संवादपत्र
Newsletter

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From **Mine Waste** to **Sustainable Infrastructure**

Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC)

Autonomous Body Under Ministry of Mines, Government of India

Welcoming Our New Secretary, Ministry of Mines

Shri Keshav Chandra, IAS, assumed charge as Secretary, Ministry of Mines, Government of India, on 27 July 2026. An accomplished administrator, he has held several key positions, including Chairperson, New Delhi Municipal Council (NDMC) and Director, Serious Fraud Investigation Office (SFIO).

As Chairman of the Governing Body of JNARDDC, his rich experience and leadership are expected to provide valuable direction in advancing innovation, research and technological excellence in the non-ferrous sector.

Dr. Rohit Kumar Gupta, Director, JNARDDC, warmly welcomed Shri Keshav Chandra and conveyed JNARDDC's commitment to supporting the Ministry's vision and strengthening the Centre's contributions to the nation's minerals and metals sector.



Dr. Rohit Kumar Gupta Welcoming Shri Keshav Chandra

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निदेशक का प्रतिवेदन

DIRECTOR'S MESSAGE

It is a privilege and honour to assume charge as Director of the JNARDDC. With strong capabilities in research, technology development and industrial collaboration, JNARDDC contributes to aluminium and non-ferrous metals, critical minerals, recycling, waste valorisation and the circular economy.

With my more than 26 years of experience in metallurgy, materials development, processing, characterisation, additive manufacturing, failure analysis and administration, I look forward to supporting JNARDDC's continued growth. At ISRO's Vikram Sarabhai Space Centre and Liquid Propulsion Systems Centre, I led the indigenous development and qualification of advanced materials for aerospace applications. These included materials for motor cases, propellant tanks, structures, liquid and cryogenic engines, and semi-cryogenic engines for PSLV, GSLV, LVM3, SSLV, Mangalyaan, Chandrayaan and Gaganyaan.

Acknowledging the earlier Directors / Researchers, I look forward to strengthening collaboration among scientists, academia, industry, startups, MSMEs and other stakeholders to translate R&D into deployable technologies. With the dedication of the JNARDDC team and the support of the Ministry of Mines and our partners, I am confident that the Centre will achieve new heights in scientific excellence, innovation and national service.

Together, we shall contribute to an Aatmanirbhar, sustainable and Viksit Bharat.

Dr. Rohit Kumar Gupta
Director, JNARDDC

अर्द्धवार्षिक
July, 2026



JNARDDC: Milestones and Achievements

Our Vision

To be renowned nationally and globally as primary research hub for processing of all aluminium products, exploration of critical minerals and metal recycling.

Our Mission

To undertake innovative research projects for providing technological solutions for sustainability of aluminium industry, exploration of critical minerals, recycling of industrial scrap and providing technical solutions in testing and advanced characterization of minerals.

173 Projects Completed

20 Ongoing Projects

21 Patents Granted

02 Copyrights Secured

14 Technologies / Knowhow Commercialized

JNARDDC ranked among India's Top 5 Innovative R&D Institutions (2025) by CII, New Delhi.

Key role in the technological characterisation and assessment of bauxite for major greenfield and brownfield alumina refinery projects of NALCO, Vedanta, ANRAK, Ashapura and JSW.

Aluminium-sector technical expert and implementing agency for various Government initiatives:

- **NITI Aayog: REE recovery from red mud/fly ash** and **resource efficiency in aluminium.**
- **BIS: Al-scrap guidelines** and **aluminium alloy standards.**
- **Ministry of Mines:**
  - **Recycling Promotion under the National Non-Ferrous Metal Scrap Recycling Framework, 2020.**
  - **Implementing Agency for S&T (Mines)–PRISM for startups/MSMEs.**
  - **PMA for the ₹1,500 crore Incentive Scheme for Promotion of Critical Mineral Recycling.**
  - **PMA for the Pilot Projects Scheme for Recovery of Critical Minerals from overburden, tailings, fly ash, red mud, etc.**
- **Ministry of Coal/Power: Third-party Referee Laboratory** for coal sample analysis.
- **State of Art Analytical Lab** with ISO/IEC 17025:2017 & ISO 17034:2016 NABL accreditation for characterization of soil, bauxite, limestone, graphite, pulp, iron ore, manganese ores, rare earth elements, PGE/Gold, critical minerals analyses of Ore , tailing, dumps, wastes etc.

Cover Story

Transforming Coal Mine Overburden into Value-Added Resources: JNARDDC's Collaborative R&D Initiative to Support Sustainable Mining and Building & Construction Sectors.

As part of the project "Recycling Coal Mine Overburden to Reuse as a Value-Added Building Material to Promote a Circular Economy" (Project Code: EE-53), a full-scale demonstration model has been successfully constructed at the premises of Central Mine Planning & Design Institute Limited (CMPDI), Ranchi. The demonstration structure represents a significant milestone towards the practical implementation of sustainable technologies for the utilization of CMO in building and construction applications. The project is sponsored by CMPDI, Ministry of Coal, Government of India and is being jointly executed by Birla Institute of Technology (BIT), Mesra, Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC), Nagpur, Visvesvaraya National Institute of Technology (VNIT), Nagpur and CMPDI, Ranchi. The collaborative programme aims to transform CMO into highvalue construction materials, thereby promoting sustainable mining practices and the principles of a circular economy. Coal mining operations generate enormous quantities of overburden comprising shale, sandstone, clay and weathered rocks, which are generally disposed of in large dumps. These waste dumps occupy valuable land, increase environmental liabilities and pose long-term challenges in mine reclamation. The present project addresses this issue by developing indigenous technologies for converting coal mine overburden into geopolymer based load bearing structural elements and cement based non-structural materials viz. zero cement M20-M30 grade concrete and columns, bricks, blocks, paver blocks and tiles. At JNARDDC, extensive research has been undertaken on the characterization, processing and utilization of CMO for the development of sustainable construction materials. The work focuses on maximizing the use of mine waste in combination with industrial by-products such as fly ash and slag to produce durable, environment friendly building materials with minimal consumption of natural resources. The project aims to develop low-carbon, cost-effective construction materials suitable for affordable housing, mine rehabilitation and infrastructure applications. Laboratory studies included optimization of mix designs, geopolymer formulation and evaluation of key engineering properties such as compressive strength, water absorption, efflorescence, durability and environmental performance to establish commercially viable technologies. The demonstration model constructed at CMPDI, Ranchi, validates the practical application of CMO based building materials under field conditions. The successful implementation demonstrates the technical feasibility of converting mining waste into value-added construction products, paving the way for large-scale adoption. The project supports the Government of India's vision of Sustainable Mining, Waste-to-Wealth, Circular Economy, PMAY and Aatmanirbhar Bharat by promoting resource efficiency, reducing overburden disposal and transforming mining waste into valuable infrastructure materials through scientific innovation and institutional collaboration.



The demonstration model constructed at CMPDI

Key R&D and Analytical Facilities


Multi Gravity Separator


Petrological polarising microscope


Autoclave


Centrifuge


Rheometre


TOC analyzer


Calorimeter


Surface and Porosity Analyzer


Single Disc Magnetic Separator


AFT Analyser


CHN Analyser


High Performance Microwave Digestion System


Direct Mercury Analysis


ICP-OES


ICP-MS


GF-AAS


UTM


Sample preparation lab


Vickers Hardness tester



Rockwell hardness tester


XRF



vibratory Cup Mill



Sulphur analyser


Hydrocyclone


Impact mill

Key R&D and Analytical Facilities (Contd...)



SEM with EDS & EBSD



Metallurgical Microscope



Gas Pycnometer



Thermal conductivity meter



Induction melting furnace



Extrusion Press of 14 MN Capacity



Spark-OES



Erichsen Cupping Tester



Flame photometer



Anodisation setup



Spectrophotometer



Carbon-Sulphur Analyser



Bomb Calorimeter



XRD



Bead machine



DSC-TGA



Planetary Ball mill



Pellet making machines





TCLP

Completed Projects

S-49: An Optimal Approach for the Retrieval of Value-Added Substances from Secondary Aluminium Black Dross

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborators: Sri Ramakrishna Engineering College (SREC), Coimbatore; Phoenix Alloys

PI: Mr. Kola Immanuel Raju

Co-PI: Dr. V N S U V Ammu, R Anil Kumar

Team: R N Chouhan, Dr Anas N S, S Mukherjee

This project successfully developed a hybrid pyro-hydrometallurgical process for the recovery of value-added products from secondary aluminium black dross. The developed process enables efficient extraction of alumina and other useful constituents, which can subsequently be converted into industrial flux materials. The technology offers an environmentally sustainable solution for the utilisation of aluminium black dross while promoting resource recovery and circular economy practices. Based on the encouraging laboratory-scale results, the technology is proposed for pilot-scale validation and further process optimisation.





S-53: Recovery of Nickel from Secondary Steel Industry Waste

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborator: Hydromet Research and Recovery LLP

Principal Investigator: Mrs. Jyoti Pendam

Co-PI: Dr Upendra Singh

Team: Dr Priyanka Nayar, Dr Mohamed Najar, Dr P Mondi, Sreedevi T E

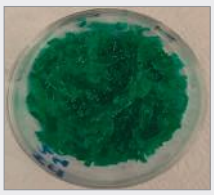
JNARDDC has developed a sustainable hydrometallurgical process for producing high-purity nickel sulphate hexahydrate from Electric Arc Furnace (EAF) cyclone dust generated during stainless steel production. The optimised process integrates atmospheric leaching, selective iron removal, solvent extraction and antisolvent crystallisation to achieve over 80% overall nickel recovery and produce nickel sulphate crystals with >99% purity suitable for battery applications. The technology demonstrates an effective waste-to-resource approach by converting industrial waste into a value-added battery material, promoting resource efficiency, reducing environmental burden and supporting the circular economy and India's *Atmanirbhar Bharat* initiative.



EAF Dust



Leaching Reactor Unit



($NiSO_4 \cdot 6H_2O$)



P-67: Coal Mine Overburden Alkali-Activated Composites (CMOAAC) for Pre-Fabricated 3D Volumetric Construction Elements and Systems



Sponsor: Ministry of Coal (MoC), Government of India

Collaborators: Visvesvaraya National Institute of Technology (VNIT), Nagpur; Indian Institute of Technology (IIT-BHU), Varanasi

Principal Investigator: Dr. Mohamed Najar P. A.

Co-PIs: Dr. Paparao Mondi, Dr. P. G. Bhukte, Dr. Upendra Singh

Project Team: Dr. Priyanka Nayar, Mrs. Jyothi Pendam

The project successfully developed a cement-free geopolymer concrete derived from Coal Mine Overburden (CMO) for extrusion-based 3D printing applications. The optimised mix design, comprising 67% CMO and 33% geopolymer binder (binder-to-filler ratio of 1:2), exhibited excellent rheological properties suitable for automated additive manufacturing. The developed material was successfully used to fabricate a range of structural components, including paver blocks, hollow bricks, slabs and prototype column formwork. The printed elements demonstrated excellent dimensional stability, strong interlayer bonding and minimal deformation, confirming their suitability for automated construction processes. The project established an innovative approach for transforming coal mine overburden into high-value construction materials through advanced 3D printing technology, thereby supporting sustainable infrastructure development and circular economy objectives.



Toilet pod and Office Cabin Wall made of 3D Printed Geopolymer made of Coal Mine Overburden

Ongoing Projects

S-51: Extraction of Gallium from Titanium and Iron Ore Industrial Wastes



Sponsor: S&T, Ministry of Mines

Collaborator: CSIR-NIIST, Thiruvananthapuram, Kerala

Industry partner: V V Titanium Pigments Pvt. Ltd., Thoothukudi, Tamil Nadu

Principal Investigator: Dr Upendra Singh

Co-PIs: Jyoti Pendam, Sreedevi T E

Team: Dr Priyanka Nayar

JNARDDC is developing an indigenous, sustainable process for gallium recovery from industrial wastes, including TiO_2 chlorinator waste, ETP sludge and iron ore tailings, with scale-up to a 50–100 litre pilot plant.

Silica-modified boehmite was successfully synthesized and demonstrated efficient gallium adsorption, enriching the gallium concentration from 55.5 ppm to 712 ppm. Separately, solvent extraction studies on the acid leach liquor identified TBP as the most effective extractant, and subsequent stripping followed by Na_2PO_4 precipitation further enriched gallium to ~2000 ppm. In addition, an integrated process involving HCl leaching, solvent extraction, stripping, and selective precipitation was developed for titanium industry chlorinator waste, increasing the gallium concentration from ~80 ppm to ~3000 ppm.

S-52: Sustainable Manufacturing of Automobile Engine Pistons with 100% Recycled Aluminium Alloys with Extended Fe-impurity Tolerance



Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborators: BML Munjal University; Motocast Power Alloys Pvt. Ltd., Rajasthan

Principal Investigator: Mr. Anil Kumar

Co-PI: I Kola Raju, RN Chouhan

Team: Dr. VNSUV Ammu, Arun Kumar, Suman M & Dilip D

The project focuses on developing high-performance automobile engine pistons using 100% recycled aluminium alloys with enhanced tolerance to iron impurities without compromising mechanical properties. Advanced alloy design and optimised processing routes are being developed to manufacture piston prototypes suitable for industrial validation. The technology aims to maximise the utilisation of recycled aluminium, reduce dependence on primary metal, lower manufacturing costs and carbon emissions and promote circular economy practices within the automotive sector. The successful implementation of this project will contribute to sustainable aluminium recycling while supporting indigenous manufacturing of lightweight automotive components.

S-55: Conformal Cooling Strategies for Minimising Peripheral Coarse Grain Growth in High-Strength Aluminium Alloy Extrudates

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborators: Bharat Forge; Yantra India Ltd.

Principal Investigator: Dr. V. N. S. U. Viswanath Ammu

Co-PI: Kola I Raju & RN Chouhan

Team: Dr. Arun Kumar & Dr Anas NS
Anil Kumar & Suman M



This project aims to improve the quality and performance of high-strength aluminium extrusions by minimising peripheral coarse grain (PCG) formation during extrusion. Computational modelling and simulation are being employed to understand thermal behaviour and grain growth mechanisms, followed by the design and fabrication of 3D-printed conformal cooling channels for industrial extrusion dies. The developed technology is expected to improve microstructural uniformity, enhance mechanical properties, reduce product rejection and increase manufacturing productivity. The project will also demonstrate the application of advanced additive manufacturing techniques for next-generation aluminium extrusion technologies.

S-56: Triazine-derived g-C3N4-based Separation of Niobium & Tantalum from the Tin Slag: A Fully Scalable Fluoride-Free Process.

Sponsor: S&T, Ministry of Mines

Collaborator: BHU Varanasi

Industry partner: Lohum, Noida

Principal Investigator: Dr Upendra Singh

Co-PI: Jyoti Pendam

Team: Dr Priyanka Nayar, Sreedevi T E



Two novel fluoride-free processes have been developed for the extraction of niobium (Nb) and tantalum (Ta) from tin slag, achieving leaching efficiencies of >95% for Nb and >90% for Ta. Current research is focused on the purification and separation of Nb and Ta from impurities in the leach liquor using D2EHPA solvent extraction, targeting the removal of iron (Fe), titanium (Ti) and tin (Sn). In parallel, a novel g-C_3N_4-based adsorbent has been developed and successfully demonstrated selective separation of Nb and Ta from Sn using synthetic solutions, with Sn being retained on the adsorbent while Nb and Ta remain in the eluate. The process is now being evaluated using actual leach liquor, with encouraging results. Further optimisation of the adsorption process, integration with solvent extraction and scale-up studies are currently underway.

S-57: Assessment, Mapping, and In-Situ Sampling of Lateritic Bauxite Plateau Deposits through Integrated Hyperspectral Sensor Data and AI-powered Heterogeneous Robotic System



Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborators: Indian Institute of Science (IISc), Bengaluru; National Remote Sensing Centre (NRSC)

Industry Partner: Dyau Robotics Pvt. Ltd. (ARTPARK)

Principal Investigator: Dr. P. G. Bhukte

Co-PI : Dr Bivas Pradhan

Team : M Meena, Vinod K & Amit Palade

This multidisciplinary project integrates artificial intelligence, hyperspectral remote sensing, robotics and geospatial technologies for rapid assessment, mapping and in-situ characterisation of lateritic bauxite deposits. Advanced AI-based predictive models and autonomous robotic systems are being developed to identify prospective mineralised zones and facilitate field validation with greater speed and accuracy. The project is expected to significantly enhance mineral exploration efficiency, improve the accuracy of resource assessment, reduce exploration time and costs and establish an advanced technology platform for future exploration of bauxite and other strategic mineral resources in India.

S-58: Setting up a 1000-liter Bayer Liquor Processing Pilot Plant for Recovery of Gallium in India



Sponsoring Agency: Ministry of Mines

Collaborator: JSC Titanium Institute, Ukraine

Principal Investigator: Dr Upendra Singh

Co-PIs: Jyoti Pandam, Sreedevi TE

Team: Dr Priyanka Nayar, Dr. Ragi T M, K Janbandhu, M Tirpude

Gallium is a strategically important critical mineral with extensive applications in semiconductor devices, advanced electronics, optoelectronics, renewable energy technologies and defence systems. This project aims to establish India's first 1000-litre Bayer liquor processing pilot plant for gallium recovery by adapting internationally proven technology to the operating conditions of Indian alumina refineries. The pilot plant will validate the recovery process using Bayer liquor from domestic alumina refineries and generate the engineering and operational data required for commercial-scale implementation. Successful execution of the project will strengthen India's critical mineral value chain, reduce dependence on imported gallium and support the nation's vision of Aatmanirbhar Bharat in strategic and high-technology materials.

During the reporting period, a technical team from JSC Titanium Institute, Ukraine, visited JNARDDC in February 2026 to review the project progress and inspect the proposed pilot plant site. Based on the recommendations, site preparation activities were completed and procurement of major process equipment was initiated. Locally sourced equipment, including storage tanks, motors, chillers and other auxiliary systems, was delivered to the project site in April 2026. The pilot plant layout and instrumentation plan were finalised and marked at the installation site. In parallel, Tri-Calcium Hydro Aluminate (TCHA) settling studies were carried out to optimise settling characteristics and generate essential design data for sizing and selection of the major process equipment. These activities represent significant progress towards the establishment and commissioning of India's first pilot-scale gallium recovery facility.

S-59: Recovery of Sulphur-Free Nickel from Pharmaceutical Spent Catalyst Sludge to Achieve Zero Waste



Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborators: ABN Metal Recycling Pvt. Ltd.; Visvesvaraya National Institute of Technology (VNIT), Nagpur

Principal Investigator: Ms. Shweta D. Naik

Co-PI : Jyoti Pendam & Sreedevi TE

Team : Mahin Sapkal, Dr. Ms Prachi P & S Yadav

Pharmaceutical spent catalyst sludge is a hazardous industrial waste containing significant quantities of nickel along with sulphur, alumina, and alkali components. Improper disposal of this waste poses serious environmental and economic concerns, while nickel is recognized as a critical metal with high industrial and strategic importance. This study presents an integrated hydrometallurgical process for the recovery of sulphur-free nickel and other valuable products from pharmaceutical spent catalyst sludge through a zero-waste approach.

The process involves controlled roasting of the raw sludge at 600 °C to remove organic matter, oxidize sulphur species, and convert nickel into an acid-leachable form while minimizing the formation of refractory nickel–aluminate spinel phases. The roasted material is subsequently subjected to sulfuric acid leaching at 90 °C, resulting in efficient dissolution of nickel as nickel sulphate with substantial sulphur removal. Under optimized process conditions, a sulphur-free nickel oxide product containing 98.6 wt.% NiO was obtained, while the sulphur content was reduced to below 2 ppm, demonstrating the high effectiveness of the desulfurization process.

The pregnant leach solution generated after filtration was further processed through selective precipitation, crystallization, and electrowinning for complete resource recovery. Nickel sulphate was recovered from the purified leach solution, followed by 99.9% pure metallic nickel through electrowinning. Simultaneously, aluminium hydrate (ATH) with a purity of 98.6% was recovered through selective precipitation, while sodium sulphate (Na_2SO_4) with a purity of 99.8% was obtained by crystallization. The integrated recovery of all valuable constituents effectively eliminates secondary waste generation and maximizes resource utilization.

The developed process demonstrates excellent technical feasibility, environmental sustainability, and economic potential for recovering critical metals from pharmaceutical spent catalyst sludge. By converting hazardous industrial waste into high-value products, including 98.6 wt.% sulphur-free nickel oxide, 99.9% pure nickel metal, 98.6% aluminium hydrate (ATH), and 99.8% sodium sulphate, the proposed process fully aligns with circular economy principles and provides a sustainable pathway toward zero-waste management in the pharmaceutical industry.

S-60: Setting up of One Tonne per Day Pilot Plant for Hydro-Chemical Delamination of Flexible Multi-layer Packaging (MLP) Refuses to Recover Metallic Aluminium and Polymers

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborator: Alumicopper Pvt. Ltd.

Principal Investigator: Dr. Mohamed Najar P. A.

Co-PI : Dr U Singh & Dr Paparao M

Team : Mayur T, Kiran J, & D R Meshram



Flexible multi-layer packaging (MLP) waste poses significant recycling challenges due to the strong bonding between metallic aluminium and polymer layers. Building upon successful laboratory-scale studies, this project aims to establish a 1 TPD hydro-chemical pilot plant for efficient delamination and recovery of metallic aluminium and polymer fractions without thermal degradation. The developed technology will provide an environmentally sustainable solution for difficult-to-recycle packaging waste, reduce landfill disposal, enable recovery of valuable materials and promote circular economy principles through industrial-scale recycling of composite packaging materials.

S-61: Setting up of a 1 TPD Pilot Plant for Recovery of Salt from Waste Aluminium Dross

Sponsoring Agency: S&T, Ministry of Mines

Industry Partner: Alumicopper Private Limited

Principal Investigator: Dr Upendra Singh

Co-PIs: Dr Priyanka Nayar, Jyoti Pendam, Sreedevi TE

Team: Ragi T M, M Tirpude, A S Gijare, Naushin A



This project aims to establish a 1 tonne per day (1 TPD) pilot plant for processing waste aluminium dross through optimised leaching, filtration and evaporation techniques to recover industrial-grade salt and other value-added products. The process is designed to maximise resource recovery while minimising waste generation and environmental impact. The pilot-scale demonstration will validate an economically viable and sustainable technology for aluminium dross utilisation, transforming an industrial waste into commercially useful products and promoting resource efficiency and circular economy practices within the aluminium industry.

During the reporting period, the laboratory-scale process for salt recovery from waste aluminium dross was completed and the process flow sheet was finalised based on the experimental outcomes. The detailed engineering design, technical specifications and process layout for the 1 TPD pilot plant have been completed. Procurement activities have progressed significantly, with the tendering process completed and the purchase of major equipment currently in the final stage. In parallel, the project site has been prepared for pilot plant installation, ensuring readiness for equipment erection and commissioning. These developments represent a major milestone towards the demonstration of an indigenous pilot-scale technology for sustainable aluminium dross recycling

S-62: Recovery of Potash from Granitic Gneiss (Rock Dust)



Sponsoring Agency: S&T, Ministry of Mines

Collaborator: CSIR-NIIST

Industry Partner: M/s. N.S & Co.

Principal Investigator: Dr Upendra Singh

Co-PIs: Dr P Mondi, Dr Priyanka Nayar, Sreedevi T E

Team: Jyoti Pendam, A S Gijare, Kiran J, Dr. Ragi TM

The project aims to develop an integrated process for the extraction, separation and purification of potash from granitic gneiss (rock dust) using an optimised acid-leaching route. The developed technology is intended to produce fertiliser-grade potassium compounds while ensuring complete utilisation of the process residue for the manufacture of construction materials in accordance with Net Zero Waste Process (NZWP) principles. Successful implementation of the project will promote value addition from indigenous mineral resources, reduce India's dependence on imported potash fertilisers and contribute to sustainable resource utilisation and circular economy initiatives.

During the reporting period, rock dust samples were procured from the industry partner and subjected to detailed preliminary characterisation to determine their mineralogical and chemical composition. Initial water leaching experiments were successfully carried out to assess the recovery potential of soluble potash from the raw material. Based on these encouraging results, systematic acid-leaching studies are currently in progress to optimise key process parameters, including leaching conditions, reagent concentration and reaction time, to maximise potash extraction efficiency. The outcomes of these studies will form the basis for developing a robust and scalable process for the production of fertiliser-grade potash from indigenous rock dust resources

S-63: Development of Red Mud-Based Pigment and Filler for Paint and Allied Industry



Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Ind. Partner: CHEMSPERTS &

Technical Collaborator IKON Chemical Testing Lab, Mumbai

Principal Investigator: Dr. P. G. Bhukte

Co-PI : Dr. Najar & Dr. Bivas Pradhan

Team : Mayur T, M Meena, Vinod K & Amit Palade

Red mud, a major by-product of the alumina industry, possesses significant potential as a raw material for value-added products. This project aims to develop high-quality iron oxide-based pigments and functional fillers from red mud for use in water-based and solvent-based paints, including primers, intermediate coats and top coats. The developed products are targeted to meet the requirements of IS 44:1991 while ensuring colour stability, durability and consistent performance. The project will promote large-scale utilisation of red mud, reduce environmental challenges associated with its disposal, replace conventional mineral pigments and create sustainable commercial opportunities for the paint and coatings industry through circular utilisation of industrial waste

S-64: Setting up a Semi-Pilot Plant for Converting Aluminium Extrusion Die Sludge into Alumina, Zeolite and Recycled Leachate

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborator: Balaji Extrusions, New Delhi (Aluminium Extrusion Manufacturers Association of India)

Principal Investigator: Mr. Amol Mankar



Co-PI : Dr Suchita Rai, Dr. Prachiprava Pradhan, Mahin Sapkal & Megha Panchal

Team : KJ Kulkarni, S Yadav & Shweta N.

This project focuses on developing a sustainable waste-to-resource technology for the aluminium extrusion industry by converting die-cleaning waste into high-value industrial products. During die cleaning with hot caustic solution, significant quantities of solid sludge and alkaline leachate are generated, which are conventionally disposed of in landfills. The project will demonstrate, at Technology Readiness Level (TRL) 6, the conversion of 50 kg of die-cleaning sludge per batch into calcined alumina and 50 litres of spent leachate per batch into detergent-grade zeolite through semi-pilot-scale processing. The developed technology aims to reduce landfill disposal, recover valuable materials from industrial waste, promote circular resource utilization, and provide an environmentally sustainable and economically viable solution for the aluminium extrusion sector.

S-65: Optimising Homogenization Practices for AA6005 and AA6082 Aluminium Alloys – SOP Development for the Recycling Industry

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborator: Yashoda Metals & Alloys

Principal Investigator: Mr. Anil Kumar



Co-PI : Kola I Raju & Shweta D Naik

Team : RN Chouhan & Dr Arun Kumar, Ramesh Naik & Dr Anas NS

The project focuses on developing optimised homogenization schedules for AA6005 and AA6082 recycled aluminium alloys to achieve uniform microstructure and enhanced mechanical properties. Comprehensive metallurgical investigations are being carried out to establish scientifically validated Standard Operating Procedures (SOPs) for aluminium recycling industries. The developed process will improve product quality, minimise manufacturing defects, enhance process consistency and increase industrial acceptance of recycled aluminium alloys for structural and engineering applications. The project will contribute significantly to sustainable aluminium recycling and strengthen India's circular economy initiatives.

S-66: Development and Indigenisation of AA4032 and AA2618 Aluminium Alloy Billets for Lightweight Automotive Applications

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborators: GITAM University, Visakhapatnam; Abilities India Piston & Rings Ltd.

Principal Investigator: Mr. K Immanuel Raju

Co-PI : RN Chouhan, Anil Kumar & Dr Arun Kumar

Team : Dr. V Ammu & Ramesh Naik



This project aims to develop an indigenous manufacturing technology for AA4032 and AA2618 aluminium alloy billets, which are presently imported for high-performance automotive applications. The work integrates Direct Chill (DC) Casting with Ultrasonic Melt Processing (USP) to produce billets with refined microstructure, improved compositional uniformity and superior casting quality. Standard Operating Procedures (SOPs) will be developed for industrial-scale production, enabling import substitution and strengthening India's capability to manufacture lightweight, high-performance aluminium alloys for the automotive sector. The project will support the "Make in India" initiative while enhancing competitiveness in advanced materials manufacturing.

S-67: Fibre Laser-Induced Breakdown Spectroscopy (LIBS) for Real-Time Analysis of Ores and Aluminium

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Collaborators: CSIR–Central Glass & Ceramic Research Institute (CGCRI);

Ind Partners: Hindalco Industries Ltd.; New Age Instruments & Materials Pvt. Ltd.

Principal Investigator: Dr. P. G. Bhukte

Co-PI : RN Chouhan, Dr. Bivas Pradhan, Dr. Arun Kumar

Team : Ramesh K Naik & M Meena



This project aims to develop an indigenous Ytterbium Fibre Laser-based Laser-Induced Breakdown Spectroscopy (LIBS) system for rapid, accurate and non-destructive elemental analysis of ores and aluminium. The advanced analytical system will enable real-time process monitoring, rapid material characterisation and improved quality control across mining, mineral processing and aluminium industries. By reducing dependence on imported analytical instruments, the project will strengthen indigenous instrumentation capabilities, enhance process efficiency and provide advanced analytical solutions for strategic mineral and metallurgical applications.

P-70: Beneficiation Studies on Gujarat Bauxite (Scale-up Laboratory and Pilot Plant)

Sponsor: Varun Minerals, Dwarka, Gujarat

Principal Investigator: Dr. Pravin G. Bhukte

Co-PI : Dr. Bivas Kr Pradhan



This industry-sponsored project aims to develop an efficient beneficiation process for low-grade Gujarat bauxite through laboratory-scale optimisation followed by pilot-scale validation. The research focuses on reducing silica and iron impurities while enhancing alumina content to improve ore quality for non-metallurgical (refractory) applications. Process parameters are being optimised to establish a commercially viable beneficiation flowsheet suitable for industrial adoption. The successful implementation of this project will facilitate the utilisation of low-grade indigenous bauxite resources, improve raw material quality for industrial applications and contribute to sustainable mineral resource development through value addition and efficient utilisation of domestic mineral deposits. Currently, the pilot plant trials are in progress at MMPL, IBM, Nagpur.

N-52: Setting up a Pilot Demonstration Plant for Red Mud Bricks

Sponsor: National Aluminium Company Limited (NALCO) **Collaborator:** Manishri Refractories & Ceramics Pvt. Ltd., Cuttack



Principal Investigators: Dr. Anupam Agnihotri and Dr. Mohamed Najar P. A.

Co-PI : Dr U Singh & Dr Paparao

Team : Ashwin Ingley, Kiran Janbandhu, D R Meshram

National Aluminium Company Limited (NALCO), Jawaharlal Nehru Aluminium Research Development, Design Centre (JNARDDC) and Manishri Refractories & Ceramics Pvt. Ltd. (MRCPL) have partnered to establish a pilot demonstration plant, focused on sustainable bauxite residue (red mud) management.

The primary objective of this project is to install, commission, and exhibit a Pilot cum Demonstration Plant, capable of utilizing approximately 30 tonnes of Bauxite Residue (BR) per day. The daily production targets include 6,000–7,000 Load Baring Bricks (LBB) and 400–500 Light Weight Foam Bricks (LWFB). The process integrates a pre-processing stage for partial iron recovery. This reduces the final weight of the bricks and recovers valuable iron minerals to enhance the economic feasibility.

The project builds on previous successful trials executed by NALCO, JNARDDC and MRCPL to bridge the gap between bench-scale research and industrial-scale waste utilization. These efforts are part of a larger strategy to mitigate the environmental impact of red mud, which is traditionally stored in massive landfills or wet disposal systems. The groping preparation and plant setup work is currently in progress at NALCO's premise.

P-72: Study on the Effect of Addition of Dust Suppression Chemicals in Bauxite Processing

Sponsor: Ma'aden Aluminium Company, Saudi Arabia

Principal Investigator: Mr. Amol Mankar

Co-PI: Dr Suchita Rai, Mahin S, Dr. Prachi P & Megha P

Team : K Kulkarni, S U Bagde & S Yadav



The project evaluated the impact of two dust suppression chemicals on bauxite processing and their potential effects on key operations in the Bayer alumina refining process. The study primarily assessed the poisoning effect of these chemicals on the precipitation process, with emphasis on liquor productivity, hydrate particle size distribution and product soda content under conditions representative of the Ma'aden Alumina Refinery. Laboratory investigations also includes the organic carbon pick-up studies to evaluate the accumulation of organic impurities due to addition of these dust suppression chemicals. The outcomes of the study provided valuable insights into the suitability of dust suppression chemicals for industrial application while ensuring minimal impact on refinery performance and product quality.

P-73: Continuous Leaching Fabrication, Installation and Integration in Existing Setup Experimental Leaching Trials (10 kg/hr, total 50 kg) for Leaching of Soluble(s) from High-Temperature First-Cut Spent Pot Lining (SPL)

Sponsor: Klean Carbons & Fuels Pvt. Ltd., Bhubaneswar

Principal Investigator: Dr. Paparao Mondi

Co-PI : SU Bagde



This project involves the fabrication, installation and commissioning of a continuous leaching unit integrated with the existing pilot-scale facility for the treatment of High-Temperature First-Cut Spent Pot Lining (SPL). The continuous system is designed to process approximately 10 kg of SPL per hour, enabling systematic evaluation of process parameters for efficient leaching and recovery of valuable soluble constituents. The validated technology will provide an environmentally sound solution for the management and utilisation of SPL, support safe recycling of hazardous aluminium industry waste and generate engineering data required for future industrial-scale implementation.

P-74: Pilot-Scale Trials of AA6xxx, AA3xxx and AA5xxx Aluminium Alloy Billets and Ingots



Sponsor: Vedanta Limited

Principal Investigator: Mr. K Immanuel Raju

Co-PI : Dr. VNSUV Ammu & Anil Kumar

Team : Ramesh N, Dr Arun Kumar, Dr Anas N S, Suman M & Gaurav.

This project focuses on pilot-scale production and validation of AA3xxx, AA5xxx and AA6xxx series aluminium alloy billets and ingots using optimised melting, casting and processing practices. The trials aim to establish robust manufacturing parameters, evaluate metallurgical quality and generate comprehensive technical data for large-scale industrial production. The project will facilitate the development of standardised manufacturing practices, improve utilisation of recycled aluminium resources and strengthen indigenous capabilities for producing high-quality aluminium alloys required by the automotive, transportation, infrastructure and engineering sectors. The outcomes are expected to enhance product quality, process efficiency and competitiveness of the domestic aluminium industry.

Projects Recently Approved by NALCO

Semi-Pilot Scale Production of 4N High-Purity Alumina (10 kg/ Batch) for Advanced Strategic Applications

Sponsor: National Aluminium Company Limited (NALCO)

Project Cost: ₹250.52 Lakhs

Duration: 1 Year

The project aims to establish a semi-pilot-scale process for producing 4N (99.99%) High-Purity Alumina (HPA) with a production capacity of 10 kg per batch. HPA is a critical material used in LED lighting, lithium-ion batteries, semiconductor substrates, sapphire glass and advanced electronic components. The project will develop an indigenous production technology, reduce dependence on imports and support India's growing demand for strategic and high-value advanced materials.

Development of AA3XXX Aluminium Alloy for Multi-Port Heat Exchanger Tubes for HVACR Applications

Sponsor: National Aluminium Company Limited (NALCO)

Project Cost: ₹30.00 Lakhs

Duration: 9 Months

This project focuses on developing an AA3XXX-series aluminium alloy for manufacturing multi-port heat exchanger tubes used in Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) systems. The developed alloy will undergo industrial validation to assess its mechanical properties, corrosion resistance and thermal performance under service conditions. The technology is expected to strengthen indigenous manufacturing capabilities and support import substitution in the HVACR sector.

Development of Lead-Free Machinable Aluminium Alloys for Industrial Applications

Sponsor: National Aluminium Company Limited (NALCO)

Project Cost: ₹30.00 Lakhs

Duration: 9 Months

The objective of this project is to develop environment-friendly lead-free machinable aluminium alloys as sustainable alternatives to conventional lead-containing alloys. The research will optimize alloy chemistry and processing parameters to achieve excellent machinability while maintaining the required mechanical and metallurgical properties. The developed alloys will comply with emerging environmental regulations and cater to automotive, engineering and precision manufacturing industries.

Projects Recently Approved by Science & Technology (Mines), Ministry of Mines

Sustainable Recovery of Neodymium from Nd–Fe–B Magnet Scraps through Alloy-Assisted Extraction and Selective Distillation

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Industry Partner: Bhagyanagar Magnesium Pvt. Ltd.

Principal Investigator: Dr Arun Kumar S.

Project Cost: ₹100.94 Lakhs

Duration: 2 Years

The project aims to develop an environmentally sustainable process for recovering high-purity neodymium (Nd) from discarded Nd–Fe–B permanent magnet scraps using alloy-assisted extraction followed by selective distillation. The technology will support recycling of rare earth elements from end-of-life products, reduce dependence on imported critical minerals and contribute to the development of a circular economy for strategic materials used in electric vehicles, wind turbines, electronics and defence applications.

Zero-Waste Extraction of Battery-Grade Nickel Sulphate from Spent Reformer Catalyst

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Industry Partner: MTC Business Pvt. Ltd.

Principal Investigator: Ms. Shweta Dhamande Naik

CO-PI: Dr. U Singh, Mahin Sapkal, Sreedevi TE

Team: Jyoti Pendam, Dr A Chukkla Rao, Mr S Bagde, Mr Mayur T

Project Cost: ₹88.76 Lakhs

Duration: 1 Year

Spent reformer catalysts generated from nickel-based steam methane reforming processes represent a significant secondary source of nickel and alumina, but their disposal and inefficient recycling result in the loss of valuable resources and environmental concerns. The spent reformer catalyst investigated in this study contained approximately 11.1% Ni, 69.3% Al_2O_3 and 13.6% CaO, highlighting its potential for resource recovery. This work focuses on the bench-scale development of a flexible hybrid hydrometallurgical process for the zero-waste recovery of battery-grade nickel sulphate or nickel hydroxide along with value-added alumina trihydrate (ATH) and calcium sulphate ($CaSO_4$).

Efficient Recovery of Potash from Biomass Ash Residues

Sponsor: Science & Technology (Mines), Ministry of Mines, Government of India

Industry Partner: Sakshi Chem Sciences Pvt. Ltd.

Principal Investigator: Ms. Jyoti Govindrao Pendam

Project Cost: ₹65.68 Lakhs

Duration: 18 Months

The project aims to develop an efficient process for recovering potash from biomass ash residues generated by biomass-based industries. The recovered potash will be processed into fertiliser-grade products, while residual materials will be utilised for value-added applications to ensure maximum resource utilisation. The technology will reduce dependence on imported potash fertilisers, promote sustainable waste valorisation and contribute to circular economy practices through efficient utilisation of biomass-derived industrial residues.

Ongoing Technical Assignments of JNARDDC

S&T–PRISM: Promoting Startups & MSMEs

JNARDDC is the **Implementing Agency for S&T–PRISM** of the Ministry of Mines, supporting innovation-led development and commercialisation by Startups and MSMEs. Till now

40 projects worth ₹52.13 crore have been sanctioned by the Ministry of Mines. S&T–PRISM scheme aims to support Startups and MSMEs in developing, demonstrating and commercialising innovative technologies, products and services. It bridges the gap between R&D and market deployment, promotes indigenous technology, import substitution and value addition and strengthens technology-driven self-reliance.

Key outcomes include:

- **India's first Nd–Pr metal manufacturing plant** by Aswini Rare Earths Pvt. Ltd., Pune, inaugurated in October 2025.
- **Phase-I pilot plant** of Ishita International, Nagpur, for value-added fertiliser production from Indian rock phosphate, inaugurated in December 2025.

PRISM 5.0 Update:

Under the S&T PRISM Scheme 5.0 of the Ministry of Mines, JNARDDC facilitated the evaluation of innovative proposals from Start-ups, MSMEs and Individual Innovators focused on the critical minerals value chain. Against the call announced on March 1, 2026, 81 proposals were received, of which 33 were shortlisted after preliminary scrutiny by the TEC.







A two-day interactive workshop was organised at JNARDDC, Nagpur, on May 29–30, 2026, where 10 proposals were recommended by the TEC for consideration by the PSC.

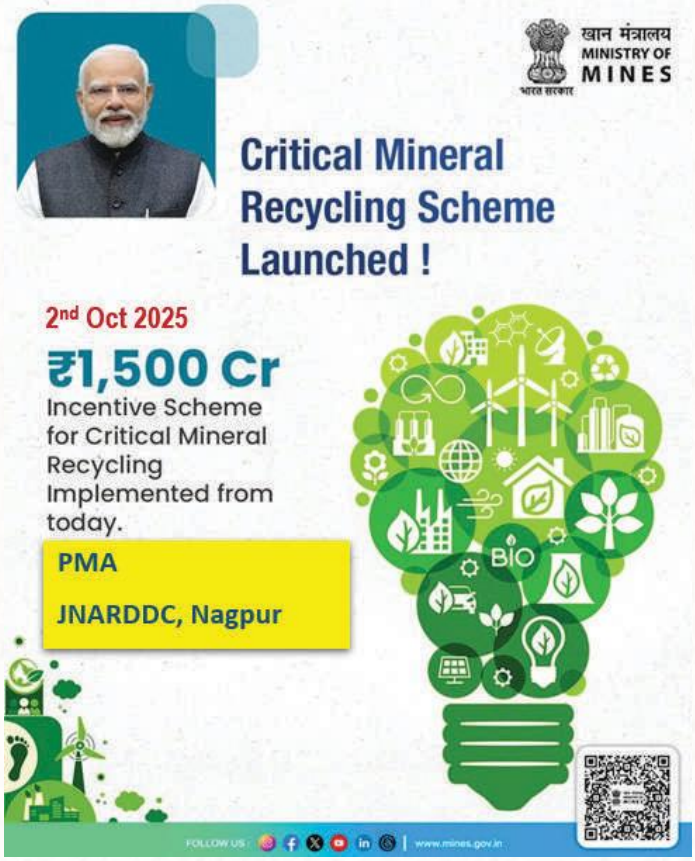
The first PSC meeting, held on June 25, 2026, approved 8 projects covering areas such as rare-earth magnets, critical mineral recovery from e-waste, nickel and lithium recovery, titanium recycling, zirconia production and mineral recovery from coal overburden. These projects aim to promote indigenous technology development, critical mineral security, circular economy and import substitution.

₹1,500 Crore Incentive Scheme for Critical Mineral Recycling

The Ministry of Mines has designated JNARDDC as the Project Management Agency (PMA) for the Incentive Scheme for Promotion of Critical Mineral Recycling, a flagship initiative aimed at developing domestic recycling capacity for the recovery of critical minerals from secondary resources such as end-of-life lithium-ion batteries and e-waste. The Scheme seeks to strengthen India's critical mineral value chain, reduce import dependence and promote a sustainable circular economy.

As the PMA, JNARDDC played a pivotal role in conceptualizing and operationalizing the Scheme. It assisted in drafting the Scheme Guidelines, developed and launched the dedicated Scheme website and online portal for application submission, evaluation, project monitoring, progress reporting and incentive claim processing. JNARDDC also provides end-to-end support in application scrutiny, technical and financial evaluation, project monitoring, capacity verification and facilitation of incentive disbursement in accordance with the Scheme Guidelines.

A total of 71 applications were received, of which 58 entities have been found eligible. The Scheme has created a strong proposed pipeline with 858 KTPA processing capacity and ~96 KTPA potential critical mineral recovery. The Scheme is expected to significantly augment India's domestic critical mineral recycling capacity, reduce import dependence and strengthen the circular economy and critical mineral supply chain.



Ministry of Mines Scheme on "Pilot Projects for Recovery of Critical Minerals from Overburdens/Tailings/Fly Ash/Red Mud, etc."

JNARDDC is serving as the Project Management Agency (PMA) for the Scheme, supporting the implementation, coordination and monitoring of pilot projects aimed at developing innovative technologies for critical mineral recovery from secondary resources. Under the Scheme, a project titled "Establishment of Pilot Line for Rare Earth Mineral(s) Separation from Multiple Feedstocks" was awarded to NFTDC, Hyderabad.

State of the Art Analytical Services

During the first half of 2026, the Centre provided world-class analytical services for the characterization and analysis of a wide range of materials, including soil, bauxite, limestone, graphite, pulp, iron ore, manganese ores, rare earth elements (REEs), PGE/Gold and other critical minerals in ores, tailings, dumps and waste materials, to major organizations and industry stakeholders such as GSI, IBM, MOIL and OMC, among others, covering a total of 42,196 samples of various mineral, ore, waste and industrial materials during the period. As a Third-Party Referee Coal Laboratory, JNARDDC also undertook the analysis of 7,020 coal samples.

Recycling Promotion and Circular Economy

» JNARDDC is setting up a state of art "Non-Ferrous Metal Recycling (Demonstration, Research & Skill Development Unit) facility with the assistance of DAIKI Aluminium.

» Non-Ferrous Metal Recycling Website & Stakeholders' Portal (nfmrecycling.jnarddc.gov.in) provides a national database and facilitation platform

» Stakeholder consultations were held under the supervision of Ministry of Mines for deliberations on the draft guideline documents prepared by JNARDDC:

- Process standards for scrap recycling Products
- Laying down Minimum Infrastructure requirement for recycling units
- Develop performance indicators and a mechanism for ranking and evaluation of units in coordination with MoEF&CC and other stakeholders

» The Ministry of Mines has entrusted JNARDDC as the nodal agency for developing a Vision Document on circular economy in Aluminium, Copper, Lead and Zinc, with the study awarded to PricewaterhouseCoopers Pvt. Ltd. (PwC). The study will assess the scrap and process-residue value chain, recycling technologies, policy framework and technology gaps and develop an implementation roadmap for improving resource efficiency, recycling, material security and sustainable growth in India's non-ferrous metals sector.

Patents

JNARDDC continues to strengthen its innovation ecosystem through the development and protection of indigenous technologies. During the reporting period, two patent applications were filed in collaboration with leading academic and industrial partners, covering advanced aluminium alloy development and sustainable recycling technologies.

An Alloy Composition and a Method for its Preparation

Patent Application No.: 202621017676

Date of Filing: 17 February 2026

Inventors: Dr. Amit Arora, Mr. Sagar Kumar Deb, Mr. Kola Immanuel Raju, Ms. Ritu Singh

Collaborating Organisation: Indian Institute of Technology (IIT) Gandhinagar

This joint invention relates to the development of a novel aluminium alloy composition and an optimised preparation methodology aimed at improving metallurgical performance and industrial applicability. The innovation is expected to contribute to the development of high-performance aluminium alloys for advanced engineering applications.

Method for Producing Recycling-Friendly Iron-Tolerant Aluminium–Silicon Alloys with Enhanced High-Temperature Creep Resistance

Patent Application No.: 202641055024

Date of Filing: 30 April 2026

Inventors: Dr. A. K. Prasada Rao (GITAM University), Mr. R. Anil Kumar, Mr. Kola Immanuel Raju, Mr. R. N. Chouhan, Dr. Anupam Agnihotri (JNARDDC), Dr. Ashish Thakur (Abilities India Pistons Ltd.)

Collaborating Organisations: GITAM University and Abilities India Pistons Ltd.

This joint patent presents an innovative process for producing recycling-friendly aluminium–silicon alloys with improved tolerance to iron impurities while maintaining excellent high-temperature creep resistance. The technology supports greater utilisation of recycled aluminium, reduces dependence on primary metal and promotes sustainable manufacturing practices for high-performance automotive and engineering applications.

Publications

JNARDDC researchers continued to make significant contributions to scientific knowledge through publications in high-impact international journals and presentations at national conferences. The published research highlights the Centre's expertise in resource recovery, sustainable metallurgy, advanced aluminium alloys, additive manufacturing, red mud utilisation and circular economy technologies.

Research Publications (Journals)

A Mechano-Active Acid-Free Process for Recovery of Alumina Trihydrate Using Alkali Roasting from Red Mud

Authors: Sreedevi Thikkandy Edathil, Venkatesan Jayapalan, Upendra Singh, Anupam Agnihotri and Jayasankar Kalidoss

Journal: *Journal of Sustainable Metallurgy* (SCIE & TMS Journal)

Publication Date: January 2026

The study presents an innovative acid-free and environmentally sustainable process for recovering alumina trihydrate from red mud through mechano-active alkali roasting. The developed process minimises chemical consumption while enhancing alumina recovery, contributing to sustainable red mud utilisation and circular economy practices.

Rheology of Red Mud Slurries and Digestion Liquor: Effects of Modifier Dosage and Conditions

Authors: Prachiprava Pradhan, Vikas Rathore, Suchita B. Rai, Amol Mankar and Anupam Agnihotri

Journal: *Chemical Engineering & Technology* (SCIE)

Publication Date: February 2026

This research investigates the rheological behaviour of red mud slurries and digestion liquor under varying process conditions and modifier dosages. The findings provide valuable insights for improving slurry handling, pipeline transport and process efficiency in alumina refineries.

Cyclic Deformation and Low-Cycle Fatigue Life Prediction of Stress-Relieved LPBF AlSi10Mg via Strain-Based Models

Authors: Anil Kumar Ramavajjala, R. N. Chouhan, Sushil K. Mishra, Vijay Hiwarkar, C. A. Joshi, Anupam Agnihotri and Rajesh K. Khatirkar

Journal: *Journal of Alloys and Compounds* (SCI)

Publication Date: March 2026

The paper presents a comprehensive investigation into the cyclic deformation behaviour and low-cycle fatigue life of Laser Powder Bed Fusion (LPBF) manufactured AlSi10Mg alloy using strain-based predictive models. The study contributes to the development of reliable design methodologies for additively manufactured aluminium components used in advanced engineering applications.

Conference Proceedings

» Design and Development of a Lightweight Aluminium Cascade System for Type IV COPVs for Stationary and Mobile Applications; A. Parasumanna, H. Muthusamy, V. N. S. U. Viswanath Ammu and Kola Immanuel Raju in the Symposium on International Automotive Technology by ARAI on 28th Jan 2026

» Mine Overburden Waste – An Alternate Aggregate Resource; Dr. Mohamed Najar P. A. in the National Conclave on Minerals by VNIT Nagpur and CMPDI, Nagpur on 12 February 2026

Conferences & Workshops Organised

Workshop on Technical Evaluation, Mentoring, Technology Exchange and Stakeholder Engagement for the Critical Minerals Value Chain

Venue: JNARDDC, Nagpur

Date: 29–30 May 2026

JNARDDC organised a two-day national workshop on Technical Evaluation, Mentoring, Technology Exchange and Stakeholder Engagement, bringing together startups, MSMEs, industry, academia and government stakeholders. The workshop promoted innovation, technology commercialisation, collaboration and knowledge exchange across the critical minerals value chain, reinforcing JNARDDC's role as a national knowledge hub.

Recognitions

Congratulations on the Award of Ph.D. Degree

JNARDDC extends its heartfelt congratulations to the following employees on the successful award of their Doctor of Philosophy (Ph.D.) degree. This significant academic achievement reflects their perseverance, scholarly excellence and commitment to advancing research and innovation.



Dr. V.N.S.U. Viswanath Ammu
Senior Scientist



Dr. Ragi T. M.
Scientific Assistant-II



Dr. Arun Kumar
Scientist



Dr. Prachiprava Pradhan
Scientist



Dr. Bivas Pradhan
Junior Scientist

Memorandum of Understanding (MoUs) Signed

MoUs were signed with premier government organisations, academic institutions, innovation ecosystems and industry partners. These collaborations are aimed at strengthening research, technology development, industrial partnerships, entrepreneurship and capacity building.

Manishri Refractories & Ceramics Pvt. Ltd. (MRCPL), Cuttack

Date: 18 February 2026

JNARDDC signed an MoU with Manishri Refractories & Ceramics Pvt. Ltd. (MRCPL) for establishing a Pilot Demonstration Plant at NALCO's Damanjodi Alumina Refinery, Odisha, to address the long-standing challenge of bauxite residue (red mud) management. The project will demonstrate large-scale conversion of red mud into value-added construction materials, supporting sustainable waste utilisation and circular economy practices.



Geological Survey of India (GSI), Nagpur Region

Date: 28 February 2026

An MoU was signed with the Geological Survey of India (GSI), Nagpur Region, for the characterisation and analysis of approximately 16,000 soil and sediment samples generated under GSI's National Geochemical Mapping Programme. The collaboration will strengthen geochemical investigations and contribute to mineral exploration and resource assessment activities across the country.



TEXMiN – Technology Innovation in Exploration & Mining Foundation, IIT (ISM) Dhanbad

Date: 7 April 2026

JNARDDC entered into a strategic collaboration with TEXMiN, IIT (ISM) Dhanbad, to promote joint research, technology development, technology translation, innovation and capacity building in the field of critical minerals. The partnership aims to accelerate the development of indigenous technologies supporting India's critical mineral mission and sustainable mining initiatives.

Indian Institute of Management (IIM) Nagpur – InFED & AIC-InFED

Date: 27 April 2026

An MoU was signed with IIM Nagpur (InFED and AIC-InFED) to foster collaboration in entrepreneurship, innovation, startup incubation and technology commercialisation. The partnership will facilitate mentoring, innovation support, business development and market linkage for technologies developed at JNARDDC, thereby strengthening the Centre's innovation and commercialisation ecosystem.





New Equipments & Facilities

ICP - OES

Model - icap pro

Make - Thermoscientific

Dual-view (axial/radial) plasma. High sensitivity & low detection limits. Fast simultaneous multi-element analysis. High-resolution optical system. Excellent matrix tolerance. Low argon consumption. Automated wavelength & interference correction. User-friendly software. High sample throughput



Vertical Machining Center (VMC)

Model - MCV-450 Plus

Make - ACE Micromatic Group

VMC will enable high-precision and faster machining, improving productivity and dimensional accuracy. Its automatic tool changer and high-speed spindle will reduce machining time and manual intervention, while supporting the development and production of complex components with consistent quality.

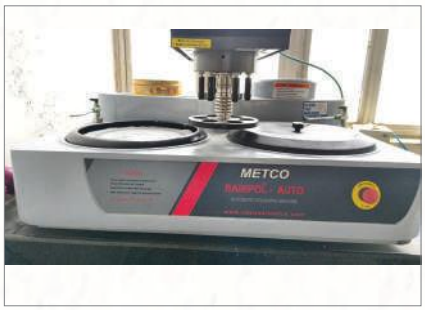


Automatic Disc Polishing Machine

Model - Chennai Metco

Make - PMV052IC

Automatic Disc Polishing Machine provides automated, uniform and high-quality polishing of metallurgical specimens, ensuring consistent surface preparation for microscopic and microstructural examinations. It will enhance the facility's metallographic sample preparation capabilities, enabling faster and more consistent preparation of specimens for microscopic examination. It will improve sample quality, surface finish and repeatability, supporting reliable material characterization and R&D activities.



High - Temperature Muffle Furnace



Model - LABINDIA

Make - LABTHERM

Capable of operating up to 1700 °C, this facility will support calcination trials for specialty-grade alumina and advanced materials research. It will enable precise temperature-controlled experiments and prolonged high-temperature testing. This new capability will strengthen JNARDDC's in-house R&D and process development facilities.

Autoclave



Make - Amar Equipment Pvt. Ltd., Mumbai

Maximum Pressure - 100 bar

Maximum operating Temperature - 375°C

Capacity of Vessel - 5 litre

The material of construction (MOC) for this vessel is Monel 400, which has excellent resistance to corrosive environments. The design pressure and temperature of the vessel are 100 bar and 425°C, respectively. This equipment is used for liquor preparation, desilication, digestion, and precipitation studies, which are vital processes in the alumina refinery.

Cold Crushing Strength (CCS) Testing Machine FLEXURAL ATTACHMENT



Model - TM042FA.1000.0

Make - EIE Instruments Pvt. Ltd, Ahmadabad,

The Cold Crushing Strength (CCS) Testing Machine with a Flexural Attachment is used to evaluate the compressive and flexural strength of refractory materials, ceramics, geopolymer composites, bricks, blocks, and concrete specimens. It enables three-point and four-point bending tests to assess the load-bearing performance of construction materials. The equipment supports research on coal mine overburden-based materials, geopolymers, and advanced construction products, facilitating quality evaluation, product development, and technology validation.

Outreach Activities

37th Foundation Day of JNARDC

JNARDDC celebrated its 37th Foundation Day on 27 April 2026, inaugurated by Dr. Prem Lal Patel, Director, VNIT Nagpur, with distinguished guests from WCL, Greta Energy Ltd. and CMDC. The event highlighted JNARDDC's 36-year journey, self-sustaining model and critical mineral initiatives. The programme was graced by distinguished Guests of Honour, including Shri Anand G. Prasad, Director (P&P), WCL; Mr. Vaibhav Kaikulte, President, Greta Energy Ltd.; and Mr. U. K. Quraishi from CMDC, Raipur. Technical Achievement Awards and special recognitions were presented to scientists, staff and divisions for outstanding contributions. A technical session on "Transforming Waste: A Strategic Source of Critical Minerals" featured experts from GSI, MECL, NEERI, VNIT, MOIL and IBM, with participation from leading organisations and former employees.



International Day of Yoga 2026

JNARDDC celebrated the 12th International Day of Yoga on 21 June 2026 at its campus in Wadi, Nagpur, under the theme "Yoga for Healthy Ageing." Over 200 participants, including employees, their families, contractual staff, school children, members of Wadi Nagar Parishad, NGO-Feedback Foundation and local residents, participated in the event. The yoga session was conducted by Dr. Paparao Mondi, Yoga Guru and Scientist, JNARDDC, who guided participants through yoga asanas, pranayama, meditation and relaxation techniques. The event reaffirmed JNARDDC's commitment to promoting healthy lifestyles, community well-being and the enduring values of yoga.



Employee of the Year 2025–26

JNARDDC confered the Employee of the Year 2025–26 award on Shri Lalit Mohan, Section Officer, in recognition of his dedicated service and exemplary performance. Through his efficient management of Purchase and Stores, he has ensured timely procurement, transparent processes and uninterrupted support to the Centre's R&D activities. His professionalism, integrity and commitment have made a significant contribution to the smooth functioning of JNARDDC.



Honouring a Legacy of Dedicated Service

Shri M. T. Nimje

Head of Department (Aluminium Electrolysis)

After over 33 years of distinguished service, Shri M. T. Nimje, Head of Department (Aluminium Electrolysis), superannuated from JNARDDC on 31 January 2026. During his tenure, he made significant contributions to aluminium electrolysis, development of technologies for treatment and utilization of Spent Pot Lining (SPL), red mud utilization and other sustainable process innovations for the aluminium industry. His technical expertise and leadership have significantly strengthened JNARDDC's R&D capabilities and industry outreach.

JNARDDC expresses its heartfelt gratitude for his invaluable service and wishes him good health, happiness and a fulfilling retired life.





Shri K. J. Kulkarni

Senior Scientific Officer Grade-II (Alumina)

With over 33 years of dedicated service, Shri K. J. Kulkarni retired from JNARDDC on 28 February 2026. During his tenure, he made significant contributions to Bayer process technology, Bayer liquor quality improvement, development of speciality alumina products and analytical testing, supporting the advancement of alumina refining technologies. JNARDDC sincerely thanks him for his dedicated service and wishes him good health, happiness and a rewarding retired life.





Dr Anupam Agnihotri

Director

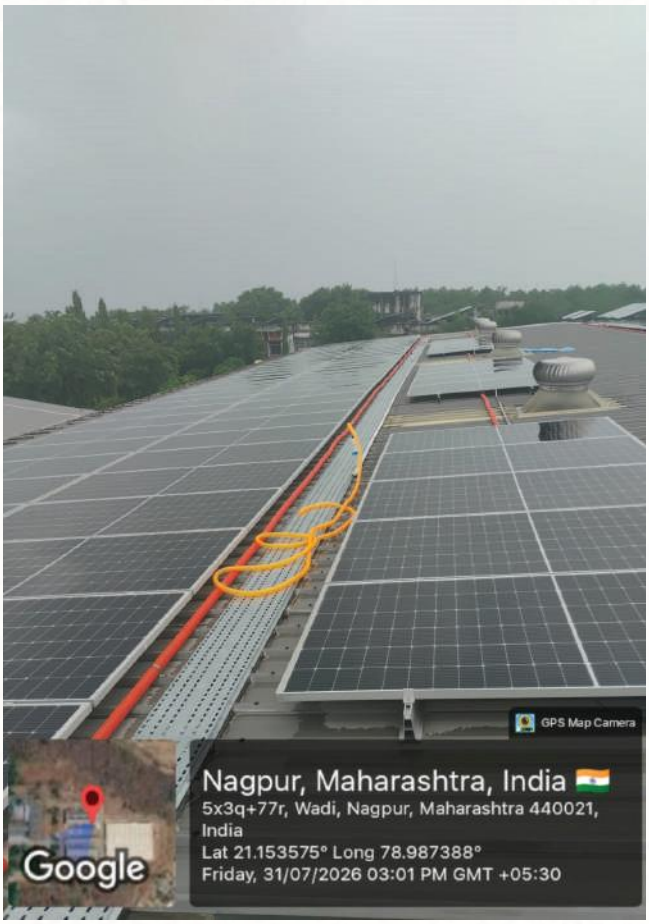
Dr. Anupam Agnihotri superannuated as Director, JNARDDC on 30 June 2026, concluding a distinguished career spanning nearly 36 years, from 16 August 1990 to 30 June 2026. During his long association with the Centre, he played a pivotal role in strengthening its R&D capabilities and institutional growth. His tenure brought about a significant transformation in the outlook and work environment of the Centre through major renovation and modernisation of its office and laboratory facilities. Under his leadership, JNARDDC was recognised among the Top Five Innovative Research Institutions in India by CII. He also provided key guidance in the implementation of important national initiatives such as recycling promotion & circular economy, S&T PRISM Scheme and the Incentive Scheme for Promotion of Critical Mineral Recycling. His leadership and commitment to scientific excellence have left a lasting imprint on JNARDDC. The JNARDDC fraternity expresses its sincere gratitude for his dedicated service and wishes him good health and happiness in the years ahead.





Rooftop Solar Installation





Under the PM Surya Ghar Yojana, which aims to achieve rooftop solar saturation across all technically feasible Central and State Government buildings by December 2025, JNARDDC successfully installed and commissioned a 217.41 kWp Rooftop Solar Power System under the Renewable Energy Service Company (RESCO) Model for a period of 25 years. The system was installed on Shed Nos. 2 and 3 by M/s Solarium Green Energy Limited, the designated vendor of NTPC Vidyut Vyapar Nigam (NVVN) and was commissioned on 31 December 2025. Commercial operation commenced in February 2026. The installation is expected to substantially reduce dependence on conventional grid electricity, lower the Institute's carbon footprint and greenhouse gas emissions, enhance the share of renewable energy in its power consumption and contribute to the Government of India's objectives on clean energy transition, energy security, sustainable infrastructure and Net Zero commitments. The project also demonstrates JNARDDC's commitment to environmentally responsible and energy-efficient operations.

Media Coverage


पुर, नौरी

आयोग्यत नहित ४६ ह्यों से मतारो
तर रितनी तविवन को तावेनगल


JNARDDC to set up India's first Gallium extraction plant in city for R&D soon


businessline.

JNARDDC develops critical metallurgical tech to cut import dependence


JNARDDC to set up India's first Gallium extraction plant in city for R&D soon


प्रचार के लिए समन्वय है जरूरी

महानिदेशक
विमला वत्स शर्मा

पीआईबी की कार्यशाला में मिली पहचान


Dr Patel praises JNARDDC for successfully adapting to evolving Government policies

JNARDDC celebrates 37th Foundation Day

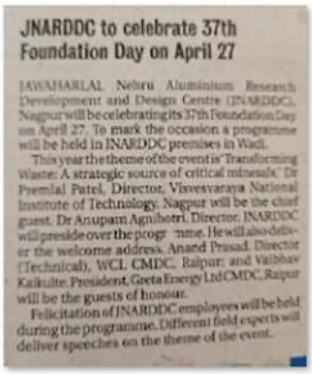

JNARDDC to set up India's first Gallium extraction plant...

JNARDDC facilitated to set up India's first Nd-Pr metal manufacturing plant in Pune


पीआईबी नागपुर ने ली आईएमपीसीसी बैठक, समन्वित संचार पर दिया जोर


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JNARDDC to celebrate 37th Foundation Day on April 27

JAWAHARLAL Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur will be celebrating its 37th Foundation Day on April 27. To mark the occasion a programme will be held in JNARDDC premises in Wadi.

This year the theme of the event is "Transforming Waste: A strategic source of critical minerals." Dr Premlal Patel, Director, Visvesvaraya National Institute of Technology, Nagpur will be the chief guest. Dr Anupam Agnihotri, Director, JNARDDC will preside over the progr amme. He will also deliver the welcome address. Anand Prasad, Director (Technical), WCL CMDC, Raipur and Vaibhav Kalkulte, President, Greta Energy Ltd CMDC, Raipur will be the guests of honour.

Felicitation of JNARDDC employees will be held during the programme. Different field experts will deliver speeches on the theme of the event.




रणनीतियों के माध्यम से पहुंच को बढ़ाने पर कार्यशाला का आयोजन

सूचना के प्रसार में आईएमपीसीसी महत्वपूर्ण


மாலைமுரசு

ஸ்ரீ ராமகிருஷ்ணா பொறியியல்
கல்லூரியில் சர்வதேச மாநாடு!

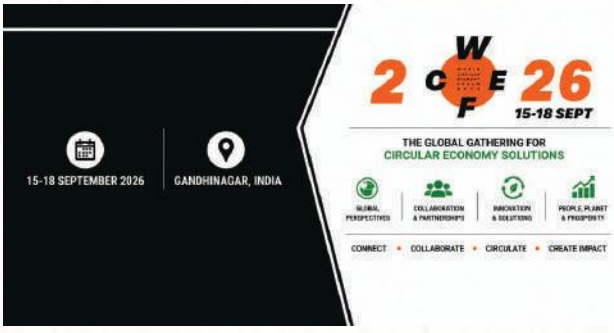
Upcoming Events

Event	Date	Venue
14th International Bauxite, Alumina & Aluminium Society (IBAAS) Conference 2026	09–11 September 2026	Jharsuguda, Odisha
World Circular Economy Forum 2026	15-18 September 2026	Gandhinagar, Gujarat
Critical Mineral Innovation Hackathon 2026	Registration Open Till 20th September 2026	Online under Indian Mining Week 2026
India Mining Week 2026	15-17 November 2026	New Delhi
44th International Committee for Study of Bauxite, Alumina & Aluminium (ICSOBA) Conference 2026	15–20 November 2026	Bengaluru, Karnataka
6th International Symposium on Innovations in Chemical Engineering (SICE 2026)	07– 10 December 2026	Indian Institute of Science (IISc), Bengaluru
80th Annual Technical Meeting (ATM) of the Indian Institute of Metals (IIM)	10–12 December 2026	Jaipur, Rajasthan









जवाहरलाल नेहरू एल्युमिनियम अनुसंधान विकास एवं अभिकल्प केन्द्र, नागपुर







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