Detoxification of Spent Pot Lining
Controlled Heat Treatment Process for Destruction of Leachable Toxic Cyanide in First Cut Aluminium Spent Pot Lining Materials

Worldwide aluminium is produced by electrolysis of alumina at high temperature (~950 °C) in molten cryolite/AlF₃ bath. The electrolysis pot is provided with electrically conductive carbon linings which act as cathode in electrolysis pot. Over a period of electrolysis pot operations, the carbon lining gradually deteriorates due to penetration of elemental sodium and liquid bath materials into its pores which results in cracking/heaving/swelling of cathode. Upon failure of pot these linings are removed and are called Spent Pot Lining (SPL). Due to high toxicity of leachable cyanide and fluoride in SPL, Central Pollution Control Board (CPCB), India classified it as a hazardous waste under class A. The typical composition of 1st cut SPL is presented below:

<table>
<thead>
<tr>
<th>Element or Compound</th>
<th>C</th>
<th>Al₂O₃ (Total)</th>
<th>SiO₂ (Total)</th>
<th>Na⁺ Total</th>
<th>Na⁺ Leachable</th>
<th>F⁻ Total</th>
<th>F⁻ Leachable</th>
<th>CN Total</th>
<th>CN Leachable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon portion</td>
<td>50–70%</td>
<td>5–13%</td>
<td>0–1%</td>
<td>12–26%</td>
<td>6–11%</td>
<td>6–11%</td>
<td>2–5%</td>
<td>100–2000 ppm</td>
<td>90–800 ppm</td>
</tr>
</tbody>
</table>

JNARDDC developed a simple and cost-effective process for detoxification of SPL by destroying leachable cyanide at moderate temperature. The process not only detoxifies the SPL but also recovers valuable elements such as high calorific value carbon, sodium as caustic and fluoride as calcium fluoride from detoxified SPL by leaching with water. The advantages of this process are: minimum processing units, no chemical treatment, less capital investment and no additional waste generation. The end products are free from leachable hazardous elements and can be utilized for other industrial applications. CPCB has approved this process for treatment of SPL for its safe utilisation and declared JNARDDC as nodal agency for SPL. The process flow diagram is shown below:

![Process Flow Diagram](image-url)
Wishing you all a happy and successful New Year 2020! Let us take a moment to examine ourselves and prepare a resolution on how we can make aluminium a competitive metal in India.

The global aluminium market is expected to register 6.5% CAGR during 2020-2025 and reach a value of USD 235.8 Billion by 2025. The major factors for this growth are automotive and building & construction industries. In addition, the increasing use of aluminium in electric vehicles (EVs) is anticipated to further boost the growth of the aluminium market. The significance of secondary aluminium is increasing as policy makers globally are emphasizing on resource efficiency. India’s downstream industry is likely to witness a phenomenal progress in coming years as growth of aluminium consumption looks imminent through value added products. Aluminium consumption in India is poised to grow from 3.3 million tons in 2015-16 to 5.3 million tons in 2020-21.

In 2019, the Centre successfully created a large-scale digital database of bauxite and laterite deposits of Maharashtra state using GIS and remote sensing technology which will help prospective entrepreneurs to access information required for successful mining. In waste management area, Centre took efforts to compile national and international contribution on utilisation of red mud to bench mark future investigations. This report would certainly help in identifying comprehensive re-use options of red mud. Projects on utilization of PLX as a potential and value-added filler material with specific reference to white ceramics and pigments and development of inline automated anode butt monitoring system to measure anode butt parameters have been successfully completed. Recent initiatives in the centre include production and certification of certified reference materials (CRMs) for the analysis of aluminium alloy, complete utilisation of red mud & dross, recovery of strategic rare earths from industrial waste and Wifi enabled sensor arrangement for online measurement of anode current distribution of aluminium electrolysis cells.

I invite and welcome you all to get associated for getting the maximum benefits out of R&D facilities and expertise available with us.

Jai Hind
Waste to Wealth - Red Mud Meet

An interactive meet on “Waste to Wealth - Productive Utilisation of Red Mud (Bauxite Residue)” was organized in association with Ministry of Mines (MoM) inaugurated by Dr K Rajeswara Rao, Additional Secretary, MoM at Hotel Le Meridien, New Delhi, on 26th July, 2019. The meet was to review and discuss current status of red mud generation and its safe disposal / utilization which will help in identifying the series of research gaps that exist today and need immediate attention.

Indo-European meet on “Resource Efficiency in Aluminum Industry with a Focus on Effective Utilization of Red Mud (Bauxite Residue)”

JNARDDC in association with Ministry of Mines (MoM), Ministry of Environment Forest & Climate Change (MoEFCC), European Union-Resource Efficiency Initiative (EU-REI) & European Union (EU) organized an interactive Indo-European Meet on “Resource Efficiency in the Aluminum Industry with a Focus on Effective Utilization of Red Mud (Bauxite Residue)” on 19th September, 2019 at Hotel Taj, New Delhi. The delegation of experts from European Union enlightened about global and EU developments in the sector and specifically about ongoing Horizon 2020 Program under which three major projects (EnsureAl, Removal & SCALE) are in operation with an aim to bulk utilization of bauxite residue (red mud). The European perspective was put forward by EU experts - Ms Katy Taesmelis, International Aluminium Institute (IAI); Mr Gyorgy (George) Banvolgyi, Hungary; Mr Ugo Miretti, ITRB Group; Mr Casper van der Eijk SINTEF, Norway; Dr Papadimitriou Konstantinia, Greece and summarized by Dr Dieter Mutz, EU-REI.

The programs were widely attended by the top officials from Ministry of Mines and industry executives along with other representatives from all three primary aluminium producing companies (NALCO, VEDANTA & HINDALCO), Govt organizations (Ministry of Environment and Climate Change, CPCB, SPCC, BARC, IBM, Ministry of Road Transport, NHAI and BIS etc) as well as from user industry mainly cement where red mud can be consumed in bulk quantity. Day long deliberations were held and it was unanimously decided to focus all efforts for effective bulk utilization of red mud with necessary government support which will be a win-win situation for all the stakeholders.
Capacity Building Program on Resource Efficiency in Aluminium (REAL)

A two and half day Capacity Building program on Resource Efficiency in Aluminium (REAL) was organized during 21 – 23rd November, 2019, at Bhubaneswar by JNARDDC, under the aegis of Ministry of Mines and NITI Aayog in association with Aluminium Association of India (AAI), Material Recycling Association of India (MRAI) and Aluminium Secondary Manufacturers Association (ASMA). Shri Ratan P Watal, Secretary, Economic Advisory Council to the Prime Minister (EAC-PM), Government of India (GoI) inaugurated the program along with Dr B N Satpathy (Senior Consultant, Office of PSA to GoI) and executives from primary/secondary aluminium industry and Ministry of Mines. Prof Vijaya Raghavan, PSA to GoI conveyed his message on importance of resource efficiency in aluminium along with his best wishes for the programme. During the programme, there were various deliberations on status of REAL in primary and secondary aluminium production, current status and technology available for utilization of industrial wastes like cross, spent pot lining (SPL) and bauxite residue (red mud) at both global and domestic markets. The event witnessed over 150 participants from Ministry of Mines, EAC-PM and Office of Principal Scientific Advisor (O/o PSA), GoI, NITI Aayog, NALCO, HINDALCO, Vedanta group, regulatory bodies like Odisha SPCB, BIS, various secondary aluminium producers and manufacturers affiliated to MRAI, ASMA, All India Non-ferrous Metal Exim Association (ANMA) and Federation of All India Aluminium Utensil Manufacturers (FAIAUM). To spread the awareness on resource efficiency amongst young minds, undergraduate and senior secondary students were specially invited to take participation.

Interaction with Solar Industries India Ltd., Nagpur

Mr A K Jain, Director, Solar Industries India Ltd. along with his colleague, visited JNARDDC on 22nd August, 2019 for seeking assistance on an issue related to aluminium wire rods used for production of shells. As a follow-up to understand the problem, subsequently, a team of scientists visited two of their plants on 27th August, 2019. Scientists at the Centre conducted various Thermo Mechanical Treatments on the collected rod samples to improve their mechanical properties for developing import substitute.

Scientists from JNARDDC at Solar Industries India Ltd.
Federation of All India Aluminium Utensils Manufacturers at JNARDDC

Officials from Federation of All India Aluminium Utensils Manufacturers (FAIAUM) visited JNARDDC on 23rd August, 2019 for discussing various matters related to aluminium utensils manufactured in the country. During the meeting it was felt that the need for standardization of utensils’ quality is required to counter various myths about aluminium utensils as this sector is a potential market for recycled aluminium. Post meeting, they had a look at the facilities available and research work carried out at the Centre and had shown interest in taking up the technical issues related to aluminium utensil industry.

Officials from Proman Infrastructure Services Pvt. Ltd. at JNARDDC

Mr Juhani Honkanen (Finland) and Mr Raghuram of Proman Infrastructure Services Pvt Ltd., Bengaluru called on JNARDDC on 30th August, 2019 and presented the capabilities of Plasma Arc Furnace to recover iron from red mud economically. During the meeting, several issues were discussed like continuous processing of red mud, need to refine the mix of products to optimize economics of the operation etc. As this technology may help to achieve processing of red mud in large volumes and producing products like iron casting, ball mill balls, steel castings, pig iron, special materials etc. JNARDDC sought the demonstration of the technology.
Delegation of scientists visited Mineral Resource Department, Directorate of Geology and Mining (DGM) Raipur, Chhattisgarh on 2nd August, 2019. During the visit Director, JNARDDC presented Centre’s facilities, capabilities, achievements, services offered and R&D activities that can be pursued jointly. Shri Dev Senapati, Director DGM, Shri Jayant Kumar Pachne, Additional Director and host of officials present were deeply impressed and promised to utilise the services of the Centre. Subsequent to the above visit, ball has been set rolling for future interactions between two organisations with DGM utilising the services of JNARDDC for characterising their substantial quantity of bauxite samples.

Aluminium recyclers seek support from JNARDDC

Mr Jay Poddar (FTC Exim Pvt. Ltd.), Mr Sanjay Gadla (Alpro Extrusion Pvt. Ltd.), Mr Manoj Kumar Bagaria (L Madanlal Aluminium Ltd.) and P S Kushwaha (Manikji Metachem Pvt. Ltd.) visited JNARDDC on 23rd September, 2019 to seek support for applications of secondary aluminium in steel industry as de-ox products. They requested JNARDDC to convince steel industry for using de-ox made from recycled aluminium as the quality of the de-ox products produced by them is at par with primary aluminium products. They also sought expert suggestions on issues related to extrusion of aluminium and invited JNARDDC team to visit recycling plants at Kolkata for the same.
Collaboration between JNARDDC and Vikas Altech Pvt. Ltd.

Mr K Srinivas, CEO and Mr Amit Sen, CGM, Vikas Altech Pvt Ltd. (VAPL), leading aluminium micro tube manufacturers visited JNARDDC on 1st October, 2019 for discussing the various issues related to aluminium micro tube extrusion and also standardization of material and processes. After witnessing the lab facilities at the Centre, Mr K Srinivas expressed to join hands with JNARDDC for collaborative work to provide possible solutions to the problems raised by their customers. Subsequently, JNARDDC team visited VAPL on 21st November, 2019 to understand the issues faced by VAPL in regard with raw material-product characterization, tube level testing, uniformity of zinc coating, extrusion process parameters and failure analysis.

Interaction with Bhilai Steel Plant

A team of scientists from JNARDDC along with Mr Saket Jain, Swarnalata Holdings Pvt Ltd., Raipur visited Bhilai Steel Plant (BSP), Chhattisgarh, on 25th September, 2019 and had a detailed discussion with Shri Virender Dhawan, (GM, Quality) and his team regarding the utilization of various steel industry rejects for geopolymer products viz. paver blocks, stabilized hard bricks and light weight porous/hard/layered brick/block etc. JNARDDC showcased geopolymer products developed at the Centre by utilizing rejects from BSP and other industries. BSP expressed its interest in developing insulating (back up refractory) and refractory bricks utilizing slag from steel melt shop and iron ore fines (generated in-house) respectively for captive consumption. Further discussions were held on usage of deoxidizer manufactured from recycled aluminium instead of primary aluminium. BSP opined that recycled aluminium deoxidizer can be taken up only after detailed discussion with manufacturers.
Visit to NCCBM, Haryana

Team of scientists led by Dr Anupam Agnihotri visited National Council for Cement and Building Materials (NCCBM), Haryana along with delegation led by Ms Rachna Arora (Dy Head of the EU REI Project in India) on 18th October, 2019 to explore the feasibility of developing red mud having pozzolanic characteristics which can be consumed by cement industry for bulk utilisation of red mud. Extensive discussions were held and facilities of NCCBM were witnessed. JNARDDC has agreed to provide red mud samples to NCCBM for their study and invited them for further interaction and to chalk out the strategy for collaborative research.

Visit to Jindal Aluminium Limited, Bangalore

As JNARDDC is in the process of commissioning its 14 MN extrusion press, Dr Anupam Agnihotri along with a team of scientists visited JINDAL Aluminium Ltd. (JAL), Bangalore during 3rd - 5th July, 2019 with a view to explore the possibility of technical collaboration with the India’s largest extruder. During the meeting with Mr K R Raghunath, Vice Chairman, JAL, few topics of mutual interest viz. extrusion of aluminium, operational training of JNARDDC employees on JAL’s extrusion facility at Bangalore, Die design etc. were discussed. Subsequently, officials from JNARDDC at JAL during 16 - 19th October, 2019 to acquire hands-on training on operation, maintenance and technical know-how of the extrusion press.
Visit to aluminium recycling units in Ahmedabad

A team of scientists led by Dr. Anupam Agnihotri met members of All India Non-ferrous Metal Exim Association (ANMA), Ahmedabad during 8-10th August, 2019 and conveyed the need for a well organized aluminium scrap recycling sector, compliance with pollution norms and standardization of their products. During the visit, technology and quality related challenges being faced by remelters were heeded and samples were collected for analysis to provide possible solutions.

Professor from BML Munjal University visited JNARDDC

Prof A K Prasada Rao, Dept. of Mechanical Engineering, BML Munjal University (Hero Group), Gurgaon visited JNARDDC on 13th September, 2019 and admired the facilities available at the Centre. During the meeting, Dr. Rao presented his work on DC casting technology, melt conditioning and quality issues related to recycled aluminium and also expressed his interest for collaborating with JNARDDC in aluminium downstream.
Vigyan Bharti Forum

About 40 students from MSB Educational Institute, Nagpur visited Centre on 27th September, 2019 as a part of their curricular activities. The students went around laboratories, interacted with scientists and learnt about the basics of aluminium production technology and various useful applications of aluminium.

Students at JNARDDC campus

Educational visit of students to JNARDDC

The students from Nagpur Institute of Technology led by their respective faculties visited JNARDDC on 24th September, 2019 to get themselves acquainted with the activities of Centre as part of their curricular activities. Students were intrigued while witnessing the functioning of facilities of the centre and found some of the analytical instruments interesting.

Students from Nagpur Institute of Technology at JNARDDC
CGCRI scientist at JNARDDC

Dr Himansu Sekhar Tripathi, Head, Refractory & Traditional Ceramics Division, CSIR-Central Glass & Ceramic Research Institute (CGCRI), Kolkata interacted with scientists at JNARDDC on 3rd October, 2019 for exploring the utilization of residual dross, alumina hydrate and calcined bauxite from low grade bauxite/aluminous laterite as filler materials in ceramics and refractories. Also, the possibility of using low iron alumina and silica from clay minerals in the preparation of fused alumina, ceramics, special cement, binder for paper industry and low cost precursors for nano-particles and nano-composites will be investigated.

Visit to Anna University, Chennai

Dr Mohamed Najar and Dr Priyanka Nayar from JNARDDC met Prof Janakiraman Kumar, Crystal Growth Centre, Anna University Chennai on 24th October, 2019 to discuss the possibilities of making sapphire from 3N (99.9%) pure alumina prepared through low temperature process. Prof Kumar demonstrated sapphire making process and associated facilities at their Centre and conversed about the possibility of collaborative R&D on 4N pure alumina and its application in LED and semiconductors. Further, the team visited other departments and expertise available at Anna University and agreed to work on biomedical applications of alumina based nano-composites with Prof N Rajendran, Chemistry Department.
**RECENTLY COMPLETED R&D PROJECTS**

**Development of Inline Automated Anode Butt Monitoring System to Measure Anode Butt Parameters (Joint Project with NALCO)**

**Sponsor**: NALCO, Bhubaneswar, Odisha  
**Principal Investigator**: Vimal Kishor Jha  
**Co-Investigators**: RJ Sharma, MT Nimje  
**Team Members**: S K Thokal, N Warhadpande

An automated inspection system is developed for the acquisition of visual images of anode butt of the anode assembly. A beam photoelectric sensor is used for hardware triggering of cameras for capturing images on the arrival of the anode butt assembly at the known location. The image analysis software, which is developed for image acquisition and analysis of anode butt assembly, measures 15 parameters for calculating the anode butt height, weight, carbon under the pin and percentage of bath on the surface of anode butt.

**Technological Testing of Bauxite Sample for Establishing the Mass Balance of the Process Design of the Expansion Study at Vedanta Limited, Lanjigarh, Kalahandi, Odisha**

**Sponsor**: Vedanta, Lanjigarh, Odisha  
**Principal Investigator**: M J Chaddha  
**Co-Investigators**: Dr Suchita B Rai, RJ Sharma, K J Kulkarni  
**Team Members**: M Panchal, S Kowe, Prachiprava Pradhan, S Yadav

The complete technological testing of Kodingamali bauxite was carried out for Vedanta Alumina refinery at Lanjigarh. This project included thorough physical/chemical characterization and optimization of parameters required for the unit operations (pre-desilication, digestion, settling) of Bayer process to produce alumina. These parameters will be helpful to Worley Parsons (Technology supplier of Vedanta) in designing, manufacturing and supplying of the refinery equipment.

**Utilization of PLK (Partially Laterised Khondalite) as a Potential and Value Added Filler Material with Specific Reference to White Ceramics and Pigments (Joint Project with C V Raman College of Engineering & NALCO)**

**Sponsor**: NALCO, Bhubaneswar, Odisha  
**Principal Investigator**: Dr Mohamed Najar PA  
**Co-Investigators**: Dr PG Bhukte, M J Chaddha  
**Team Members**: K R Rao, K J Kulkarni, K Janhandhu

The objective of the project is utilization of Partially Lateritized Khondalite (PLK) with reduced Fe,O3 content in white ceramics and pigments. Various beneficiation techniques like magnetic separation, spiral concentrator, hydro-cyclone classifier and acid leaching were used for reduction of iron oxide content, out of which acid leaching is found to reduce the Fe,O3 content from 17 – 20% to 1.1 – 1.5%. Usage of these samples in white ceramics and pigments was validated at CGCRI Kolkata and Mundle Paint & Chemical Industry, Bhandara respectively. Material and energy balance as well as techno-economics of the process were also assessed for commercial exploitation of PLK as value added filler/binder material.
Nano Processing of Industrial Rejects for Use as Additives in Mix-Designs for Improved Pozzolanic Reaction Efficiency (Joint Project with VNIT, Nagpur)

Sponsor: S&T Division, Ministry of Mines, Govt of India
Principal Investigator: Dr Priyanka Nayar
Co-Investigators: Dr Mohamed Najar PA, M J Chaddha, Dr SP Puttewar
Team Members: K R Rao, A S Gijare

Various Pozzolanic tests (Electrical Conductivity test, Chapelle Activity, Pozzolanic Activity Index, Reactive Silica) were performed on both the milled and unmilled wastes (GBFS, red mud, fly ash, lime sludge and sandstone sludge). The materials that showed improved pozzolanicity after nano processing were casted into cubes, the compressive strength of which will be measured as soon the curing period is over. Report preparation is in progress.

Utilization and Development of Process for Recovery of Strategic Rare-Earths from Industrial Waste-Bauxite Residue at Lab Scale

Sponsor: Department of Science & Technology, New Delhi
Industry Partner: HINDALCO
Principal Investigator: Dr Upendra Singh
Co-Investigators: Dr SP Puttewar, Dr Priyanka Nayar
Team Members: K R Rao, K Janbandhu, DR Meshram

A feasibility trial study was carried out to extract scandium from the leach liquor of red mud using solvent extraction. Liquid-liquid extraction using di-2-ethylhexyl phosphoric acid (D2EHPA) in kerosene as an extractant was found to recover 85% of rare earth elements (REEs) from sulfuric acid leachate. To achieve desired scandium purity, the organic phase was subjected to acid stripping followed by treatment with aqueous solution. Complete study on extraction and recovery at lab scale is under progress and further trials to achieve desired purity are also under investigation.

Fabrication of Advanced Ceramic Nano-Coatings for Automotive Applications (Joint Project with Christ University, Bangalore)

Sponsor: S&T Division, Ministry of Mines, Govt of India
Principal Investigator: Dr Priyanka Nayar
Co-Investigators: Dr SP Puttewar, Dr Mohamed Najar PA
Team Members: VNS UV Annu, KR Rao, A S Gijare

Alumina sol gel was deposited on different automobile components by spin coating. Surface morphology of the deposited coatings was characterized using scanning electron microscope. Zirconia/alumina nanopowders were also plasma sprayed on the components at Non Ferrous Materials Technology Development Centre (NFTDC), Hyderabad. Coated components will be validated for wear resistant and thermal barrier applications in diesel engine at Christ University, Bangalore.

Development of a Process Technology (at Lab Scale) for Low Cost Production of 3N (99.9%) Pure Alumina

Sponsor: Department of Science & Technology, New Delhi
Principal Investigator: Dr Priyanka Nayar
Co-Investigators: Dr Mohamed Najar PA, M J Chaddha, Dr SP Puttewar, Dr Upendra Singh
Team Members: K R Rao, A S Gijare

Preparation of 3N pure alumina using sol gel auto combustion technique is going on. Visited Crystal Growth Centre, Anna University, Chennai for discussion on making sapphire out of the prepared powder. Samples are being sent in batches for conducting different tests related to its water absorption, thermal conductivity, thermal expansion, compressive strength, Rockwell hardness etc.
ONGOING PROJECTS SPONSORED BY GOI

To Study the Fire Retardancy of Nano-ATH in Polymers (Joint Project with CIPET, Bhubaneswar)

Sponsor: S&T Division, Ministry of Mines, Govt of India
Principal Investigator: Dr Suchita B Rai
Co-Investigators: M J Chaddha, M T Nimje, R J Sharma, K J Kulkarni
Team members: Megha Panchal, Sabhajeet Yadav

The project aims at improving the fire retardancy and mechanical strength of polymers by incorporating nano-sized aluminium tri-hydroxide (ATH). Parameters for the synthesis of nano-sized ATH are being optimized at JNARDDC. The samples are being sent to CIPET for making polymer composites. Properties are being studied using TGA, DSC, Vertical burning test, Cone Colorimetry etc. by CIPET.

Recovery of Smelter Grade Alumina and Silica from Coal Fly Ash

Sponsor: S&T Division, Ministry of Mines, Govt of India
Principal Investigator: M T Nimje
Co-Investigators: Dr Suchita B Rai, R J Sharma, Vimal Kishor Jha
Team Members: Dr SP Puttewar, M J Chaddha, Dr Upendra Singh, Dr Mohamad Najar P A, P Mahendiran, K R Rao, S K Thokal, S U Bagde

Aim of this project is to develop bench scale process for extraction of pure silica and aluminium fluoride from coal fly-ash (CFA), which is a solid waste generated by Indian thermal power plants. CFA was collected from Koradi, Nagpur thermal power plant for experimentation. Laboratory studies resulted in obtaining 40% (of total silica) pure vaporized silica and about 95% (of total alumina) precipitated aluminium fluoride. Optimization of process parameters for bench scale fabrication is in progress.

Techno-economic Survey of Aluminium Scrap Recycling in India (Joint Project with MRAI)

Sponsor: S&T Division, Ministry of Mines, Govt of India
Principal Investigator: R N Chouhan
Co-Investigators: VN SUV Ammu, P Mahendiran
Team Members: Dr Paparao Mundi, R Anil Kumar, Kola Immanuel Raju, Dr Anas N S

Visited various aluminium recycling units in Ahmedabad, and gathered information related to methods and technologies that are being implemented for scrap processing, sorting, cleaning and melting. Secondary research was carried out where, published articles, books, journals and national policies, acts, white papers, conference presentations, annual reports of companies etc. were analyzed and summarized. Survey questionnaires jointly prepared by JNARDDC & MRAI has been circulated to the recycling industry to collect the data on recycling of aluminium scrap. Visit to recycling units located in southern regions like Chennai, Bangalore and Coimbatore and eastern region viz. Kolkata is being organized.
Development of Ceramic Proppant from Low Grade Materials (Partially Lateritised Khondalite - PLK, Fly Ash, etc.) (Phase-II – Scale-up Studies)

Sponsor : NALCO, Bhubaneshwar, Odisha
Principal Investigator : Dr P G Bhukte
Co-Investigators : M J Chaddha, Dr S P Puttewar
Team Members : M T Nimje, P Mahendiran, K R Rao, K Janbandhu

Installation and commissioning of rotary kiln and proppant crush test press required for setting up of scale up facility for the production of proppants from Partially Lateritised Khondalite (PLK), Fly ash, additives etc. is under progress. The granules of various sizes were generated using mixer cum granulating machine. The calcination trials of granules in rotary kiln are under progress.

Development of a Wi-Fi Enabled Sensor Arrangement for Online Measurement of Anode Current Distribution of Aluminium Electrolysis Cell (Joint Project with NALCO)

Sponsor : NALCO, Bhubaneshwar, Odisha
Principal Investigator : R J Sharma
Co-Investigator : Vimal Kishor Jha
Team Members : M T Nimje, S K Thokal, N Warhadpande

Wi-Fi enabled data acquisition system has been developed which can work well in high temperature and magnetic field of the smelter plant. The data acquisition system will be used to measure voltage drop between the two points of the stem at fixed distance with the help of specially designed detachable probe. The data collected can be utilized for reducing cell instabilities, improving pot control and efficiency. Design and fabrication of sixteen probes and acquisition systems are in progress. One master unit is also designed to collect data from all the acquisition systems and transmitting the same to control room. The whole system will be installed soon at NALCO, Angul.

Technical Feasibility Study for Extraction of Alumina as Aluminium Fluoride from Low Grade Bauxite

Sponsor : International Bauxite Alumina & Aluminium Society (IBAAS), Nagpur
Principal Investigator : M T Nimje
Co-Investigators : Dr Suchita B Rai, Dr P G Bhukte, Vimal Kishor Jha, S K Thokal, S U Bagde

Aim of project is to study the technical feasibility of east coast bauxite for extraction of alumina as aluminium fluoride using HF/Fluorosilicic acid. Two methods, which were found to be technically feasible for this extraction are (a) removal of iron oxide through HCl treatment and subsequent conversion to aluminium fluoride and (b) Chemical treatment of bauxite with HF and precipitation of aluminium fluoride. Optimization of process parameters is under progress.
Production and Certification of Certified Reference Materials (CRMs) for the Analysis of Aluminium Alloys

Sponsor: S&T Division, Ministry of Mines, Govt of India
Principal Investigator: R N Chouhan
Co-Investigators: Dr Upendra Singh, R Anil Kumar, K Immanuel Raju
Team Members: V N S Y V Amma, Dr Paparao Mondi, Dr Anas S

The main objective of the project is to produce certified reference materials (CRMs) for aluminium alloys at JNARDDC for the benefit of the aluminium industry and to provide import substitute. Being accredited with ISO 17025 by NABL for its analytical facilities, JNARDDC is wellplaced to produce CRMs. In this regard, accreditation in accordance with ISO 17025 is under progress. Initially, the development of CRM for one wrought and one cast alloy will be taken up and the range will be expanded subsequently.

Optimization of Digestion Efficiency in Bayer Process by Ascertaining the Ideal Size Fraction of Bauxite Feed

Sponsor: S&T Division, Ministry of Mines, Govt of India
Principal Investigator: Dr Suchita B Rai
Co-Investigators: M J Chaddha, Prachiprava Pradhan
Team Members: R J Sharma, Dr P G Bhukte, K R Rao, K J Kulkarni, M Panchal

The project aims to determine the optimum size of bauxite for digestion by grinding and characterization of various size fractions. Technological testing and evaluation of digestion efficiency would be carried out.

Utilization of Aluminium Dross to Achieve Zero Waste – A Bench Scale Study (In Collaboration with Shanark Industries, Nagpur)

Sponsor: S&T Division, Ministry of Mines, Govt of India
Principal Investigator: Dr Upendra Singh
Co-Investigator: Jyoti G Pendam
Team Members: Dr Priyanka Nayak, K R Rao, K Janbandhu

The main objective of the project is to develop the bench scale process for preparation of Poly Aluminium Chloride (PAC) from waste aluminium dross and to prepare castable refractory from residual dross for industrial applications to achieve zero waste. This requires preliminary characterization and quantification of aluminium from aluminium dross. The potential benefit in preparing PAC from aluminium dross is providing alternative source to primary material and reduction in waste disposed to landfills.

An Innovative and Viable Process for Recovery of Iron Values from Red Mud and Processing of Non-Iron Material for Developing Value Added Products – Complete Utilization of Red Mud (Joint Project with CSIR-IMMT, Bhubaneswar)

Sponsor: National Aluminium Company Limited (NALCO), Bhubaneswar, Odisha
Principal Investigator: Dr Mohamed Najar P A
Co-Investigators: M J Chaddha, Dr Suchita B Rai, Prachiprava Pradhan, K J Kulkarni, K R Rao
Team Members: Pradeep Manthena

This project aims to develop an innovative and viable process for the recovery of iron values from red mud generated at the alumina refinery plant and the utilization of non-iron part for insulation applications. Beneficiation techniques like magnetic separation and jigging would be used.
RECENT PUBLICATIONS

Research Papers Published


Research Paper Presented / Published in Conference Proceedings

1. R N Chouhan, P Mahendiran, VNSUV Ammu, A Agnihotri, Quality of AA6063 Alloy Billets, 8th International Bauxite, Alumina & Aluminium Conference & Exhibition (IBAAS), Guiyang, China, 4-6th September, 2019.

2. VNSUV Ammu, P Mahendiran, R N Chouhan, S Ambade, P Dungore, A Agnihotri, Die design and press validation for a complex profile produced by port hole dies using AA6063 alloy, 8th International Bauxite, Alumina & Aluminium Conference & Exhibition (IBAAS), Guiyang, China, 4-6th September, 2019.


Invited lectures


Patent filed

European Union delegates at JNARDDC

The delegation from European Union’s Resource Efficiency Initiative for India (EU–REI) led by Dr Dieter Mutz visited our Centre on 20th September, 2019 to discuss and chalk out the way forward for future cooperation among the participating organizations viz. EU, JNARDDC, NEERI, AMPRI and IMMT. The meeting stressed upon the need of future collaborations for the benefit of Indian refineries and stakeholders in effectively managing the bauxite residue. The way of adapting international standards and best practices in business on resource efficiency and fostering the efficient and sustainable use of natural resources was also discussed.

EU–REI delegation at JNARDDC

JNARDDC hosted 19th PERC meeting

The 19th Project Evaluation & Review Committee (PERC) meeting was held under the Chairmanship of Shri Aleck Chandra, Economic Adviser, Ministry of Mines, during 6-7th August, 2019 at JNARDDC. Around 30 proposals covering different areas, namely Geosciences & Exploration, Mining, Mineral Processing, Metal Extraction (Metallurgical processes) and Alloys, Specialty Materials & Product were evaluated, out of which 11 project proposals were recommended to SSAG for approval. The committee also reviewed 4 ongoing projects and recommended acceptance of 13 completed projects.
Prof T C Rao’s visit to JNARDDC

Prof T C Rao, Former Director, CSIR-Advanced Materials and Processes Research Institute (AMPRI), Bhopal and Ex-HoD, Fuel and Mineral Engineering, ISM, Dhanbad was invited as an expert to review the ongoing S&T projects of JNARDDC. During his visit on 16th July, 2019, Prof Rao lent his invaluable guidance and support in providing direction to the research activities being carried out at JNARDDC, and also suggested new research areas which could be dwelt upon by scientists.

JNARDDC participation in ICNFMM-2019

23rd International Conference on Nonferrous Minerals and Metals-2019 was organized by Corporate Monitor in association with JNARDDC, Aluminium Association of India (AAI) and CSIR-CGCRI at Kolkata on 12-13th July, 2019 for promoting recycling and utilization of non-ferrous metal processing wastes. Four research papers were also presented by JNARDDC during the event.
JNARDDC was an associate organizer for 8th International IBAAS Conference & Exhibition (IBAAS-GAMI) on “Technological Advances in Alumina, Aluminium Smelter, Downstream Fabrication, Energy Conservation, Environmental Protection and Smart Manufacturing with Special Reference to China” held during 4-6th September, 2019 at Guiyang, China. Along with JNARDDC, CHINALCO, CHALICO, International Aluminium Institute (IAI), IBAAS etc. have also participated. Scientists from JNARDDC presented their papers in the areas of downstream applications, utilization of industrial rejects and bauxite residue, out of which, one was adjudged as the best paper in downstream category. As a part of conference, JNARDDC team visited Huajin Alumina, Guizhou Huairen Aluminium, Chongqing Huafen Aluminium Corporation and Nanping Aluminium and discussed about the possible collaboration on metal recycling & waste management.

CMD, HCL visited JNARDDC

Shri Santosh Sharma, Chairman-cum-Managing Director, Hindustan Copper Ltd., Kolkata visited JNARDDC on 16th August, 2019 for having a close look at the facilities and expertise available at the Centre and appreciated the services provided by the Centre to the aluminium industries. He expressed his keen interest to collaborate with JNARDDC in future.
Metal Asia Excellence Award

Dr. Arupam Agnihotri was felicitated with Metal Asia Excellence award during the 23rd International Conference on Non-Ferrous Minerals and Metals 2019 for his contribution in the field of aluminium.

Felicitation of Dr. Agnihotri

**Best Paper Award at IBAAS-GAMI 2019**

Mr. R.N. Chouhan, Principal Scientist from JNARDDC presented a paper during 8th IBAAS International Conference & Exhibition (IBAAS-GAMI) held on 4–6th September, 2019 at Guiyang, China. His paper titled “Quality of AA5063 Alloy Billets” bagged best paper award in the downstream category.

Mr. R.N. Chouhan receiving best paper award during IBAAS-GAMI 2019

**JNARDDC Scientist at Workshop on RE & CE**

Mr. R.N. Chouhan, Principal Scientist, JNARDDC attended workshop on “Training of Trainers (ToT) on Resource Efficiency (RE) and Circular Economy (CE)” program jointly organized by European Union - Resource Efficiency Initiative & Ministry of Environment, Forest and Climate Change, Govt of India (GoI) during 5-6th December, 2019 at New Delhi. This program covered foundation courses on sectoral approaches as well as development of RE and CE activities. As Ministry of Mines, GoI nominated JNARDDC as a nodal agency for conducting capacity building programs on RE and CE in aluminium sector, similar modules and concepts will be incorporated in future training programs on capacity building.

Participants of ToT program
Superannuation of Dr S P Puttewar

Dr Suresh Pundlikrao Puttewar, who joined JNARDDC on 4th May, 1992, superannuated from the services of JNARDDC as Senior Principal Scientist with effect from 30th November, 2019. During his pristine career of 27 years he contributed significantly to the bauxite and analytical services of Centre. He proved to be an apt administrator and was able to execute time bound jobs of MECL, GSI and also assisted in the set up of the 14 MN extrusion plant. JNARDDC family wishes him a healthy and prosperous retired life.

Valedictory function of Dr S P Puttewar

Valedictory of Mr P Mahendiran

Mr Periyasamy Mahendiran, Senior Scientist (Downstream Division) resigned his job on 30th September, 2019 after serving JNARDDC for more than 13 years. Mr Mahendiran, an alumnus of IISc Bangalore played an active role in the execution of several projects viz. “Development of friction stir welding technique for aluminium-steel joint”, “Developing downstream application of strip cast aluminium alloys (AA8011 & AA3004)”, “Development of super thermal aluminium (STAL) conductor for indian power sector” and “Integrated approach for development of process models and pilot production of aluminium alloy extrudates using porohole dies”. He was adept in handling the Scanning Electron Microscope (SEM) and made notable contributions in installing 14MN extrusion press at JNARDDC. The Director and staff accorded him a warm farewell and wished him every success for his future endeavors.

Mr P Mahendiran
Appointment of Director, JNARDDC as the Chairman of the Indian Institute of Metals, Nagpur Chapter

Director along with scientists from JNARDDC attended Annual General Body Meeting of Indian Institute of Metals (IIM), Nagpur Chapter on 30th November, 2019 at VNIT Nagpur, which was held for formation of new executive body. Dr Agnihotri, the Chairman of the newly elected body of IIM, Nagpur Chapter laid out the plan of activities for the year 2020. During the event, Mr Moreshwar Zade, an alumnus of the Metallurgical and Materials Engineering Department, VNIT, was felicitated for his selection as Executive Director, SAIL-MEL Chandrapur.

Dr Agnihotri during felicitation of Shri Moreshwar Zade

Safety training

A training on “Safety and First Aid Operations” was organized on 5th November, 2019 at JNARDDC for acquaintance of first aid procedures to be followed in laboratory. Dr Prakash C. Roondhe from NIMH, Nagpur, delivered the lecture about the various casualty incidents that could encounter during day-to-day activities in the lab, and the appropriate remedial first aid operations required. The event came out to be successful with participants from different divisions of JNARDDC and NIMH.

Dr Roondhe delivering lecture during the training
JNARDDC sporting event 2019-20

In order to rejuvenate the team spirit and keeping alive the competitiveness, mental & physical toughness, annual sporting event was inaugurated by Director, JNARDDC on 2nd December, 2019. Participants will compete against each other in sports like carrom, table tennis, badminton and cricket. The event received a widespread participation as usual and will be a big success while bringing freshness to the minds which are otherwise engaged in serious research activities.

Joint vigilance awareness week program at JNARDDC

JNARDDC & NIMH jointly observed Vigilance Awareness Week from 28th October to 2nd November, 2019 with “Integrity - A way of Life, (ईमानदारी-एक जीवन शैली)” as the theme. The observance of the Vigilance Awareness Week commenced with the Integrity Pledge by all employees of JNARDDC and NIMH during the inaugural function. Chief guest, Shri Vinod Dayashankar Goeghate, Chief Vigilance Officer (CVO), MECL, Nagpur addressed the gathering explaining how general awareness and daily practices get rid corruption, an unethical practice and social evil. Dr Agnihotri said that the purpose of vigilance awareness week is to educate employees at large about the corruption related practices and educating them how to report about it. Dr Upendra Singh, CVO, JNARDDC and Dr S Pingle, CVO, NIMH were also present during the event.
वन महोत्सव

जयपुर राजस्थान राज्य में एक वन विकास अभियान का आयोजन 23 जुलाई, 2019 को किया गया था। कार्यक्रम में जिले बैंक के वरिष्ठ नेता भी उम्मीद वाले नेता द्वारा सम्मानित की गई। कार्यक्रम में प्रभावी यथा विनिर्देशक ने दिए चुनाव 33 जिले ने लगाए गए वन तत्वों का आयोजन किया। नेता बैंक के वरिष्ठ नेता ने दिए चुनाव 33 जिले ने लगाए गए वन तत्वों का आयोजन किया।

जो एन ए आर डी डी सी में स्थानांतरित दिवस समारोह

स्थानांतरित दिवस भारत के लोगों के लिए बहुत महत्त्व का दिन है। यह दिन 1857 में 15 अगस्त को ब्रिटिश साम्राज्य से देश की आजती को समर्पित किया गया था। यह दिवस स्थानांतरित दिवस को उत्तरी व्यक्तियों के साथ मनाया जाता है। इसके बाद भारतीय सैन्य ने कार्यालयों एवं उनके परिवारों के साथ समारोह को समाप्त किया।
जवाहरलाल नेहरू एन्ज्युमीनियम अनुसंधान विकास एवं अभिकल्प केंद्र एवं राष्ट्रीय खोज एवं स्वास्थ्य संस्थान, नागपुर में संयुक्त रूप से हिंदी राजभाषा पक्षवादा आयोजन

हिंदी पक्षवादा के दौरान गणमान्य व्यक्तिगति

जे एन ए आर डी डी सी में गणेश उत्सव समारोह

गणपति विशेषज्ञ
Density Kit

Make: Mettler Toledo
Model: MS603TSA00
Maximum Capacity: 600 g
Readability: ± 1 mg

Description: Used for determination of density and specific gravity of ores, rocks and other materials. Other applications include weighing, back-weighing, differential weighing, check weighing, totaling, formulation, density, dynamic weighing, percent weighing, counting and factor weighing.

Crush Test Press

Make: FLOXLAB, France
Model: FLOXLAB A3-36041
Maximum pressure: 20,000 psi

Description: The proppant crush test apparatus conducts proppant crush-resistance experiments to determine crushing strengths of ceramic, sand, proppants and other materials. The amount of proppant crushed at a specific closure stress is determined in accordance with the test practices of the ISO 13503-2 standard. The device is capable of generating pressures up to 20,000 psi when used with a piston of 50 mm (2 in.) diameter. The piston displacement is maintained at a controlled and constant rate up to 2,000 psi per minute. This apparatus is fully automated, rapid and produces accurate data.

High Temperature Rotary Kiln

Make: Kinc Mineral Technologies Ltd, Vadodara
Capacity: 5-20 kg/batch
Maximum temperature: 1550°C

Description: Used for the calcination of proppant granules and other materials. This 8 m long kiln, which is installed at JNARDDC, operates in the counter current flow configuration and uses diesel as fuel. Oil fracturing proppant is mainly used for petroleum and natural gas exploration. The granules will be fed into kiln shell from one end of the kiln and with the help of slow tilting rotation of the kiln body, the balls will do circular rolling and move toward the other end of the kiln body.
In-house R&D activities (Waste Utilisation)

Detoxification and utilization of lead slag

Geopolymerization of toxic slag and dust generated at lead smelting plants restricted the free movement of lead for safe utilization. Utilization of lead slag in combination with granulated blast furnace slag, fly ash and other rejects were successfully demonstrated for making suitable mix designs capable of generating building blocks and bricks (crushing strength in the range of 5-15 MPa).

Utilization of ferrosilicon slag and fume silica for building materials

Considering the chemical and physical properties of both fume silica and ferrosilicon slag, attempts were made for its conversion into geopolymer blocks (crushing strength 5-10 MPa) in combination with fly ash and lime sludge.

Delamination of plastic from aluminium foils

The developed method enables the separation of layers in 3-9 hours by organic-aqueous reagents. The process utilizes the presence of an aliphatic amine in the reagent mixture for quick separation of plastic and aluminium layers at room temperature for efficient and value-added recycling of plastic and aluminium.

Briquetting of baghouse carbon dust

A simple and easily adaptable process has been developed for briquetting of fine carbon dust (nano to micron particles) collected from the bag house of secondary aluminium industry.

Alpha alumina from clay minerals

Acid treatment route has been developed for the recovery of alpha alumina from aluminosiliceous industrial rejects such as laterite (L), partially lateritic khondalite (PLL), kaolinitic khondalite (KK), saprolite (S) etc. The developed method selectively separate alumina and silica in to two different entities; which holds specific value-added applications. The material is suitable for preparation of fused silica, ceramic and refractory applications, nano-silicates, silicagel, preparation of binders and fillers etc.
19th PERC meet held at JNARDDC

Staff Reporter

MINISTRY OF MINES and Nonferrous Industries, Aluminium Research Development and Design Centre (JNARDDC) held its 19th annual meeting of the Board of Directors at JNARDDC, Jamshedpur Road, On Sunday.

The meeting was held under the chairmanship of Shri. Jatin Sinha, Minister of State for Mines and Steel. The members of the board present during the meeting were: Dr. S. Pratap Singh, Director General; Dr. P. P. Pal, Assistant Director General; Dr. A. K. Bhattacharya, Additional Director General; Dr. C. S. Pillai, Chief Executive; Dr. R. C. Khanna, Additional Director General; and Shri. P. K. Singh, Additional Director General.

The meeting was attended by representatives of various industries and companies interested in the development of the aluminium industry in India.

THE TIMES OF INDIA

JNARDDC to hold capacity-building, awareness programme in Odisha

Staff Reporter

JNARDDC, in collaboration with the Ministry of Mines and Steel, will organize a capacity-building and awareness programme on aluminium from November 11 to 12 at Hotel Mayfair Lagoon, Bhubaneswar. The programme will be held under the guidance of the Ministry of Mines and Steel.

The programme will aim to build the capacity of the students serving in aluminium and waste management. As per the schedule, the programme will start from 9 a.m. on November 11.

New body of IIM Nagpur Chapter installed

Staff Reporter

A new body of the Institute of Management and Entrepreneurship (IIM) Nagpur was installed at the institute’s main campus on Monday. The new body’s installation was inaugurated by the President of the Institute, Dr. Rameshwar Tandon, and the new President of the Institute, Dr. Amrita Agarwal.

The new body includes representatives from various industries and companies interested in the development of the aluminium industry in India.

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THE TIMES OF INDIA

JNARDDC develops equipment to calculate instant data of bath chemistry at a low cost

By Jagdish Machnigny

JNARDDC, a well-known aluminium research, development and design Centre (NABOR), has developed an equipment which helps in optimization of production process at low cost. The equipment is installed at the India Bauxite beneficiation and aluminium production unit of Hindalco.

The equipment, named as "Bath Data Analyzer" helps in the optimization of the production process. The equipment calculates the instant data of the bath chemistry and provides feedback to the operators in real-time. This helps in the efficient operation of the production process.

The Bath Data Analyzer is a significant achievement for JNARDDC as it helps in reducing the time required for batch chemistry calculation. The equipment calculates the bath chemistry in just five minutes, compared to the traditional batch chemistry calculation which takes around 1.5 to 2 hours.

The equipment is equipped with a user-friendly touch screen display which provides real-time data of the bath chemistry. The equipment is also equipped with an alarm system which informs the operators in case of any deviation from the optimal values.

The equipment is capable of handling multiple batch chemistry calculations simultaneously, thereby reducing the overall time required for batch chemistry calculation.

The equipment is designed to be user-friendly and easy to operate. The equipment is also equipped with a manual mode which helps in case of any technical failure.

The Bath Data Analyzer is expected to reduce the production cost by up to 10% and improve the efficiency of the production process.

The equipment is now being used in various aluminium production units of Hindalco. The equipment is also being exported to other aluminium producers worldwide.

EU to share technologies with India for recycle of bauxite residue

Dr. Agnihotri to participate in international conference

The conference was attended by Dr. T.K. Chand, CMD, NLCL and other experts in the field of aluminium.

City Bharat

"स्पॉटलाइट"

Increasing demand of electric vehicles will raise use of aluminium in automotive sector till 2021

" up to 2021"

By Jagdish Machnigny

Increasing demand of electric vehicles will raise use of aluminium in automotive sector till 2021. The automotive industry is expected to witness a significant growth in the demand for aluminium due to the increasing use of electric vehicles.

According to a recent report by Allied Market Research, the global automotive aluminium market is expected to grow at a CAGR of 7.1% during the forecast period of 2020-2027. The report has highlighted the growing demand for lightweight materials in the automotive industry as a key driver of the market growth.

The report also highlights the growing demand for aluminium in the vehicle bodies and chassis of electric vehicles. The use of aluminium in the vehicle bodies and chassis helps in reducing the weight of the vehicle, thereby improving the efficiency of the vehicle.

The report further predicts that the increasing demand for lightweight materials will lead to an increase in the production of aluminium in the automotive sector. The report has also highlighted the increasing demand for aluminium in the production of electric vehicle batteries.

The report has further predicted that the increasing demand for aluminium in the automotive sector will lead to an increase in the production of aluminium in the automotive industry.

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Bauxite Miners Meet (BMM) - 2020

Bauxite Miners Meet (BMM) 2020 is being organized by Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC) on 20th March 2020 in Nagpur. This will provide a perfect forum for the stakeholders involved in bauxite mining and its subsequent users in understanding each other's exact requirements through discussions and deliberations on bauxite mining, quality, testing, business etc.

POSTPONED DUE TO COVID-19

BMM-2020
Bauxite Miner’s Meet

organised by

JNARDDC, Nagpur

20th March 2020
Venue: JNARDDC

Dr P.G. Bhuikte
Tel: 07104 222742 / Mob. No: +91 99600 20724
E-mail: pgbhuikte@jnardc.gov.in
ICNFM 2020

Under the aegis of Ministry of Mines, Corporate Monitor, in association with JNARDEC, Material Recycling Association of India (MRAI) and Aluminium Association of India (AAI) is organizing 24th International Conference on Non-ferrous Metals 2020 during 10 – 11th June, 2020 at Nagpur. The conference will feature a satellite session on “Environment-friendly technologies for primary & secondary metals”.

Visit us at: www.nonferrousmeet.net

24th International Conference on Non-ferrous Metals -2020
With Satellite Session on:
Environment-friendly Technologies for Primary & Secondary Metal Extraction

Radisson Blu Hotel, Nagpur, India
July 10-11, 2020

Organised by:
Corporate Monitor
In association with:
Jawaharlal Nehru Aluminium Research Development and Design Centre
Material Recycling Association of India &
Aluminium Association of India
Supported by:
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Media Sponsors: AL Circle, METAL ASIA

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UPCOMING EVENTS

IBAAS-JNARDDC 2020

International Bauxite, Alumina & Aluminium Society (IBAAS), jointly with JNARDDC is organizing 9th IBAAS International Conference & Exhibition (IBAAS-JNARDDC 2020) during 4 – 6th November, 2020 at Raipur. The title of the conference is ‘Sustainability Challenges of Bauxite, Alumina & Aluminium Industry’ with one day Aluminium Stewardship Initiative (ASI) workshop. The conference will focus on key topics and issues in the bauxite, alumina, aluminium and aluminium downstream industry and secondary sectors.

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