications of Superalloys in energy sectors has been identified and technology has been developed to produce alloys for high temperature gas turbine and boilers for Advanced Ultra Super critical Thermal Power plants to be established in India for the first time. In recent past it has been decided to establish High Temperature Gas cooled Nuclear power reactor and Molten Salt Breeder reactor for generating hydrogen, which requires varieties of Superalloys having unique chemistry. In the space sector, lightweight materials like Titanium alloys, Aluminum-Lithium alloys, composite materials etc are essential for reducing the mass of spacecraft, thereby improving fuel efficiency and payload capacity. Titanium alloys are also critical due to their exceptional strength-to-weight ratio and resistance to extreme environmental conditions encountered during launch and re-entry. Moreover, heat-resistant superalloys are vital for propulsion systems and thermal protection systems.

Dr. Placid Rodriguez was eminent metallurgist and exceptional leader. He made strong foundation of mechanical metallurgy and many other laboratories in Indira Gandhi Centre for Atomic Research, Kalpakkam a world class research laboratories for metallurgical research. He was the Director of IGCAR, Kalpakkam from December 1992 till October 2000. Dr. Rodriguez was internationally well-known for his R&D contributions in the areas of Mechanical Metallurgy, Welding Metallurgy and Nuclear Materials. He has guided and nurtured several young colleagues in the multidisciplinary fields of Science and Engineering for the advancement of fast breeder reactor technology in India. MIDHANI has worked with team of scientist from IGCAR in development of many alloys for India's fast breeder nuclear reactor program.

In this presentation, role of MIDHANI in development of various grades of materials used in space, defense, aerospace, Nuclear and various strategic programs have been explained. MIDHANI's journey in last 50 years has been challenging, and its commitment towards national objective, more than 500 alloys of different grades have been developed. Many alloys have been developed and supplied for aeroengines, space launch vehicles, missiles, nuclear energy and also export to aerospace companies.

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22 October, 2024 (Tuesday)

Seminar Room, 2nd Floor, Krishna Chivukula Block (KCB 222)

Dept. of Metallurgical & Materials Engg., IIT Madras

Event Schedule

Welcome Address

Prof. Subramanya Sarma

Head, Dept. of Metallurgical & Materials Engg.,
IIT Madras, Chennai

About PRML Series

Prof. M. Kamaraj

Professor, HAG, E.G. Ramachandran Institute Chair
Chairman, PRML Committee

Presidential Address

Prof. Prathap Haridoss

Dean, Academic Courses
IIT Madras, Chennai

Introducing PRML Speaker

Dr. Satyesh Kumar Yadav

Associate Prof., Dept. of Metallurgical & Materials Engg.,
IIT Madras, Chennai
Chairman, IIM Chennai Chapter

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Vote of Thanks

Dr. V. Karthik

Metallurgy and Materials Group, IGCAR
Chairman, IIM Kalpakkam Chapter

Kindly join for High Tea after the event

-PRML

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