

17th ATMA RAM MEMORIAL LECTURE

By

Shri. T V Narendran, Global CEO and Managing Director, Tata Steel Limited

The title of the presentation: Innovation in Materials Industry- A National Prerogative

Shri Narendran started his lecture by giving his tribute to the great visionary of the country 'Dr. Atma Ram' and his contribution on the foundation of CSIR-CGCRI.

The Lecture covered mainly four topics:-

1. **Challenges and opportunities in steel** - CO₂ capture and utilization
2. **Challenges and opportunities in non-steel materials** - Graphene and Composites
3. **Opportunities in Strategic materials** - Solar PVs, Batteries, Recycling of Rare earth metals
4. **Building robust collaborative Eco-systems** - CSIR as nodal drive to lead the Indian Model

1. CO₂ capture and utilization:

India being one of the few countries with huge Iron ores and the National Steel policy to produce 300 mT by 2030, steel industry is an important sector to capture market and for economic growth. However, the problems associated with steel production are mainly the capture of emitted CO₂ and its effective utilization.

The opportunities for green steel production are:-

- Recycling of steel using green energy
- Utilization of CO₂ by fixing in organic/inorganic compounds with scalable technologies
- Green energies at low cost for steel production- Fundamental R&D → Scale-up to commercialization
 - Hydrogen as substitute for coal – ways of H₂ production, storage & Transportation
 - Gas based direct reduction of iron ore
 - Electric Arc furnace for steel making

Tata steel and CSIR have signed an MOU to setup joint research activities on CO₂ capture and utilization.

2. Non-steel materials:

Mega trends driving new materials- Light weight, advanced functionality, Durability, Increasing and ageing population.

- Choice of the material based on possibility for India based global leadership
 - Filters: Large global market, high growth, profitability and low Chinese dominance
 - Material with billions dollars of business : Graphene, Composites and Ceramics

He briefed how Tata steel outsourced the manufacturing for the production of 6 atomic layers of graphene for varieties of applications. He also urged the opportunities in the production of graphene and its innovative utilization in advanced areas.

Composites- a durable structural material with scope for India based global growth.

- Global market - \$95 bn
- Indian market - \$4-5 bn (growing market)

Tata steel has these available in the market:-

Glass fiber polymer composites - Infrastructure, Railways, Industrial

Opportunities – New technologies for volume production and recycling of composites

He pointed out the potential for the big market of ceramics and Tata steel are yet to start the business and is in communications with CSIR-CGCRI on this matter.

3. Strategic Materials:

This aspect was not so much on the Tata steel point of view but more from country's point of view

- India missed the opportunities – PVs (80% is imported) → How to indigenise the market?
- Imported energy sources → moving towards renewable → battery economy
 - Materials imported – Li, Ni, Co, Needle coke

Opportunities for innovation:-

- Self-sustaining on the source materials locally
 - Recycling and Urban mining.
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- Rare earths – huge demand in electrical vehicles

Opportunities: Conversion of Rare earth oxide to pure metals and recycling of REEs.

4. Building Robust Ecosystems:

Policy frame work needed to build robust ecosystems

- Promote market for advanced materials
- Ensure focus through theme-based public funding
- Encourage through- TRL funding covering industry, academia, research labs and MSME
- Funding at academic level- large number small amount
- Encourage building strong pipeline of scientist and engineers in focused fields
- Funding for new technology implementation at industry- small number, large amount
- Conscious of valley of deaths. Ensure continuity of team in focused themes.

The Triple Helix: - Government- Industry- Academia

Could CSIR be instrumental in driving the triple helix?

