Minutes of 27th Project Evaluation & Review Committee (PERC) meeting held under the chairmanship of Shri Shakil Alam, Economic Advisor, Ministry of Mines from 18th to 19th July, 2025 at JNARDDC, Nagpur. The list of participants is enclosed in Annexure A.

1. Vide announcement no. Met4-14/6/2024(R&D) dated 17th April 2025, Ministry of Mines had invited Projects Proposals from Academic Institutions, Universities, National Institutes and R&D Institution recognized by the Department of Scientific and Industrial Research, Government of India, for up to 3 years duration in the identified thrust areas and identified directed research topics under R&D Component of Science and Technology Programme of Ministry of Mines. The last date for submission of Project Proposals on SATYABHAMA Portal (research.mines.gov.in) was extended from 31.05.2025 to 15.06.2025.
2. A total number of 221 new project proposals were received online on the portal. A two-stage review process was adopted to evaluate the proposals for recommendation to Standing Scientific Advisory Group (SSAG). The first stage comprised of preliminary screening of the proposals done by a team of experts constituted by Ministry of Mines. Based on the guidelines as adopted in 14th PERC, the experts conducted pre-screening of the proposals. After screening, 82 proposals covering three major groups (i) Metallurgy :- (Alloys, Rare Earths, Specialty materials and product : Metal Extraction (Metallurgical processes) : Circular Economy and Recycling of Non ferrous metals) (ii) Mining :- (Mining includes rock mechanics, design, equipments, energy, environment, safety : Geoscience and Exploration and Decarbonization : Green Technology in Mineral based industry) (iii) Mineral Processing :- (Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste : Extraction of strategic, critical minerals and REE) were considered by the PERC. In addition to the above, 2 project proposals (SNTMOM/1285/2024 & SNTMOM/1322/2024) was deferred by SSAG recommended that PERC may examine again these project proposals after on-boarding relevant industry partner and 2 project proposals (SNTMOM/1293/2024, & SNTMOM/1348/2024) were deferred by PERC to recommended for resubmission in next PERC. These projects proposals were also considered by PERC. The total of 86 projects proposals were considered for review. Three meeting rooms were arranged at JNARDDC, Nagpur for (a) Mining (b) Mineral Processing AND (c) Metallurgy.

As per the terms of reference of PERC, the concerned members recused themselves, to avoid conflict of interest, from the proceedings from that part of the meeting when project(s) related to their institute(s) was under consideration.

3. At the outset of the three groups meeting, the members were briefed about the following criteria for detailed evaluation of the project proposals of their respective group:-

i. Does the proposal cover the thrust areas?
ii. Is the problem well defined? Does the proposal adequately cover prior work both in the institution and elsewhere? Is it similar to any earlier work already

sanctioned; has the PI done prior work to prove proof of concept before submitting the project or is the project in the early stage itself?

iii. Does it address a critical gap in our country's needs and requirements? Is it similar to any earlier work already sanctioned; has the PI done prior work to prove proof of concept before submitting the project or is the project in the early stage itself?
iv. Does it address a critical gap in our country's needs and requirements?
v. Is the methodology of work well laid out and doable?
vi. Are the deliverables well defined?
vii. Is there a translational potential for application / user interface? Can it move to higher TRL?
viii. Does the PI and institution have adequate competence to do the proposed research?
ix. Is there collaboration with another Lab or institution or industry to enhance the quality and quantum and application potential?
x. Budget: Is the budget correctly done? Is there deficiency or excess?
xi. Time duration?
xii. Any other comments.

4. The three panels met together under the chairmanship of EA (Mines) and finalized the projects for recommendation to the next level. After detailed discussions, the projects were selected for recommendation to the next SSAG level, recommended with modifications to SSAG or asked the PIs to revise and attempt a resubmission to the next PERC or not recommended at all. The details are given in the succeeding paragraphs.It was also decided in the meeting that under the mandatory requirements, contributions from industry and MSMEs shall be exclusively in the form of cash only (20% from industry and 10% from MSMEs) and the guidelines may be modified accordingly.

Final recommendation to SSAG as per details below:-

i. Recommended to SSAG: 15 Project Proposals
ii. Recommended with modifications to SSAG: 33 Project Proposals
iii. Resubmission to next PERC: 5 project Proposals
iv. NOT recommended: 33 Project Proposals

Project Evaluation of Resubmitted project proposals to PERC: 4 Nos.

1.	
Project No.	SNTMOM/1285/2024
Project Title	An examination into the innovative applications of aluminothermic reduction to recover zinc from electric arc furnace dust
Thrust Area	Metal Extraction (Metallurgical processes)
Institution	Annamalai University
	Dr. P. Premkumar 9894977835,ppklmeau@gmail.com C PI:-

Principal Investigator/ Constituent PI	Dr. S.Rajasomashekar 9345510460, rajasomashekar@yahoo.in Dr. C.G. Saravanan 9843064772, tmvasanth67@gmail.com Dr. T. Balasankar 9443573843, drtbalasankar@rediffmail.com
Industry Partner /Contribution	Salem Steel Plant (SSP) and NLC India Limited ₹ 5,08,005
Project Cost & Duration	₹ 32,94,750 1 Years, 6 Month
Contribution of MoM	₹ 27,86,745
Objectives of the project	The objectives of the project focusing on the recovery of zinc from electric arc furnace (EAF) dust using aluminothermic reduction are outlined as follows: i. Optimization of Reaction Parameters: To determine the optimal mix ratio of EAF dust to aluminum, the precise reaction temperature, and the duration necessary to maximize the yield and purity of recovered zinc. This objective aims to refine the process to ensure maximum efficiency and effectiveness in zinc recovery. ii. Environmental Impact Assessment: To evaluate the environmental benefits of the aluminothermic reduction process for zinc recovery from EAF dust, particularly in reducing landfill usage and minimizing hazardous waste. This assessment will also identify any potential environmental risks associated with the process and propose mitigation strategies. iii. Economic Analysis: To assess the cost-effectiveness of the aluminothermic reduction process compared to traditional methods of EAF dust disposal and other metal recovery technologies. This analysis will include a breakdown of capital and operational costs, potential revenue from recovered zinc, and overall financial viability. iv. Scalability Study: To explore the scalability of the aluminothermic reduction process for industrial application across India. This will involve investigating the technical and economic challenges of scaling up the process from pilot to full-scale operations, including considerations for logistical, infrastructural, and regulatory factors. 5.Techn
REMARKS/SUGGESTION:	
Recommended with modifications	1. PI has complied with the recommendations of last PERC. 2. There is novelty and Industry partner has been tied up. 3. Industry contribution should be at least 20%.
2.	
Project No.	SNTMOM/1293/2024
	Technology development of sustainable homogenizes aluminium

Project Title	alloy production using ai-collaborative robot integration in advanced recycling process to suit SMEs
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	SNR Sons Charitable Trust
Principal Investigator/ Constituent PI	Dr. C. Bhagyanathan 9047026422, bhagyanathan.chandragandhi@srec.ac.in Co.PI: Dr. V. Rukkumani 9944642533, rukkumani.v@srec.ac.in Dr. P. Karuppuswamy 9994622850, hod-mech@srec.ac.in
Industry Partner /Contribution	Indo Shell Cast Private Limited ₹ 35,00,000
Project Cost & Duration	₹ 99,80,950 2 Year
Contribution of MoM	₹ 64,80,950
Objectives of the project	i. Enhancing Melt Quality Monitoring and Standardization ii. Establish real-time melt quality inspection. iii. Develop a Standard Operating Procedure for recycled alloys. iv. Integrated visual inspection system for continuous quality assessments. v. Implement AI-driven cobots for precise, consistent pouring of molten aluminium. vi. Develop high-capacity conveyor systems and predictive maintenance algorithms for streamlined material flow.
REMARKS/SUGGESTION:	
Recommended	1. Project idea is good 2. The PI has complied with the previous PERC recommendations. 3. End user beneficiary / Industry partner included from the foundry sector of Coimbatore. 4. Industry contribution is around 35% of project cost.

3.	
Project No.	SNTMOM/1322/2024
Project Title	Advanced ai system for efficient aluminium scrap sorting-computer vision, deep learning ensemble, and robotics for sorting by colour, texture, and shape
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Vellore Institute Of Technology
Principal Investigator/ Constituent PI	Dr. Kathirvelan J 9500356597,j.kathirvelan@vit.ac.in Co. PI: Dr. Sharmila A 9942029141, sharmilaa@bitsathy.ac.in

Industry Partner /Contribution	Galore Systems Pvt Ltd, Bangalore ₹ 10,41,119
Project Cost & Duration	₹ 52,05,597 2 Year
Contribution of MoM	₹ 41,64,478
Objectives of the project	i. Development of an Advanced Computer Vision System with Depth Sensing with state-of-art technologies: - Designing and implementing a state-of-the-art computer vision system capable of capturing high-resolution images with depth information for enhanced accuracy in scrap identification. ii. Optimization of Deep Learning Algorithms for Ensemble Model Prediction for the first time in this domain: - Fine-tuning deep learning algorithms within an ensemble model framework to accurately predict and classify metal scraps based on light reflection, intrinsic pattern, color and shape descriptors. iii. Deployment of a Fully Trained Scrap Detection Ensemble Model in ROS-Compatible Robots for custom applications: - Implementing the optimized ensemble model in collaborative robotic systems using the Robot Operating System (ROS) to facilitate precise and efficient scrap sorting. iv. 4. Development of a High-Performance Control System for ROS-Compatible Robotic System in a cost effective manner: - Creating a cost-effective control system for ROS-compatible robot, focusing on high throughput and robust kinematic performance to ensure effective and accurate scrap handling and sorting.
REMARKS/SUGGESTION:	
Recommended	1. Project idea is good. 2. The PI has complied with the previous PERC recommendations. 3. Deliverables will lead to the development of an AI system for efficient aluminium scrap sorting. 4. Industry funding of 20% has been ensured by PI.

4.	
Project No.	SNTMOM/1348/2024
Project Title	Fiber laser induced break-down spectroscopy for real-time analysis of ores and aluminium
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	CSIR Central Glass and Ceramic Research Institute, JNARDDC
Principal Investigator/	Atasi Pal, 9836562606, atasi@cgcri.res.in Co-PI:

Constituent PI	Pravin G Bhukte 9960020724, pgbhukte@jnarddc.gov.in
Industry Partner /Contribution	HINDALCO ₹ 75,00,000
Project Cost & Duration	₹ 2,43,10,000 2 Year 6 month
Contribution of MoM	₹ 1,68,10,000
Objectives of the project	The project aims on development of high energy pulsed Ytterbium fiber laser (YFL) as a source for laser induced break-down spectroscopy (LIBS) to provide rapid, accurate and non-destructive analysis of raw materials, particularly ores and aluminium. The primary objectives are i. Fiber laser – Compact YFL design: a. operating wavelength of 1064 nm b. pulse duration of 1–100 ns to deliver essential energy to ablate sample to create plasma plume c. pulse duration <1 ps to minimize thermal effects, improve ablation precision and enhance signal-to-noise ratio d. high beam quality to ensure localized plasma generation and enhance the spatial resolution of the LIBS system. ii. Compact laser module – Ruggedized packaged fiber laser including control electronics and user interface, heat dissipation and housing. iii. LIBS system – Opto-mechanical system for laser focusing on the sample, sample holder and emission collection optics for spectroscopy analysis, spectrometer along with the advanced software are key parts of a complete LIBS system. The ideal laser parameters (e.g., wavelength, power, pulse duration) and optical configurations for precise elemental detection in complex ore matrices and aluminium alloys will be identified to achieve LIBS spectral resolution within the range of 0.1 to 0.3 nm and spatial resolution of 50-200 micron in collaboration with New Age Instruments & Materials Pvt. Ltd. iv. System benchmarking –In collaboration with JNARDDC, study of deposits and co
REMARKS/SUGGESTION:	
Recommended	1. It is an innovative idea and implementation of the technology will be beneficial for Atmanirbhar Bharat Abhiyan. 2. Indigenisation of the technology will be helpful for on exploited/unexploited mines, recycling. 3. PI should include a mining professional in the project team for effective deliverables of project outcomes.

Project Evaluation of new proposals: 82 Nos.

1	
Project No.	SNTMOM/1435/2025
Project Title	Development of plastic china clay as import substitute for high-tension electrical insulators and other ceramic industry
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	Maulana Azad National Institute of Technology Bhopal
Principal Investigator/ Constituent PI	Ramesh Kumar Nayak 8763724080, rameshkumarnayak@gmail.com
Industry Partner /Contribution	Bansi Global Minerals ₹ 22,00,000
Project Cost & Duration	₹ 87,56,000 2 Year
Contribution of MoM	₹ 65,56,000
Objectives of the project	i. To evaluate the chemical composition, physical, mechanical and electrical properties of existing electro-porcelain insulator made from imported plastic china clay. ii. To design and develop the tailor-made composition of plastic china clay using Indian China clay minerals and benchmarking with imported china clay. iii. To study the relationship between the chemical composition, microstructure, mechanical strength and electrical properties of newly developed electro-porcelain insulator in laboratory for high-tension electrical applications. iv. 4. To design and optimize the process parameters for mass production of high-tension electro-porcelain insulators using engineered plastic china clay at IEC, Mandideep, Bhopal, Madhya Pradesh (TRL-5)
REMARKS/SUGGESTION:	
Not recommended	1. Proof of concept is not developed for the Indian China clay for production of high-tension electro-porcelain insulators. 2. Project is below TRL-3.

2.	
Project No.	SNTMOM/1436/2025
Project Title	Tantalum recovery from waste tantalum capacitor
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	Indian Institute of Technology Bombay
	Jayasree Biswas 8100485948, biswasj@iitb.ac.in

Principal Investigator/ Constituent PI	Co PI:- Deepoo Kumar 8395934660, deepook@iitb.ac.in
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,97,500 1 Year 6 Month
Contribution of MoM	₹ 9,97,500
Objectives of the project	Develop an extraction process for recovery of Ta from waste Ta Capacitors. The key objectives are - Asses the thermodynamic feasibility of melting of Ta capacitors - Investigate the efficiency and purity of Ta separation through melting route
REMARKS/SUGGESTION:	
Recommended with modifications	1. Project is relevant and important for extraction of strategic critical minerals. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction within Rs. 10 Lakhs.

3.	
Project No.	SNTMOM/1438/2025
Project Title	Setting up of one tone per day pilot plant for hydro-chemical delamination of flexible multi-layer packaging refuses to recover metallic aluminium and polymers
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	JNARDDC, Jawaharlal Nehru Aluminium Research Development and Design Centre, Nagpur
Principal Investigator/ Constituent PI	Mohamed Najar 9890826441, najar@jnarddc.gov.in Co PI:- Paparao Mondi 09164898889, yourspop@gmail.com Upendra Singh 9422980366, singhu@jnarddc.gov.in
Industry Partner /Contribution	Alumicopper Private Limited ₹ 13,12,065
Project Cost & Duration	₹ 87,47,100 1 Year
Contribution of MoM	₹ 74,35,035
Objectives of	Setting up of One Tone per Day pilot plant for Hydro-chemical

the project	Delamination of Flexible Multi-layer Packaging (MLP) Refuses for recovering of metallic aluminium and polymers
REMARKS/SUGGESTION:	
Recommended	1. Detailed proof of concept already established by JNARDDC and lab scale studies successfully completed up to 1 kg. 2. JNARDDC holds the IPR right of the lab scale process for wet delamination of flexible Multi-layer Packaging (MLP). 3. Process developed at JNARDDC will be scaled up to 1 TPD plant and commercialisation by the industry partner.

4.	
Project No.	SNTMOM/1440/2025
Project Title	Next generation copolymeric reagent for cost-efficient beneficiation of low-grade iron ore.
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	Indian Institute of Technology ISM Dhanbad
Principal Investigator/ Constituent PI	Sagar Pal 9471191529, sagarpal@iitism.ac.in
Industry Partner /Contribution	TEXMiN (Technology Innovation in Exploration & Mining) Foundation, IIT(ISM) Dhanbad ₹ 25,00,000
Project Cost & Duration	₹ 53,05,232 2 Year
Contribution of MoM	₹ 28,05,232
Objectives of the project	The overall objective of the proposed project is to design, develop a new copolymeric selective flocculant towards enhanced iron ore recovery from low grade iron ore. Accordingly, several sub-objectives (given below) are proposed to achieve the overall goal of the project: i. To synthesize, optimize and upscaling of a copolymer: A new copolymer would be developed initially at lab scale and the optimization of the best performing copolymer would be determined. ii. To characterize the synthesized copolymer: The synthesized copolymer will be thoroughly characterized using various advanced analytical techniques [such as NMR spectral analysis (for confirming the successful synthesis), morphological analysis (using FESEM and TEM), molecular weight analysis (using a GPC), particle size and surface charge analysis (using a Particle Size and Zeta potential analyzer, which is proposed in this proposal as Capital item)] to confirm the formation of the new flocculant. iii. To evaluate the efficiency at the lab scale, optimization of process parameters and pilot scale trial: The efficiency of

	the copolymeric flocculant towards the selective beneficiation would be carried out initially at laboratory scale and simultaneously the process parameters (like optimal flocculant dose, effect of pH on the process, influence of pulp density, mixing intensity, settling time etc.) will also be optimized. Also, a fundamental understanding of the mechanism of selective flocculation by investigating the interactions between the flocculant and the mineral surfaces will be studied. Finally, the synthesized copolymer would be used for pilot scale trial towards the selective recovery of high-grade iron ore from the mixture of gangues.
REMARKS/SUGGESTION:	
Recommended	1. Selective reagent is already developed and TRL-4 is demonstrated. Target is to go up to TRL-7. 2. Deliverables will lead to development of a new copolymeric selective flocculant towards enhanced iron ore recovery from low grade iron ore. 3. Industry partner will scale up the reagent production. 4. End user is Tata Steel and they have confirmed their consent for pilot plant testing for at least 5 trials.

5.	
Project No.	SNTMOM/1442/2025
Project Title	Development of metal scrap sorting framework utilizing artificial intelligence and computer vision techniques
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	National Institute of Technology Rourkela
Principal Investigator/ Constituent PI	Manish Okade 8895853758, okadem@nitrkl.ac.in Co.PI:- Snehashish Chakraverty 9438135400, sne_chak@yahoo.com
Industry Partner /Contribution	Vidita Solutions ₹ 4,25,542
Project Cost & Duration	₹ 60,79,180 3 Year
Contribution of MoM	₹ 56,53,638
	i. Developing metal scrap sorting algorithms using computer vision based HSV color model. ii. Developing metal scrap sorting algorithms utilizing color features in a Machine Learning (ML) framework. iii. Developing metal scrapsorting algorithms utilizing shape features in a Machine Learning (ML) framework. iv. Developing metal scrap sorting algorithms utilizing hybrid features in a Machine Learning (ML) framework. v. Developing metal scrap sorting models based on

Objectives of the project	Generative AI and Generative Adversarial Networks (GANs). vi. Developing metal scrap sorting models based on Deep Learning (DL) techniques. vii. Development of Metal scrap separation cobot (post sorting) using camera powered by developed algorithms/models, and testing it on a conveyor belt system. viii. Development of a framework showcasing the utility of metal scrap sorting using AI techniques, followed by technology transfer for commercialization. ix. Development of related approximate mathematical model(s) for better analysis of the experimental data and to validate the above AI models. x. Development of the models mentioned in point 9 in the uncertain scenario.
REMARKS/SUGGESTION:	
Recommended with modifications	1. The PI has completed enough preliminary work, and an industry partner is engaged. 2. Good work on deep technologies and algorithms, developing data sets, making them publicly available, and relating the work to the recycling sectors. 3. Project duration should be 2 years with proportionate budget reduction to Rs. 54 Lakhs with minimum 8% industry contribution in cash.

6.	
Project No.	SNTMOM/1443/2025
Project Title	Development of an indigenous non-ferrous metal sorting and separating (nomess) cobotic system
Thrust Area	Circular Economy and Recycling of Non Ferrous Metals
Institution	Godavari Global University Rajamahendravaram, Andhra Pradesh 533296, Sri Koundinya Educational Society
Principal Investigator/ Constituent PI	Jeya Jeevahan Yarlanki 9176901505,jeya.jeevahan@gmail.com Co.PI:- Yarlanki Vinod Kumar 8790852783, vinodmining@giet.ac.in
Industry Partner /Contribution	Advance Mechanical Services Pvt Ltd, Bangalore - 560058 ₹ 5,90,000
Project Cost & Duration	₹ 39,25,198.99 2 Year
Contribution of MoM	₹ 33,35,198.99
	i. Development of an indigenous NOMESS Cobotic system with an industry-ready 6-axis cobot having a payload capacity of 5 kg, flexible gripper, material handling system

Objectives of the project	and other required accessories. ii. Implementation of a machine vision system with RGB-D camera system to capture the materials moving on the conveyor and integrating with AI/ML technology to classify them by non-ferrous metal type. The product is expected to identify the non-ferrous metal types, namely, aluminium, copper, zinc, nickel and lead. iii. Evaluation of the proposed NOMESS Cobot for the effective sorting and separation of non-ferrous materials with the accuracy of >95% and compare the effectiveness in terms of time, cost and other benefits relative to the traditional manual sorting and separation.
REMARKS/SUGGESTION:	
Resubmission in next PERC	1. Project idea is good with sound industry partner in automation systems. 2. Project to be resubmitted with an additional partner with relevant recycling company 3. Prior work be completed before resubmission.

7.	
Project No.	SNTMOM/1444/2025
Project Title	Development of high-performance aluminum alloy strips via advanced twin roll casting (trc) for automotive and aerospace applications driving sustainable recycling in the circular economy
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	Indian Institute of Technology ISM Dhanbad
Principal Investigator/ Constituent PI	Kasturi Sala 9439348624, kasturi@iitism.ac.in Co.PI: Dr. Lalish Kumar
Industry Partner /Contribution	TEXMiN (Technology Innovation in Exploration & Mining) Foundation, IIT(ISM) Dhanbad ₹ 10,11,400
Project Cost & Duration	₹ 50,57,000 2 Year
Contribution of MoM	₹ 40,45,600
	i. Optimized Alloy Composition Design and Material Selection: Develop detailed alloy compositions for AA7XXX and AA2XXX series using thermodynamic principles and phase diagram analysis, supported by computational thermodynamics (JMAT-PRO) to ensure phase stability and optimize alloying elements. Emphasis will be placed on selecting elements favorable for resource efficiency and recycling compatibility. ii. Advanced Processing and Microstructure Control: Investigate the influence of TRC parameters-including

Objectives of the project	cooling rates, roll speed, and rolling temperature on microstructural evolution and dislocation configurations of AA7XXX and AA2XXX alloys. Employ advanced characterization techniques (SEM, EBSD, TEM) to optimize grain refinement and minimize defects. iii) Segregation Minimization and Real-Time Process Optimization: Conduct systematic testing to evaluate and control centerline and inverse segregation during TRC. Develop real-time monitoring approaches using inline sensors or thermal imaging, combined with feedback control mechanisms to dynamically adjust process parameters and achieve uniform microstructure. iii. Mechanical and Corrosion Performance Optimization: Evaluate mechanical properties, including tensile strength, ductility, and fracture toughness, alongside corrosion resistance under relevant environmental conditions. Enhance corrosion protection through alloy composition tuning and surface treatments to ensure durability and safety in automotive and aerospace applications. iv. Sustainable Manufacturing and Circular Economy Integration: Assess energy consumption, material efficiency, and carbon footprint reduction enabled by the improved TRC process. Validate the use of recycled aluminum feedstocks, ensuring compatibility and performance to support circular economy goals and promote sustainable resource utilization. v. Pilot-Scale Demonstration, Market Preparation, and Technology Transfer: Analyze results to refine alloy processing and scale up product
REMARKS/SUGGESTION:	
Resubmission in next PERC	1. Project idea is in TRL-3 / academic level. 2. It is recommended to interact with ALMEX industry professionals who specialise in the production of automobiles and aerospace using the 2XXX and 7XXX series. 3. Prior work to be done. 4. Aluminium sector industry partner to be taken on board. 5. Resubmit after doing applied work with proof of concept with specific applications with either 2XXX or 7XXX series.

8.	
Project No.	SNTMOM/1445/2025
Project Title	Setting up of 1 tpd pilot plant for the recovery of salt from waste aluminum dross
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	JNARDDC, Jawaharlal Nehru Aluminium Research Development and Design Centre
	Upendra Singh

Principal Investigator/ Constituent PI	9422980366, singhu@jnarddc.gov.in Co.PI:- Ms Jyoti G. Pendam, Scientist 9158610779, jyoti@jnarddc.gov.in
Industry Partner /Contribution	Alumicopper Private Limited ₹ 17,35,286
Project Cost & Duration	₹ 1,15,68,570 1 Year
Contribution of MoM	₹ 98,33,284
Objectives of the project	Setting up of 1 TPD pilot plant for processing aluminium waste dross. Optimization of process parameter of different unit operation (Leaching, Filtration and Evaporation) Recovery of salt from waste dross and characterization.
REMARKS/SUGGESTION:	
Recommended	1. Proof of concept is demonstrated. 2. Relevant problem is identified and technically feasible solution is proposed. 3. Deliverables will lead to setting up of 1 TPD pilot plant for processing aluminium waste dross for recovery of salt followed by commercialization by the industry partner.

9.	
Project No.	SNTMOM/1449/2025
Project Title	Development of red mud based pigment & filler for paint and allied industry
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	JNARDDC, Jawaharlal Nehru Aluminium Research Development and Design Centre
Principal Investigator/ Constituent PI	Pravin G Bhukte 9960020724, pgbhukte@jnarddc.gov.in Co.PI:- Dr Md. Najar 9890826441, najar@jnarddc.gov.in
Industry Partner /Contribution	CHEMSPERTS ₹ 98,950
Project Cost & Duration	₹ 91,41,540 2 Year
Contribution of MoM	₹ 82,27,386
Objectives of the project	i. Use of red mud as pigment in different types of water base and solvent base paints – primer, intermediate & topcoat. ii. Alteration of red mud into iron oxide-based precursor as per IS 44 1991
REMARKS/SUGGESTION:	
	1. Proof of concept is demonstrated.

Recommended	1. Process technology established at TRL 4 and is scalable. 2. Industry partner will facilitate for commercialization. 3. It will lead to alternate uses of red mud.

10.	
Project No.	SNTMOM/1453/2025
Project Title	Recovery of sulphur free nickel from pharmaceutical spent catalyst sludge to achieve zero waste
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	JNARDDC, Jawaharlal Nehru Aluminium Research Development and Design Centre VNIT, Nagpur.
Principal Investigator/ Constituent PI	Shweta Dhamande Naik 8408880695, shweta@jnarddc.gov.in Dr Kailas Wasewar 8422558423, klwasewar@che.vnit.ac.in Co.PI:- Sridevi T. E. 9894013610, msridevi@nitt.edu Jyoti Pendam 9158610779, jyoti@jnarddc.gov.in
Industry Partner /Contribution	ABN Metal Recycling pvt. Ltd ₹ 3,10,261
Project Cost & Duration	₹ 62,05,210 1 Year
Contribution of MoM	₹ 55,84,689
Objectives of the project	i. Development of process Sulphur free Nickel from pharmaceutical spent catalyst sludge ii. Recovery of Alumina and soda from residue after desulphurisation
REMARKS/SUGGESTION:	
Recommended	1. Proof of concept is demonstrated and detailed study has been done at TRL 4 level. 2. Deliverables will lead to recovery of sulphur free nickel to achieve zero waste concept. 3. Industry partner will facilitate to scale up.

11.	
Project No.	SNTMOM/1459/2025
Project Title	Genius membrane for critical minerals- greener extraction with next-generation integrated membrane-based uptake systems for critical minerals
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	Indian Institute of Technology Hyderabad
Principal	Ambika S 09600053763, ambika@ce.iith.ac.in

Investigator/ Constituent PI	Co.PI:- Dr.Vamsi Vikram 8686528453, vamsigande@che.iith.ac.in
Industry Partner /Contribution	Hindalco Industries Limited, Worli, Mumbai ₹ 11,80,000
Project Cost & Duration	₹ 58,99,999.72 3 Year
Contribution of MoM	₹ 47,19,999.72
Objectives of the project	The objective of this project is to develop and validate the "GENIUS Membrane for Critical Minerals' Recovery"— an integrated Polymer Inclusion Membrane-Deep Eutectic Solvent (PIM-DES) system for the selective and high-purity recovery of critical minerals (Li, Co, Mn, Ni) from Li-ion battery leachate. It results in a more sustainable, zero-energy PIM-DES platform for closed-loop critical mineral recycling from Li-ion batteries. This objective will be achieved through the following six work packages (WP): WP-1: Optimizing Deep Eutectic Solvents (DESs): Identifying and refining DES formulations for the selective extraction of individual critical minerals from mixed leachate. WP-2: Developing PIM-DES Membranes: Preparing and characterizing tailored Polymer Inclusion Membranes (PIM) incorporating the optimized DESs for targeted uptake and separation. WP-3: Establishing Selective Recovery Processes using individual PIM-DES: Conducting experiments to understand and optimize the performance of individual PIM-DES units for the efficient recovery of the focussed critical mineral. WP-4: Designing and Prototyping an Integrated PIM-DES System: Fabricating and testing a lab-scale prototype of a zero-energy, sequential PIM-DES system for continuous high-purity mineral recovery. Here, the integrated PIM-DES system combines multiple PIM-DES, focusing on the uptake of each critical mineral in sequential order. WP-5: Application and Optimization on Real Li-ion Battery Leachate: Applying the developed integrated PIM-DES system to the real leachate and optimizing its performance under practical conditions. WP-6: Conducting Comprehensive Sustainability Analysis: Evaluating the energy consumption, material circularity, and overall environmental impact of the developed system, aligning with Sustainable Development Goals (SDGs).
REMARKS/SUGGESTION:	
Not	Proof of concept studies not carried out for development of

recommended	membrane to selectively complex with the identified critical ~~minerals (Li, Co, Ni).~~

12.	
Project No.	SNTMOM/1460/2025
Project Title	Development of aa7075-based hybrid nanocomposite sheet reinforced with ceo2 and y2o3 trough a novel thermo-mechanical route for aerospace and marine applications
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	National Institute of Technology Trichy
Principal Investigator/ Constituent PI	Matruprasad Rout 9002319685, matruprasadrout87@gmail.com
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,05,250 1 Year 6 Month
Contribution of MoM	₹ 9,05,250
Objectives of the project	Following are the objectives of the proposed research work i. Development of hybrid nanocomposite: Development of AA7075 hybrid nanocomposite with CeO2 and Y2O3 as reinforcements through the cost-effective stir-casting process ii. Manufacturing of hybrid nanocomposite sheet: Processing of the developed hybrid nanocomposites through a novel thermo-mechanical process involving unidirectional hot rolling and cross-rolling iii. • Characterization: Characterization of the developed hybrid nanocomposite sheet for mechanical, metallurgical, wear and corrosion behavior to assess its potential applications
REMARKS/SUGGESTION:	
Recommended with modifications	1. Idea is good and novel. 2. Deliverables will lead to development of hybrid nano-composites. 3. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 4. Project duration should be 1 year with proportionate budget reduction to Rs. 8 Lakhs.

13.	
Project No.	SNTMOM/1461/2025
Project Title	Techno economic evaluation and process enhancement for the recovery of rare earth elements (ree) from waste hard disk drive (hdd) and lcd led
Thrust Area	Extraction of strategic, critical minerals and REE

Institution	Indian Institute of Technology ISM Dhanbad
Principal Investigator/ Constituent PI	Prof DR. Saravanan Pichiah 9791561099, saravananpichiah@iitism.ac.in Co.PI:- Dr. Madhumita Patel 09476315980, madhumita@iitism.ac.in
Industry Partner /Contribution	MSME Global Lab and Consultancy service LLP (GLCS) ₹ 3,00,000
Project Cost & Duration	₹ 60,93,250 3 Year
Contribution of MoM	₹ 57,93,250
Objectives of the project	i. To identify potential rare earth elements (REEs) of economic and environmental importance present in waste Hard Disk drives (HDD) and LCD/LED. ii. To elucidate the best recovery methods that can be easily translated to TRL-7. iii. To study the process modelling and techno-economic feasibility of the optimised process for maximised recovery. iv. To decipher the cradle-to-grave life cycle analysis of REEs and their recovery from HDD and LCD/LED for establishing a circular economy and sustainability.
REMARKS/SUGGESTION:	
Not Recommended	PI is absent

14.	
Project No.	SNTMOM/1462/2025
Project Title	Pilot-scale recovery of critical minerals cobalt from zinc processing residue a circular economy approach for resource security
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	Indian Institute of Technology ISM Dhanbad
Principal Investigator/ Constituent PI	Raj Kumar Dishwar 7607020467, rajkumardishwar@iitism.ac.in
Industry Partner /Contribution	TEXMIN ₹ 1210000
Project Cost & Duration	₹ 60,51,000 2 Year
Contribution of MoM	₹ 48,41,000
	i. The primary aim of this project is to scale up the laboratory-proven process for the recovery of high-grade cobalt oxide from zinc plant residue (zinc-cobalt cake), advancing from Technology Readiness Level (TRL) 4 to TRL 6 and beyond, with a focus on pilot-scale demonstration.

Objectives of the project	ii. A thorough cost-benefit and techno-economic analysis will be conducted to assess scalability and commercial potential. The project will deliver a comprehensive process flow sheet and engineering guidelines for industry adoption. iii. The end goal is to produce high-grade cobalt oxide suitable for metallurgical and battery applications, while also exploring the valorization of co-recovered metals such as zinc, lead, and cadmium to minimize environmental impact. iv. Ultimately, the project aims to strengthen India's technological capabilities in critical metal recovery and contribute to the country's circular economy and strategic resource security.
REMARKS/SUGGESTION:	
Recommended	1. Proof of concept is demonstrated. 2. Deliverables will lead to the recovery of high-grade cobalt oxide from zinc plant residue with special focus on pilot-scale demonstration. 3. Industry partner will facilitate to scale up.

15.	
Project No.	SNTMOM/1465/2025
Project Title	Collaborative human-robot (cobot) system for safe disassembly and hazardous materials segregation from electronic waste using x-ray imaging and artificial intelligence
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Vellore Institute of Technology
Principal Investigator/ Constituent PI	Ramakrishnan Ramachandran 9884381498, ramakrishnan20@gmail.com Co.PI:- Sathish Paulraj Gundupalli 7762961618, sathish.gp@vit.ac.in Vasudevan Rajamohan 9500027238, vasudevan.r@vit.ac.in
Industry Partner /Contribution	ARDEE HI-TECH PVT. LTD ₹ 1,80,000
Project Cost & Duration	₹ 92,65,717.48 2 Year
Contribution of MoM	₹ 90,85,717.48
	This project proposes a novel, scalable, AI-driven human-robot collaborative system for hazardous electronic waste (e-waste) disassembly and segregation of hazardous materials. A partial proof-of-concept (PoC) has been achieved at TRL-3. The objectives are strategically designed to advance the solution from laboratory research (TRL 3) to operational pilot deployment (TRL 7). The six specific objectives are:

Objectives of the project	OB1: Develop an AI-enabled X-ray imaging and classification system tailored for E-Waste, capable of identifying and localizing hazardous components such as lithium batteries, mercury switches, and lead solder using deep learning models trained on recycler-annotated datasets [TRL 3–5]. OB2: Design and implement a safe, standards-compliant collaborative robotic cell with AI-driven control, force-limited actuators, and kinesthetic teaching for semi-automated e-waste dismantling in close cooperation with human operators. [TRL 3–6] OB3: Integrate the AI-based vision system with robotic control frameworks to enable real-time, adaptive disassembly and segregation of hazardous components through fusion of X-ray and RGB-D data for enhanced 3D scene understanding [TRL 4–6]. OB4: Pilot the selective removal and containment of hazardous subassemblies (e.g., battery packs, PCBs with lead solder) from diverse E-Waste categories, benchmarking against manual dismantling in terms of safety, cycle time, and reliability [TRL 5–7]. OB5: Conduct environmental, economic, and occupational safety evaluations including Life Cycle Assessment (ISO 14040/44), risk and ergonomic assessments (ISO 9241-210) analysis to validate scalability and sustainability [TRL 6–7]. OB6: Demonstrate and deploy a fully integrated human-robot collaborative disassembly system at relevant industries, incorporating real-world validation, iterative AI retraining, stakeholder feedback, and the development of operator training modules for industrial adoption [TRL 6–7].
REMARKS/SUGGESTION:	
Not Recommended	1. The project lacks focus and wrt specificity / target of e-waste. LiB, Hard disk is already matured in recycling industry. 2. The e-waste sorting should be focussed with emphasis on library development and component identification for recovery of higher values critical metals such as Ga, Ge, Ind and PGE from PCBs. 3. Extensive prior work to be completed on sl.no.2 before resubmission. 4. Budget and CEPEX to be rationalized to around Rs. 60 Lakhs. 5. Industry partner contribution to be competent, relevant and enhanced. 6. PI should explore more industry partners with competence.

16.	
Project No.	SNTMOM/1467/2025
Project Title	Electro-potential tuned selective extraction of lithium and rare earth elements using ion-specific membranes in hybrid capacitive

	systems
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	SRM Institute of Science And Technology Kattankulathur, Chennai, Tamil Nadu
Principal Investigator/ Constituent PI	Dr. Bharath G 90952222508, sribharath7@gmail.com Co.PI:- Dr. Moovendaran Kalimuthu 8248141867, muthujeshz7@gmail.com Dr. Sam David S
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,77,500 3 Year
Contribution of MoM	₹ 9,77,500
Objectives of the project	The proposed project aims to develop an electro-potential tuned hybrid capacitive system integrated with ion-specific membranes for the selective extraction of lithium (Li?) from complex aqueous matrices such as industrial wastewater, RO reject streams, and saline brines. The project addresses the critical need for sustainable and energy-efficient lithium recovery methods, moving beyond conventional solvent-based or thermal processes, which are often environmentally and economically unsustainable for low-concentration resources. The specific objectives are: i. Design and Fabrication of Hybrid CDI System: Develop a laboratory-scale electro-potential controlled capacitive deionization (CDI) unit capable of selectively capturing lithium ions from multi-ionic solutions while suppressing co-ion interference (e.g., Na?, Mg^{2}?, Ca^{2}?) by tuning electrode potential windows. ii. Development of Lithium-Selective Electrodes and Membranes: Synthesize and characterize advanced functional materials such as lithium manganese oxide-modified electrodes and lithium-affinitive polymeric or inorganic membranes to enhance lithium selectivity, adsorption capacity, and cycling stability under low-voltage operation. iii. Evaluation Using Real Samples: Conduct selective extraction trials using real industrial wastewater and brine samples. Investigate lithium recovery efficiency, separation factor, regeneration behavior, and system stability under continuous operation cycles. iv. 4. Techno-Economic and Environmental Assessment: Analyze the cost-effectiveness, energy consumption,

	environmental footprint, and scalability potential of the proposed system compared to conventional lithium extraction routes. Identify pathways for pilot-scale translation and industrial adoption. The success of this project will provide a modular, energy-efficient, and eco-friendly platform for lithium recovery, contributing to India's strategic mineral security and circular economy objectives.
REMARKS/SUGGESTION:	
Not recommended	PI is absent

17.	
Project No.	SNTMOM/1468/2025
Project Title	Study on the pulsator thickeners for treating mineral processing plant tailings
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	Indian Institute of Technology Bhubaneswar
Principal Investigator/ Constituent PI	Snigdha Ghosh 7045282445, snigdha@iitbbs.ac.in Co.PI: Dr. Kisor Kumar Sau 8018020053, kisorsahu@iitbbs.ac.in Prof. B K Mishra 9437575157, bkm@iitbbs.ac.in
Industry Partner /Contribution	MSME MM Aqua Technologies LTD ₹ 9,00,000
Project Cost & Duration	₹ 53,53,500 3 Year
Contribution of MoM	₹ 44,53,500
Objectives of the project	A laboratory-scale prototype of a Pulsator clarifier will be developed to experimentally investigate solid-liquid separation mechanisms. The pulsator can be integrated with a suction technology for the sludge but at the beginning the two will be decoupled. While both technologies can be integrated later to enhance the solid-liquid separation process, they are conceptually and functionally independent. Key parameters for the pulsator—including pulse frequency, flow rate, and sludge suction pressure—will be systematically assessed to determine their impact on performance. The objective is to identify optimal operating conditions for maximum solids removal efficiency. The effectiveness of the pulsation cycle, in conjunction with suction sludge technology, will be rigorously analyzed and documented. Discrete Element Method (DEM) simulations will be carried out and based on the experimental and simulation results,

	recommendations will be provided for scaling up the system for industrial applications in mining wastewater treatment.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Proof of concept study is done. 2. Deliverables include Lab scale prototype of Pulsator clarifier. 3. Industry partner will facilitate for pilot scale development. 4. Project duration reduced to 2 years with proportionate budget reduction up to Rs. 45 Lakhs.

18.	
Project No.	SNTMOM/1470/2025
Project Title	Heat transfer management in batteries of electrical vehicles in under ground mines.
Thrust Area	Mining (Includes Rock Mechanics, Design, Equipments, Energy, Environment, Safety)
Institution	Sophitorium Engineering College Baniatangi, Odisha, National Institute of Science Education And Research Bhubaneswar
Principal Investigator/ Constituent PI	Himansu Mohan Padhy 9238392780,hmp.sophi@gmail.com Co.PI: Pratap Kumar Sahoo 9937615317, pratap.sahoo@niser.ac.in
Industry Partner /Contribution	AB Information Technology solutions Pvt Ltd ₹ 30,00,000
Project Cost & Duration	₹ 2,02,37,600 3 Year
Contribution of MoM	₹ 1,72,37,600
Objectives of the project	i. Design, Development and Fabrication of a cooling pad which can maintain the temperature in battery within operating range. ii. Simulation and analytical model development for understanding temperature variation in Battery. iii. Development and Deployment of cooling pad in EV vehicles in underground mines.
REMARKS/SUGGESTION:	
Not Recommended	1. The proposal is not aligned with the proposed thrust area 2. It is difficult to implement this technology in coal mines. It needed to be intrinsically safe for coal mines. 3. PI has not considered the dust issue which may hamper the porosity of the cooling system 4. Deliverables lack clarity.

19.	
Project No.	SNTMOM/1471/2025
	Metalens vista visual intelligence system for transparent ai

Project Title	analysis and advanced metal scrap classification using explainable ai
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	SNR Sons Charitable Trust
Principal Investigator/ Constituent PI	J. David Rathnaraj 9944025671, davidrathnaraj@gmail.com - Co.PI: Immanual R 9677817992, immangwu@gmail.com Sanjana N 7094949864, sanjananithykumar06@gmail.com
Industry Partner /Contribution	Sri Jaya Surya Engineering Works ₹ 3,32,400
Project Cost & Duration	₹ 22,16,000 3 Year
Contribution of MoM	₹ 18,83,600
Objectives of the project	The main objectives of METALENS VISTA project are: i. To develop an intelligent classification system for metal scrap processing, specifically focusing on Cast Iron, Mild Steel, Galvanized Iron, and Aluminum scraps, using thermal preprocessing through gas welding torch application combined with advanced computer vision and deep learning techniques. ii. To create a comprehensive dataset by capturing high-resolution images of thermally treated metal surfaces, documenting the distinctive melt patterns and material-specific characteristics of Cast Iron, Mild Steel, Galvanized Iron, and Aluminum under controlled heat conditions. iii. To implement a multi-modal deep learning architecture (DenseNet121, Mask R-CNN, VGG 16) enhanced with XAI frameworks (LIME, SHAP, Grad-CAM) for accurate classification of these four metal types, ensuring transparent decision-making processes and regulatory compliance. iv. To optimise the recycling process of Cast Iron, Mild Steel, Galvanized Iron, and Aluminum scraps by improving sorting accuracy and reducing processing costs, thereby contributing to sustainable metallurgical practices and resource conservation in the metal processing industry.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Proof of concept is demonstrated. 2. Library of 300 images of metal mapping was completed. 3. Project duration reduced to 2 years with proportionate budget reduction up to Rs. 22 Lakhs.

20.	
Project No.	SNTMOM/1478/2025
Project Title	Machine learning-driven development of aluminium matrix composites for sustainable drone airframes using recycled vehicle engines and alloy wheels through squeeze casting with advanced techniques
Thrust Area	Circular Economy And Recycling of Non Ferrous Metals
Institution	VISTAS Vels Institute of Science, Technology & Advanced Studies Chennai, Tamil Nadu
Principal Investigator/ Constituent PI	Muraliraja 9092674187, muralimechraja@gmail.com Co.PI: Shaisundaram V S 7299321232,saiswastik23@gmail.com Baskar S 9159048764, baskarmechstar@gmail.com Chandrasekaran M 9790857137, chandrasekar2007@gmail.com Jerritta S 9840225105, sn.jerritta@gmail.com Priya R 9884033107, priya.microbio@gmail.com
Industry Partner /Contribution	Swam Equip ₹ 10,59,044
Project Cost & Duration	₹ 70,60,293.99 3 Year
Contribution of MoM	₹ 60,01,249.99
Objectives of the project	i. To develop aluminium matrix composites (AMCs) using recycled materials sourced from two and four wheeler engines and alloy wheels as matrix material, processed using squeeze casting to ensure sustainability and performance suitability for drone airframes. ii. To apply machine learning techniques for predicting and optimizing process parameters such as melt temperature, squeeze pressure, cooling rate, reinforcement temperature, stirring time, speed in the squeeze casting of AMCs and correlate these with machine learning-predicted outcomes. iii. To evaluate the mechanical, thermal, and microstructural properties of the developed aluminium matrix composites using advanced characterization techniques. iv. To implement the efficient design of high-performance recycled aluminium composite in drone airframe components such as landing gears.
REMARKS/SUGGESTION:	
Not	1. Deliverables lack clarity.

Recommended	2. Scalability concern was not addressed by PI. 3. PI may consider more focussed problem definition and with only drone component applications without having to restrict the feed to recycled scrap.

21.	
Project No.	SNTMOM/1485/202
Project Title	Waste coal derived graphene for preventing oxidation in copper
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	Christ University
Principal Investigator/ Constituent PI	Dr. Partha Kumbhakar 08158030092, parthakumbhakar2@gmail.com
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,97,080 2 Year
Contribution of MoM	₹ 9,97,080
Objectives of the project	i. Preparation of Graphene-based structures from coal waste (coal dust) by catalytic thermal degradation and exfoliation. ii. Characterization of waste-coal based graphene and its composite to access their suitability for anticorrosional and hydrophobic properties. iii. Development of stable graphene polymeric composite to be used as coating on copper substrate. iv. Erosion and lifecycle testing of the coating. v. 5. Economic analysis, scaling up the production process and repeatability study.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Objectives to develop Graphene-based coatings on copper substrate from coal waste is defined. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction to Rs. 8 Lakhs.

22.	
Project No.	SNTMOM/1488/2025
Project Title	Integrated bioleaching for nickel extraction a sustainable approach combining fungal pre-treatment and bacterial leaching for low-grade nickel ores in india
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	Indian Institute of Engineering Science and Technology Shibpur
	Avishek kumar

Principal Investigator/ Constituent PI	9709231824, avishek@metal.iiests.ac.in Co PI:- Dr. Gautam Anand, 6289793146, anandgautam6@gmail.com Dr. Amlan Roy Chowdhury 9875507393, amlan.chest@faculty.iiests.ac.in Dr. Sukumar Kundu 08334043609, skundu@metal.iiests.ac.in
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,39,500 3 Year
Contribution of MoM	₹ 9,39,500
Objectives of the project	The primary aim of this project is to develop and optimize an integrated bioleaching process for extracting nickel from low-grade ores in India, focusing on sustainability and efficiency. Specific objectives include: i. Investigating the efficacy of fungal pre-treatment using strains like Aspergillus niger to alter nickel ore structures, enhancing nickel accessibility for subsequent bacterial leaching; ii. Identifying and characterizing bacterial strains, such as Acidithiobacillus ferrooxidans, for efficient nickel leaching from pre-treated ores iii. Evaluating the combined fungal pre-treatment and bacterial leaching process for efficiency and scalability, targeting industrial application; and iv. Assessing the environmental benefits (e.g., reduced CO2 emissions and energy use) and economic feasibility compared to conventional methods like smelting. This approach aims to increase nickel recovery from ~24% to 50-70%, reduce processing time by 20-30%, and lower environmental impact, supporting India's sustainable mining goals and reducing import dependency
REMARKS/SUGGESTION:	
Recommended with modifications	1. Objectives to investigate the efficacy of fungal pre-treatment using strains like *Aspergillus niger* for leaching of nickel in the presence of *Acidithiobacillus ferrooxidans* are defined. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction to Rs. 8 Lakhs.

23.	
Project No.	SNTMOM/1490/2025
Project Title	Characterization and sustainable recovery of metals from low-grade ores via leaching and bioleaching within a circular economy framework
Thrust Area	Metal Extraction (Metallurgical processes)
Institution	Goa University, Birla Institute of Technology and Science Pilani
Principal Investigator/ Constituent PI	Dr. Kanchanmala B. Deshpande 9421243344 kanchanmala@unigoa.ac.in Co.PI:- Srikanth Mutnuri 9421243443 srikanth@goa.bits-pilani.ac.in
Industry Partner /Contribution	NRB Group Goa ₹ 8,15,481
Project Cost & Duration	₹ 40,77,403.21 3 Year
Contribution of MoM	₹ 32,61,922.21
Objectives of the project	i. Comprehensive characterization of low-grade manganese ore. ii. Investigate the effectiveness of mild organic acids in solubilizing manganese from low-grade ores. iii. Isolate, identify, and characterize native microbial strains capable of manganese bioleaching from the ore sample. Characterize their metabolic pathways, tolerance to manganese, and leaching potential. iv. Assess the synergistic effects of combining chemical and biological leaching methods (hybrid) for manganese extraction. v. Recovery of value-added products from leachate. vi. Develop a pilotscale system integrating optimized chemical and biological leaching processes.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Adequate prior work done. 2. The pilot plant sizing should be done for atleast one tonne feed. 3. Project duration should be 2 years with proportionate budget reduction within Rs. 36 Lakhs.

24.	
Project No.	SNTMOM/1493/2025
Project Title	A new approach for the mineral exploration using cosmic muons
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	Centurion University of Technology and Management
	Dr. Prasanta Kumar Rath

Principal Investigator/ Constituent PI	0734946044,prasanta.rath@cutm.ac.in Co.PI: Dr. Nikit N. Deshmukh
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,34,500 1 Year 6 Month
Contribution of MoM	₹ 9,34,500
Objectives of the project	i. The objective is it do a proof of concept study for the identification of the location where the minerals has deposited inside the ground / rock which cannot be found by conventional methods easily. ii. To understand and use the modern cutting edge 3D simulation tools for the proof of concept study. iii. As the proof of concept study will be based on muon interaction and scattering which is non hazards, So it has more potential for application to society. iv. Develop the imaging method using muon which are free and continuously falling on the earth surface. v. Exploration for the industry application
REMARKS/SUGGESTION:	
Not Recommended	1. Lacks clarity in the proposed methodology 2. Deliverables lack clarity. 3. Modify, present a case study and resubmit for POC.

25.	
Project No.	SNTMOM/1495/2025
Project Title	Design and development of novel rheo gravity die casting process technology of magnesium alloys and development of prototype wheel hub for wheeled electric excavators
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	Indian Institute of Science Bengaluru
Principal Investigator/ Constituent PI	Prosenjit Das 7908593077,prosenjitdas@iisc.ac.in Co.PI: Dr. Subodh Kumar 9845652832,skumar@iisc.ac.in
Industry Partner /Contribution	Dietech India (P) Limited And Tata Hitachi Construction Machinery Company Private Limited ₹ 40,00,000
Project Cost & Duration	₹ 1,87,47,268 3 Year
Contribution of MoM	₹ 1,47,47,268

Objectives of the project	This project aims to develop a comprehensive and sustainable process for the recovery of high-purity tungsten from tool waste. The specific objectives of the proposed work are as follows: i. To optimize thermal oxidation conditions (temperature, duration, and atmosphere) for the effective conversion of tungsten carbide (WC) into tungsten trioxide (WO3). ii. To evaluate the physical and structural changes in tungsten phases due to thermal oxidation. This will be achieved through Brunauer Emmett Teller (BET) surface area analysis and X-ray diffraction (XRD) to quantify improvements in surface area and evaluate phase transformations that enhance reactivity. iii. To identify the most effective leaching conditions by using ammonium hydroxide (NH4OH) concentration, pressure, and temperature in a pressurized autoclave system. The aim is to maximize the dissolution of tungsten oxides while minimizing the amount of undissolved solid residue iv. To develop and validate a solvent extraction procedure for the selective recovery of tungstate ions from leachate, minimizing the precipitation of other impurities. v. To recover tungsten in the form of high-purity ammonium paratungstate (APT) using controlled precipitation techniques. The recovered APT will be analyzed for chemical purity and morphological characteristics to assess its suitability for industrial applications vi. To investigate hydrogen reduction parameters (temperature, flow rate, and duration) for converting APT into tungsten metal powder with controlled particle size and high purity. vii. To perform a mass and energy balance analysis of the entire process to identify key areas for improving energy efficiency and minimizing reagent consumption, and reducing overall environmental impact, thereby enhancing the process sustainability.
REMARKS/SUGGESTION:	
Resubmission in next PERC	1. The PI should focus on applied experimental work on process development. 2. The CAPEX to be restricted to item no. 1 (Rheo Gravity die-casting setup for Mg alloys) Rs. 25 Lakhs. 3. The OPEX to be rationalized to Rs. 40 Lakhs over 2 years. 4. Magnesium alloys can be procured indigenously as its available in India now. 5. Overall budget to be Rs. 70 Lakhs. 6. Industry partner contribution to be rationalized accordingly.

26.	
Project No.	SNTMOM/1497/2025
Project Title	Development of novel green coating for copper oxidation prevention using olive-based inhibitors

Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	National Institute of Technology Raipur
Principal Investigator/ Constituent PI	Bhargavi Rani Anne 7799335487, branne.mme@nitrr.ac.in - Co.PI: Dr. Neigapula Venkata Swamy Naidu 9963390988,nvsnaidu.mech@nitrr.ac.in
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,63,660.79 2 Year
Contribution of MoM	₹ 9,63,660.79
Objectives of the project	i. To extract and characterize olive leaf-derived polyphenols (primarily oleuropein and hydroxytyrosol) using eco-friendly solvent methods. ii. To develop a biopolymer-based composite coating by incorporating olive polyphenols into a chitosan matrix for application on copper surfaces. iii. To apply and optimize the coating formulation on copper substrates using simple dip-coating techniques. iv. To evaluate the effectiveness of coatings in preventing copper oxidation under simulated transportation conditions like high humidity and temperature. v. 5. To assess the non-interference nature of the coating, including ease of removal and impact on the conductivity and surface integrity of copper.
REMARKS/SUGGESTION:	
Recommended with modifications	1. It is suggested to include additional work on nano copper powder coatings and usage of Bio- Polymers. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with a budget of Rs. 9 Lakhs.

27.	
Project No.	SNTMOM/1499/2025
Project Title	Artificial intelligence based characterisation of acoustic emission pattern for rock failure analysis
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	Indian Institute of Technology BHU Varanasi
Principal	BNV Siva Prasad 7726811680,sivaprasadbnv.min@iitbhu.ac.in -

Investigator/ Constituent PI	Co.PI:- Dr. Bhardwaj Pandit 9591062202,bhardwajp.min@iitbhu.ac.in
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,93,750 2 Year
Contribution of MoM	₹ 9,93,750
Objectives of the project	i. Laboratory investigation of the Kaiser effect in rocks using Acoustic Emission Technology and Digital Image Correlation. ii. Explore the possibility of estimation of in-situ rock mass stress using drilled cores. iii. Characterisation of Acoustic Emission pattern and DIC strain field for various types of crack build-up and their spatio-temporal distribution leading to different modes of failure of rocks. iv. Artificial Intelligence application for assessing the rock stress and strain parameters.
REMARKS/SUGGESTION:	
Recommended	1. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 2. The duration of the project to be reduced to 1 year.

28.	
Project No.	SNTMOM/1500/2025
Project Title	Thermal energy storage in abandoned mines-- thermo-mechanical characterization and degradation modelling of rocks
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	Indian Institute of Technology Jodhpur
Principal Investigator/ Constituent PI	Dr. Debanjan Guha Roy 7735795380,geo.debanjan@gmail.com
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,67,925 3 Year
Contribution of MoM	₹ 9,67,925
	The project aims at evaluating the feasibility of deploying Thermal Energy Storage (TES) systems in abandoned mines through a comprehensive thermo-mechanical and chemical characterization of host rocks, with the aim of enabling long-duration heat storage critical for renewable energy integration in Rajasthan.

Objectives of the project	This will be achieved through the following specific objectives: i. Thermal Property Assessment: To quantify key thermal parameters—thermal conductivity, specific heat capacity, and thermal expansion—under varying moisture conditions and directional anisotropies, which are essential for understanding heat transfer dynamics and thermal stress responses in stratified rock systems. ii. Fracture-Mechanical Stability Analysis: To investigate the degradation of mechanical strength parameters such as compressive strength, Young's modulus, and fracture toughness under cyclic thermal-mechanical loading (50–90°C), simulating operational TES conditions, with a focus on microfracturing and fatigue thresholds. iii. Porous-Media Characterization: To analyze the evolution of porosity and permeability in rock matrices pre- and post-thermal cycling using micro-CT imaging and pore network modeling, with the goal of assessing fluid flow efficiency and identifying cracking. iv. Accelerated Degradation Study: To simulate long-term TES operation through accelerated thermal cycling of partially and fully saturated rock samples, and to evaluate the impact of mineral transformations, oxidation, and dissolution on structural integrity and storage capacity. v. Model Development: To formulate and validate a degradation model based on fracture-mechanical data, and to apply a statistical damage-based constitutive model accounting for temperature-dependent mechanical behavior, enabling prediction of TES performance and lifecycle. These will establish a scientific and engineering foundation for repurposing abandoned mines into robust, efficient, and long-lasting TES assets.
REMARKS/SUGGESTION:	
Not Recommended	1. Abandoned mine entry is restricted by DGMS 2. Up to 300m deep mine, there is usually joints, which was the requirement for the project 3. No clarity on the lining of the mine walls and roofs. 4. Objectives lack clarity 5. PI has not taken into account that the property is different in in-situ and abandoned mines rock.

29.	
Project No.	SNTMOM/1511/2025
Project Title	Process development for recovery of graphite from spent li-ion battery black mass using 75 mm dia-laboratory-scale flotation column
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	CSIR National Metallurgical Laboratory

Principal Investigator/ Constituent PI	Mrs. N Vasumathi 9445064888,vasumathi@csircmc.res.in - Co.PI: Dr. Mousumi Gharai 7008235493,mousumi14iit@gmail.com
Industry Partner /Contribution	Neo Seeker Metals ₹ 3,00,000
Project Cost & Duration	₹ 59,99,999.97 3 Years
Contribution of MoM	₹ 56,99,999.97
Objectives of the project	The objective of the proposed research is to develop an efficient column flotation-based process for recovering graphite from spent Li-ion battery black mass by optimizing process and operating parameters. i. Flotation Reagents: Recovery of graphite from spent Li-ion battery black mass using a laboratory Denver flotation cell (batch type) through selection and optimization of tailor-made flotation reagents (collector, frother and/or depressants) ii. Flotation Process Parameters Assessment: Evaluating the flotation (batch) parameters (pulp density, conditioning time, reagent dosage, air flow rate) using a laboratory Denver flotation cell for maximum possible graphite recovery and grade by statistical design of experiments (DOE). iii. Column Flotation Operating Parameters Optimization: Experimental study using a 75 mm diameter laboratory flotation column with a feed capacity of 20–25 kg/hr and optimizing the flotation column operating parameters (superficial air flow velocity, superficial feed flow velocity, and froth depth). iv. Process Development: To develop an efficient column flotation-based process for the recovery of graphite from spent Li-ion battery black mass, integrating optimized reagent schemes and flotation process/operating parameters for potential industrial application.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Objectives to be refined to include recovery of critical minerals (Li, Co, Mn) 2. Duration of the project to be reduced to 2 years. 3. MoM contribution in budget to be revised to 45 lakhs. 4. Industry contribution to be increased to at least 8% in cash with additional 2% in kind.

30.	
Project No.	SNTMOM/1512/2025

Project Title	Enhancing conductivity and strength in recycled copper wires with carbon nanotube addition
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Indian Institute of Technology Ropar
Principal Investigator/ Constituent PI	Dr. Hariprasad Gopalan 7550265403,hariprasad.gopalan@iitrpr.ac.in Co.PI: Dr. Avala Lava Kumar 7077110110,lava@iitrpr.ac.in
Industry Partner /Contribution	KK Metals ₹ 5,30,000
Project Cost & Duration	₹ 52,93,265.8 3 Year
Contribution of MoM	₹ 47,63,265.8
Objectives of the project	The objective of this project is to develop a scalable method for enhancing the electrical conductivity of recycled copper scrap (99–99.5% purity), especially from armature and/or end of life electronics waste, by reinforcing it with carbon nanotubes (CNTs), particularly positioned at grain boundaries. Through controlled colloidal processing, sintering, and microstructural optimization—including grain size refinement via ball milling and/or polyol-based nanocrystallization—we aim to reduce the negative impact of impurities commonly found in scrap copper (e.g., Fe, Al, Si), which typically degrade conductivity. The project will explore varying CNT loadings (vol % - 2%, 5%, and 10%) and compare the performance of multi-walled and single-walled CNTs to identify the best balance of electrical performance, mechanical strength, and ductility in the as-drawn state. By localizing impurities at grain boundaries and introducing CNTs as low-resistance pathways, the composite aims to achieve conductivity levels approaching 95–98% IACS without extensive refining, thereby providing a sustainable and economically viable solution for upcycling industrial copper waste.
REMARKS/SUGGESTION:	
Not Recommended	1. Issue of graphene synthesis not addressed. 2. Need to collaborate with an academic partner who has expertise in graphene synthesis 3. It is easier and simpler to take Cu scrap and do electrolysis to get purer copper cathode rather than trying to improve conductivity with CNT addition. 4. PI advised to collaborate with NFTDC for further guidance and improvement in the process. 5. PI may consider a fresh proposal after interacting with NFTDC.

31.	

Project No.	SNTMOM/1515/2025
Project Title	Characterization of carbonaceous phyllite for development of a metallogenic model for v-se-ni-pge-mo mineralization for future exploitation and recovery of critical metals from the lesser himalaya, ap
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	Jawaharlal Nehru University
Principal Investigator/ Constituent PI	Prof. Muduru Lachhana Dora 9404952283,mldora@jnu.ac.in Co.PI: Dr. Ravi Kumar Umrao 8014412812,ravikumrao@jnu.ac.in
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,53,400 2 Year
Contribution of MoM	₹ 9,53,400
Objectives of the project	The specific objectives of the R&D project are i. Characterization of graphite deposits and develop metallogenic model for V- Ni-Mo- Se mineralization to provide a scientific framework for future exploration initiatives. ii. Petro-mineralogical and geochemical characterization of carbonaceous phyllite with a focus on determining the concentrations and distribution of vanadium (V), selenium (Se), molybdenum (Mo), nickel (Ni), and other associated critical metals within individual silicates, oxide and sulphide mineral phases. iii. To trace the primary metal sources and understand the geological (diagenesis, metamorphism and hydrothermal) processes responsible for the enrichment of critical metals through the application of appropriate isotopic systematics, geochemical proxies and statistical tools. iv. Paragenetic reconstruction and depositional environment assessment that facilitated the concentration of critical metals within graphite-rich carbonaceous phyllite belt of northeast Himalaya. v. To evaluate the extractive potential of critical metals at the lab scale to support the Government's initiative pertaining to Atmanirbhar Bharat and Viksit Bharat, 2047.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Idea is good and the proposed study covers the research gap in the geological exploration. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry

	participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 years with proportionate budget reduction within Rs. 10 Lakhs

32.	
Project No.	SNTMOM/1516/2025
Project Title	Development of an ai-driven melt-state detection and intelligent control system for optimising furnace operations in casting processing
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	SNR Sons Charitable Trust Sri Ramakrishna College of Arts & Science, Coimbatore, Tamil Nadu, India
Principal Investigator/ Constituent PI	Dr. Soundarrajan 9942069911,asr@srec.ac.in Co.PI: Jansi Rani S 9486803382,jansi.sankar@srec.ac.in Shanmugasundaram R 9894064807,shanmugasundram.ramasamy@srec.ac.in Bhagyanathan Chandragandhi 9047026422, bhagyanathan.chandragandhi@srec.ac.in
Industry Partner /Contribution	MSME B.S FOUNDRY ₹ 22,00,000
Project Cost & Duration	₹ 1,10,09,400 2 Year
Contribution of MoM	₹ 88,09,400
Objectives of the project	i. To develop a multi-sensor fusion system for real-time, non-visual melt-state monitoring. ii. To integrate optical fibre temperature sensors for EMI-resistant, high-resolution thermal profiling. iii. To push real-time sensor data to a cloud platform for remote algorithm processing and control optimisation. iv. To train machine learning models for melt-phase classification and integrate them with closed-loop furnace control. v. To validate system performance through trials, focusing on energy savings, yield recovery, and safety improvements.
REMARKS/SUGGESTION:	
Not Recommended	1. Need to work on the problem statement. 2. Signal conditioning is a much challenging step. 3. Deliverables lack clarity.

33.	
Project No.	SNTMOM/1518/2025
	Pilot-scale validation of polymer-based dust suppressant using

Project Title	drone-enabled delivery for environmental safety in surface mining zones
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	Aditya Academy
Principal Investigator/ Constituent PI	Dr.Abhishek Kumar Tripathi 9098840971,abhishekkumar@adityauniversity.in
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 7,92,201.6 2 Year
Contribution of MoM	₹ 7,92,201.6
Objectives of the project	i. To examine the environmental safety of a polymer-based dust suppressant by studying its short-term impact on the physical and chemical properties of ball clay and coal mine soils. ii. To test the effectiveness of the polymer blend in reducing airborne dust (PM10 and PM2.5) under controlled laboratory conditions. iii. To design and validate a drone-based spray system for applying the suppressant in areas of the mine that are difficult to access or change frequently.
REMARKS/SUGGESTION:	
Not Recommended	1. Deliverables lack clarity. 2. Since mine dust is continuously generated, drone technology may not be feasible to suppress dust in mine site area 3. Less number of open cast metal mines available in general, so this technology may not be useful in metal mines, 4. Pay load is less in the present drone system, so it is difficult to apply in huge mine areas.

34.	
Project No.	SNTMOM/1520/2025
Project Title	Design and development of a centrifugal pump for dense slurry transportation of minerals and ores
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	Visvesvaraya National Institute of Technology Nagpur
Principal Investigator/ Constituent PI	Dr. Rahul Tarodiya 9977893757,rahultarodiya@mec.vnit.ac.in - Co.PI: Dr. N Anvesh Reddy, Assistant 8447568819,anveshnreddy@mec.vnit.ac.in
Industry Partner	M/S Harison Pumps Pvt. Ltd., Nagpur

/Contribution	₹ 3,50,000
Project Cost & Duration	₹ 34,14,450 3 Year
Contribution of MoM	₹ 30,64,450
Objectives of the project	i. To experimentally and numerically investigate the hydraulic performance of existing designs of centrifugal pumps used for transporting minerals and ore slurries. ii. To identify the critical zones of the pump causing additional hydraulic losses through numerical analysis. iii. To modify and optimize the design of pump components for better hydraulic performance while handling dense slurries of minerals and ores for weighted concentration up to 50%. iv. To manufacture the optimized design pump components. v. To experimentally validate the design of the manufactured pump for dense slurry flow operations.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Project idea is good 2. Deliverables should include the solid property like abrasive nature for the design and development of the pump 3. Project title should be modified accordingly 4. PI should collaborate with the mining professional for design and development 5. Project duration should be 2 years with proportionate budget reduction to Rs. 31 Lakhs

35.	
Project No.	SNTMOM/1525/2025
Project Title	Vibration-induced fluidization for preventing slurry blockage in mining transport pipelines
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	Visvesvaraya National Institute of Technology Nagpur
Principal Investigator/ Constituent PI	Nandyala Anvesh Reddy 8447568819,anveshnreddy@mec.vnit.ac.in - Co.PI: Dr Rahul Tarodiya 9977893757, rahultarodiya@mec.vnit.ac.in
Industry Partner /Contribution	M/S Pujitha Stone Crusher ₹ 2,25,000
Project Cost & Duration	₹ 27,85,250 3 Year
Contribution of MoM	₹ 25,60,250
	This project is aimed to develop a non-additive vibration-based method to reduce slurry transport resistance and prevent pipeline blockages in mining operations.

Objectives of the project	The core objectives are: i. To develop a pilot-plant test setup for slurry transportation through pipeline. ii. To characterize the rheological properties of mining slurries, including tailings and ore suspensions. iii. To design and fabricate a prototype of the Vibratory Resistance Reducer that is compatible with mining slurry pipelines. iv. To conduct systematic experimental studies on the effect of vibration parameters (frequency, amplitude) on slurry flow behavior and transport resistance. v. To develop computational fluid dynamics (CFD) based methodology for simulating vibration-induced fluidization in non-Newtonian slurry flows. vi. 6. To identify key vibration parameters for maximum resistance reduction and validate performance across different slurry types and concentrations.
REMARKS/SUGGESTION:	
Not Recommended	1. The project deliverables are not fully focussing to mining industry 2. PI has not mentioned the advantage of this system compared to conventional practice 3. More literature review required to identify the relevant industry issues 4. Objectives lack clarity as the technology needs to be aligned with the metal mines slurry transport instead of stone crushing plant.

36.	
Project No.	SNTMOM/1526/2025
Project Title	Strategic planning towards operational scaling in mining infrastructure a stochastic approach to safe and sustainable blasting operations
Thrust Area	Mining (Includes Rock Mechanics, Design, Equipments, Energy, Environment, Safety)
Institution	National Institute of Technology Tiruchirappalli, Tamil Nadu, India.
Principal Investigator/ Constituent PI	Greegar George 9483742674, greegargeorge@gmail.com Co.PI: Kasinathan Muthukkumaran 9443651836, kmk@nitt.edu
Industry Partner /Contribution	TIERA ₹ 17,00,000
Project Cost & Duration	₹ 85,72,360 3 Year
Contribution of MoM	₹ 68,72,360

Objectives of the project	i. To develop an efficient computational non-linear model for accurately determining the blast induced ground vibration in a mining site utilising the baseline data of different blast parameters. ii. To develop a probabilistic model for predicting the peak particle velocity incorporating the stochastic uncertainties in blast parameters and spatial variabilities in geological conditions. a. To determine the response statistics using uncertainty analysis b. To validate the probabilistic model using field data from various blasting scenarios c. To perform global sensitivity analysis to identify the significant factors influencing the blast induced ground vibration. d. Develop a reliability analysis framework to establish appropriate safety factors for blast-induced ground vibration, considering the uncertainties associated with the input parameters. iii. To promote a sustainable operational scaling of mining infrastructure sector a. To determine the impact of peak particle velocity due to blasting on the surrounding structural buildings employing vibration, environmental, and strain monitoring techniques. b. To ensure a safe blasting operation in a site based on stochastic optimisation of the blast parameters and geological conditions.
REMARKS/SUGGESTION:	
Not Recommended	1. Project lacks novelty. 2. Objectives are generic.

37.	
Project No.	SNTMOM/1527/2025
Project Title	Development of zno-c based passivation coating for copper by additive manufacturing
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	Christ University
Principal Investigator/ Constituent PI	Hari Murthy 8105610673,murthypotter@gmail.com Co.PI: Sourav Roy
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,99,750 3 Year
Contribution of	₹ 9,99,750

MoM	
Objectives of the project	The primary objective of this research proposal is to formulate and optimize ZnO–Carbon composite inks and validate a sustainable, efficient and novel composite coating system for enhancing the corrosion resistance and surface stability of copper substrates. Additive manufacturing technique as direct ink writing is used to have control over layer thickness, porosity, and surface morphology while the source of carbon is from discarded dry cells. The objectives of the proposal can be divided into 5: i. Design and synthesis of ZnO–carbon composites, by integrating zinc oxide nanoparticles with the recovered carbon material. ii. To develop a rheologically stable ink formulation of the ZnO–Carbon nanocomposites suitable for direct ink writing. iii. Fabrication of ZnO–C composite coatings on copper surfaces using direct ink writing, ensuring strong adhesion, uniformity, and mechanical integrity. iv. Optimization of additive manufacturing parameters, such as rheological behavior, and curing conditions to optimize the printability of ZnO–C composite inks to achieve a uniform and defect-free deposition on copper substrates. v. Laboratory trials of surface passivation performance including corrosion resistance, electrochemical corrosion, oxidation inhibition, degradation in aggressive media and thermal stability of the fabricated coatings under accelerated aging and harsh environmental conditions simulating industrial use-cases. vi. The following are the expected outcomes of the proposal • =1 µA/cm² Icorr under neutral salt spray conditions (ASTM B117 or equivalent). • >80% reduction in surface oxidation (CuO/Cu2O formation) under accelerated thermal aging 3. Stable impedance modulus =105 O•cm² over 24 hours in 3.5 wt% NaCl solution. • Water vapor transmission rate (WVTR) and oxygen transmission rate (OTR) reduced by at least 70%. • Thickness of the coating: 5–20 µm. • Retain electrical contact resistance =10 mO•cm² and thermal conductivity =5 W/m•K.
REMARKS/SUGGESTION:	
Not Recommended	1. Methodology proposed is not specific to the coating of the first layer. 2. Adequate prior work not done. 3. Suitability of ZnO-C for passivation plus is to be proved for POC. 4. Instead of working on the ink writing additive manufacturing

	technique, spray coating technique is cost effective.

38.	
Project No.	SNTMOM/1530/2025
Project Title	Development of process and technology of plasma dc arc furnace for processing and recovery of valuables from red mud and ilmenite at 0.5 tons level.
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Indian Institute of Technology Madras
Principal Investigator/ Constituent PI	Dr. Ajay Kumar Shukla 9444017943,shukla@smail.iitm.ac.in
Industry Partner /Contribution	Dynatek Heavy Equipment Pvt Ltd (A Group Company Of Proman) Bangalore ₹ 25,00,000
Project Cost & Duration	₹ 2,18,37,000 3 Year
Contribution of MoM	₹ 1,93,37,000
Objectives of the project	The specific objective of this project is to validate the SPAF furnace capability to extract metals from Ilemnite and red mud with regard to the extent of recovery, cost effectiveness, power consumption, and quality of products from the SPAF furnace. The objectives in brief are as follows: i. Design and develop a plasma DC arc furnace for processing red mud and ilmenite at a 0.5-ton level. ii. Optimize process parameters (temperature, pressure, and feed rate) for maximum recovery of valuable metals (iron, titanium, aluminum, and rare earth elements). iii. Characterize the physical and chemical properties of the processed materials. iv. Evaluate the economic viability and environmental sustainability of the developed technology. v. Develop a scalable process for industrial applications. This technology will be up-scaled for commercial exploitation in a step-by-step and systematic manner by involving scientific and fundamental investigations of already available process data, followed by a detailed techno-economic study and scale-up calculations, which will be further tested on the shop floor.
REMARKS/SUGGESTION:	
Not Recommended	1. Project lacks proof of concept. 2. For preliminary R&D and POC, PI may contact NFTDC, who will serve as an advisory partner. 3. PI may consider a fresh proposal along with NFTDC after conducting POC with ilmenite feed as focus.

39.	
Project No.	SNTMOM/1534/2025
Project Title	Sustainable electrochemical pathways for yttrium (y) powder production from e-waste recycling
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	Indian Institute of Technology Jammu, Indian Institute of Technology Hyderabad
Principal Investigator/ Constituent PI	Dr. Kancharla Hari Krishna 9491498909,harikrishna.kancharlaa@gmail.com - Co.PI: Dr.Ashok Kamraj 9790504570,ashokk@msme.iith.ac.in
Industry Partner /Contribution	Critical Mineral Trackers Geo Solutions Center, IIT-Hyderabad ₹ 11,50,000
Project Cost & Duration	₹ 62,67,700.5 3 Year
Contribution of MoM	₹ 51,17,700.5
Objectives of the project	i. Investigate the selective electrodeposition of pure elemental Yttrium (Y) from acid-leached e-waste, employing various complexing agents in potentiostatic and galvanostatic modes. ii. Optimize the choice and concentration of complexing agents to improve 'Y' recovery efficiency, lower energy demands, and limit undesired side reactions. iii. Assess and refine critical electrodeposition parameters—temperature, agitation, and pH of the acid-leached solution—to maximize 'Y' purity and deposition rates, utilizing the Taguchi full factorial experimental design. iv. Establish an economical and scalable method for extracting pure 'Y' from e-waste, offering solutions to the financial and environmental limitations of conventional recovery techniques.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Electrodeposition of Yttrium (Y) from e-waste is the novelty of the project. 2. Proof of concept to be demonstrated. 3. Seed money of ₹ 10 lacs recommended to carryout POC. 4. Duration of the project to be reduced to 1 year

40.	
Project No.	SNTMOM/1536/2025
Project Title	Synthesis of metal hybrid graphitic materials for developing composite cylinders along with hydrogen-rich gas mixture using mining effluents
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste

Institution	Indian Institute of Technology Roorkee
Principal Investigator/ Constituent PI	Pranjali Sharma 9631112451, pranjali.sharma@hre.iitr.ac.in Co.PI:- Siva Mohan Reddy
Industry Partner /Contribution	M/S Raygas Engineering India Private Limited ₹ 4,50,000
Project Cost & Duration	₹ 81,45,500 3 Year
Contribution of MoM	₹ 76,95,500
Objectives of the project	i. Detailed characterization of the mining (metals content) and organic effluent (TOC) from the metal industry ii. Design and troubleshooting of continuous reactor configuration (400 -800°C and 1 to 250 bar with reactor volume of 30 mL) for the treatment of effluents iii. Synthesis of hybrid metal graphitic materials (optimizing the parameters- temperature, residence time, pressure, and catalyst concentration) and their characterization (size, shape, metal and graphitic content, defects in the graphitic carbon along with fuel gaseous mixture) iv. Manufacturing composite laminates enhanced with the synthesized MCNTs/GMHs using vacuum-assisted resin transfer moulding v. Testing and characterization of the mechanical and thermal properties of the laminates vi. Parametric study to analyse the optimal resin-to-filler (MCNTs/GMHs) ratio for improved fracture toughness, strength-to-weight ratio, thermal conductivity, and shear strength of the composite vii. Configuring the filament winding process for using MCNTs/GMHs enhanced resin for manufacturing cylinder prototypes viii. Fabrication of the cylinder prototypes with lower costs, higher life, higher burst pressure, lower weight, and faster filling rates than conventional carbon fiber reinforced polymer matrix composite cylinders ix. Testing the burst, weight, and fatigue performance of the cylinder
REMARKS/SUGGESTION:	
Recommended with modifications	1. Project idea is good 2. Total Capital equipment should be borne by the industry partner/ institute 3. Project duration should be 2 years with MoM contribution capped at Rs. 40 Lakhs.

41.	

Project No.	SNTMOM/1541/2025
Project Title	Emerging technology driven standard operating procedure for achieving uniform composition during aluminium casting
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	Marwadi Chandarana Educare Foundation, CSIR-CMERI
Principal Investigator/ Constituent PI	Amit V Sata 9825217702, amit.sata@marwadieducation.edu.in <u>Co PI:</u> Dr Rajesh P Barnwal 09832726694, r_barnwal@cmeri.res.in
Industry Partner /Contribution	Gagan Ferrotech Ltd. ₹ 20,00,000
Project Cost & Duration	₹ 106,59,003.55 3 Year
Contribution of MoM	₹ 86,59,003.55
Objectives of the project	The overall goal of the project is to develop an emerging technology-driven Standard Operating Procedure (SoP) for achieving uniform composition during aluminium casting. The following objectives are defined to achieve the goal. This, in turn, requires control over the 4Ms, including Material, Machine, Method, and Manpower employed in the casting of aluminium alloys. i. Development of knowledge generation module by establishing a correlation between variation of raw material and chemical composition achieved for sub-process related to melting, and test as well as validate on specific Aluminium alloy (i.e., 3003, 1100, 6061, 7075) through virtual and/or real experimentation. ii. Develop a data acquisition module that will acquire the data of parameters associated with melting using relevant sensors and microprocessors, and integrate a data management module that will acquire the data coming from manual intervention with the developed data acquisition module. iii. Develop a cloud-based process monitoring module that will provide real-time monitoring over the system. iv. Development of a prognosis and analytics module that will predict chemical composition using fundamentals of artificial intelligence, and suggest critical parameters as well as their specific range of values to achieve the desired chemical composition. v. Create a digital twin for the melting of aluminium alloy to impart training on the proposed standard operating procedure to existing manpower and future manpower.
REMARKS/SUGGESTION:	
	1. Need to acquire a considerable amount of data inputs,

Not Recommended	construct cyber-physical models, and try to work on stainless steels as well. 2. Focus on a specific process e.g. Investment casting of SS or die-casting of aluminium alloys. 3. A fresh proposal may be submitted with overall budget rationalization 4. More industry partners in relevant process in Rajkot and / or eastern region to be brought in.

42.	
Project No.	SNTMOM/1553/2025
Project Title	High-entropy alloy coating for enhancing high-temperature oxidation resistance of copper components
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	Maulana Azad National Institute of Technology Bhopal
Principal Investigator/ Constituent PI	Ramkishor Anant 8791343177, ram.met@manit.ac.in
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 9,45,000 1 Year
Contribution of MoM	₹ 9,45,000
Objectives of the project	The objective of this research is to develop advanced oxidation-resistant surface coating on copper substrates using in-situ High-Entropy Alloy (HEA) synthesis via the Advanced Tungsten Inert Gas (TIG) surface melting process. While copper is widely used in thermal and electrical systems due to its excellent conductivity, its poor high-temperature oxidation resistance restricts its long-term use in extreme environments. HEAs, owing to their unique multi-principal element compositions and slow diffusion kinetics, offer exceptional thermal stability and oxidation resistance, making them ideal for protective coatings. This project aims to address the current research gap by exploring the feasibility of directly forming HEA coatings such as AlCoCrFeNi, CoCrNiAlY, and AlCrHfTiZr on copper substrate using the TIG process. The specific objectives are: i. Develop and optimize high entropy alloy (HEA) coating on copper substrates to enhance their resistance to high-temperature oxidation. ii. Investigate the microstructural evolution, phase formation and adhesion behavior of HEA coatings on copper under thermal exposure. iii. Evaluate the high-temperature oxidation resistance of the coated copper substrates through thermogravimetric analysis and surface characterization techniques.

	iv. Correlate the coating composition and microstructure with oxidation performance, identifying key alloying elements and mechanisms contributing to thermal stability. The project integrates alloy design with process innovation to extend the high-temperature performance and durability of copper based components for use in Mines, energy and aerospace systems.
REMARKS/SUGGESTION:	
Not Recommended	1. Objectives lack clarity with respect to specific choice of HEA. PI should eliminate the costly alloying elements. 2. Corrosion resistance or electrical insulation are the target performance requirement for coating. Thermal oxidation resistance of copper alloys is usually addressed with active cooling techniques. 3. The process chosen for coating is in-situ cladding type melt-coat methodology will result in high thickness.

43.	
Project No.	SNTMOM/1555/2025
Project Title	Heat transfer management in aluminium seat frames for trains, buses, batteries of electrical vehicles, and underground mines
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	Heritage Charitable Trust, National Institute of Science Education and Research Bhubaneswar
Principal Investigator/ Constituent PI	Himansu Mohan Padhy 9238392780, hmp.sophi@gmail.com Co.PI Pratap Kumar Sahoo 9937615317, pratap.sahoo@niser.ac.in
Industry Partner /Contribution	M/S AB Information Technology Solution Pvt Ltd ₹20,00,000
Project Cost & Duration	₹1,98,78,100 3 Year
Contribution of MoM	₹1,78,78,100
Objectives of the project	i. Design, Development and Fabrication of a cooling pad which can maintain the temperature in battery within operating range. ii. Simulation and analytical model development for understanding temperature variation in Battery. iii. Development and Deployment of cooling pad in EV vehicles in underground mines.
REMARKS/SUGGESTION:	
Not Recommended	1. Actual specific application in mining is succinct and the project is of universal nature. 2. No interaction with mining companies is demonstrated in

	support of the proposal. 3. PI is advised to approach other ministries for such funding where application can be widespread.

44.	
Project No.	SNTMOM/1559/2025
Project Title	Integrated process technology of combined smelting-collection-refining for extraction of platinum group metals from spent auto catalytic converter
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	CSIR National Institute for Interdisciplinary Science and Technology
Principal Investigator/ Constituent PI	Venkatesan J 8494935154, venkatesanj@niist.res.in Co.PI: Jayasankar K
Industry Partner /Contribution	Trishulevel Eshan Pvt.Ltd ₹ 5,00,000
Project Cost & Duration	₹ 34,59,740 2 Year
Contribution of MoM	₹ 29,59,740
Objectives of the project	The main objective of the project is to develop an efficient and cost-effective integrated process for the recovery of platinum, palladium, and rhodium from spent catalytic converters i. Investigate and refine separation and purification techniques to achieve high-purity outputs suitable for reuse in manufacturing. ii. Optimize key process parameters such as temperature, pressure, and reaction time to enhance recovery efficiency and reduce energy consumption. iii. Evaluate the environmental impact of the proposed process and develop strategies to mitigate potential negative effects. iv. Validate the scalability of the process through pilot-scale testing to ensure feasibility for industrial-scale implementation. v. Explore synergies with existing recycling facilities and industrial processes to maximize resource utilization and minimize waste generation
REMARKS/SUGGESTION:	
Recommended	1. Proof of concept is demonstrated. 2. Deliverables will lead to extraction of platinum group metals from spent auto catalytic converter. 3. Industry partner will facilitate to scale-up.

45.	
Project No.	SNTMOM/1560/2025

Project Title	Field demonstration of fly ash and slag based artificial sand (f-slag sand) a novel material for road infrastructure and alternate to fine aggregates
Thrust Area	Circular Economy And Recycling of Non Ferrous Metals
Institution	Indian Institute of Technology Bhubaneswar
Principal Investigator/ Constituent PI	Bendadi Hanumantha Rao 94397399910, s22ce09004@iitbbs.ac.in, - Co.PI: Omprakash Agarwalla 9437030051, meeraindustries1989@gmail.com
Industry Partner /Contribution	Meera Industries ₹ 4,92,043
Project Cost & Duration	₹ 95,57,350 3 Year
Contribution of MoM	₹ 90,65,307
Objectives of the project	i. Field demonstration of fly ash-slag based sand (F-slag sand), which was developed and patented by IIT Bhubaneswar, as a potential substitute for river sand and as a novel alternate fine aggregates in road construction projects on a pilot scale mode. ii. Construction of 200 m stretch rigid pavement in 2 segments of each 100 m length: (a) OPC with 100% natural sand, and (b) OPC with 100% F-slag sand and evaluate the structural and functional performance of them. iii. Manufacturing of F-slag sand using fly ash-slag combination as precursor materials in bulk quantity through pilot scale disc pelletizer equipment by upscaling the equipment to industrial level. iv. Understand the cost drivers and cost analysis of F-slag sand manufacturing when it is scaled up to industrial level, targeting MSME and other firms are as the major beneficiaries for “technology transfer”. v. Carrying out the Life Cycle Assessment (LCA) of F-slag sand made with the industrial wastes for the state of Odisha, considering cradle-to-gate and cradle-to-consumer approach. The prime scope of this proposal is multi-fold including upscale of disc pelletizer manufacturing technology and field demonstration of F-slag sand. The scope of this pilot project will remain confined to verifying the F-slag sand manufacturing at industrial scale and field demonstrate the same technology to suit to the construction of rigid pavement road in real life scenario. Use of binder materials shall remain confined to fly ash and slag.
REMARKS/SUGGESTION:	
	1. Software for LCA to be excluded.

Recommended with modifications	2. The road laying cost of the proposed 200 meter is quite high. It should be reduced to around Rs. 14 lakhs. 3. Rationalise the overall budget to Rs. 70 Lakhs (max) and complete the project within 2 years.

46.	
Project No.	SNTMOM/1566/2025
Project Title	Development of dual-phase superhydrophobic and self-healing coatings for long-term copper corrosion protection
Thrust Area	Metal Extraction (Metallurgical Processes)
Institution	Indian Institute of Technology Mandi
Principal Investigator/ Constituent PI	V.M.Suntharavel Muthaiah 8126723616, suntharavel@iitmandi.ac.in
Industry Partner /Contribution	ISHRAE ₹ 1,02,383.20
Project Cost & Duration	₹ 63,77,358 3 Year
Contribution of MoM	₹ 62,74,974.8
Objectives of the project	i. Analyze Corrosive Constituents: Identify and characterize the key chemical and environmental agents, such as moisture, chloride ions, sulfur compounds, and organic acids, that contribute to the corrosion of copper in real-world industrial and marine applications. ii. Understand Corrosion Mechanisms: Investigate the fundamental electrochemical and physicochemical mechanisms by which these corrosive agents interact with copper surfaces, leading to the initiation and propagation of localized corrosion, including pitting and crevice attack. iii. Develop Advanced Multifunctional Coating Systems: Formulate and engineer novel coating systems for copper substrates that significantly enhance corrosion resistance under aggressive environmental conditions, while maintaining copper's essential thermal and electrical properties. iv. Design and Fabricate Dual-Layer Coatings: Develop optimized dual-layer coatings comprising a robust metallic or ceramic base layer for structural integrity and a superhydrophobic top layer for water repellency, self-cleaning, and enhanced corrosion protection. Techniques such as sol-gel deposition, electrodeposition, and laser surface texturing will be utilized. v. Incorporate Self-Healing Functionalities: Integrate self-healing capabilities into the coating system by embedding environmentally friendly corrosion inhibitors such as benzotriazole (BTA) and rare earth elements like cerium and zirconium to enable automatic repair of micro-damages and

	extend service life. vi. Evaluate Coating Performance Under Simulated Conditions: Assess the protective performance of the developed coatings under simulated corrosive environments (e.g., chloride-rich and acidic media) through comprehensive electrochemical testing and advanced surface characterization techniques. vii. Assess Durability, Scalability, and Economic Viability: Examine the long-term durability, manufacturability, and cost-effectiveness of the coating systems for large-scale deployment in critical
REMARKS/SUGGESTION:	
Not Recommended	1. Proposal is of more of academic and exploratory nature. 2. Adequate prior work to be done on super-hydrophobic coating and its performance on copper as POC. 3. PI may consider a fresh proposal for a 2-year duration with a budget less than Rs. 50 Lakh

47.	
Project No.	SNTMOM/1567/2025
Project Title	Sustainable process development employing natural deep eutectic solvent for selective extraction and purification of li, co and ni from lithium-ion battery black mass
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	Indian Institute of Technology Tirupati, Indian Institute of Technology Hyderabad
Principal Investigator/ Constituent PI	Anil Babasaheb VIR, 9840269624, anilvir@iittp.ac.in <u>Co.PI:</u> Gande Vamsi Vikram 8686528453, vamsigande@che.iith.ac.in
Industry Partner /Contribution	Critical Mineral Trackers Geo Solutions Centre ₹ 13,50,000
Project Cost & Duration	₹ 94,78,700 3 Year
Contribution of MoM	₹ 81,28,700
	i. Screening, selection, and optimization of suitable natural deep-eutectic solvents (NADES) and leaching conditions to maximize the extraction efficiency. ii. Design and develop a novel NADES-based aqueous two-phase system (ATPS) for the selective separation and purification of Li, Co, and Ni from the NADES leachate. iii. Process intensification employing microwave and ultrasound/acoustic-based field-assisted techniques to enhance the leaching and selective separation efficiency.

Objectives of the project	iv. Develop a downstream process for recovery of the dissolved metals from the respective ATPS phases and regenerating the ATPS components for reuse. v. Techno-economic analysis (TEA) and life-cycle analysis (LCA) based on laboratory-scale experimental results to evaluate the economic feasibility and sustainability of the integrated NADES-based leaching, selective separation, and recycling process in comparison with conventional processes. vi. Scale up of the developed laboratory-scale process to the kilogram-scale for the processing of spent lithium-ion batteries black mass.
REMARKS/SUGGESTION:	
Not recommended	Proof of concept is not established with the identified reagents.

48.	
Project No.	SNTMOM/1568/2025
Project Title	Development of cost-effective automated libs and machine learning based system for real-time analysis and sorting of aluminium (al) alloys for mining applications
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Indian Institute of Technology Kanpur
Principal Investigator/ Constituent PI	Pradeep Kumar K 8172914035, head_pse@iitk.ac.in Co.PI: Rajshekhar Gannavarpu pradipta kumar panigrahi Mohammed Ibrahim Sugarno Amar Sahebrao Ghar
Industry Partner /Contribution	New Age Instruments & Materials Private Limited ₹ 13,03,000
Project Cost & Duration	₹ 2,56,42,000 3 Year
Contribution of MoM	₹ 2,43,39,000
Objectives of the project	To develop an automated LIBS-based system tailored for on-site Al alloy analysis and real-time integration with mechanical sorting systems. Detailed overview: i. Development of a compact LIBS system comprising of DPSS fiber-coupled pulsed laser operating at 1064 nm and UV-VIS spectrometer for spectral analysis and identification of different classes of Al alloys. ii. Development of DL and AI based software module for real-time analysis and classification of Al alloys.

	iii. Development of a compact fiber-coupled pulsed MOPA system operating at 1064 nm as optical excitation source for LIBS of Al iv. Field trials with integration into industrial sorting workflows.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Project concept is good. 2. Project duration should be 2 years with proportionate budget reduction to be under Rs. 2 crores. 3. Revise the ministry-related budget to 125 lakhs plus 25 Lakhs from industry partner and Rs 20 Lakhs from JNARDDC. 4. PI should include more data production for the algorithmic models. 5. PI advised to demonstrate the scrap/metal/alloy sorting machine to JNARDDC.

49.	
Project No.	SNTMOM/1570/2025
Project Title	Development of sustainable biomining technology for recycling of critical metals indium and strontium from electronic waste
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	University of Mumbai
Principal Investigator/ Constituent PI	Bhupendra Pushkar 8424021024, bpushkar@mu.ac.in
Industry Partner /Contribution	M/s EXIGO Recycling Pvt. Ltd., New Delhi ₹ 3,50,000
Project Cost & Duration	₹ 66,05,500 2 Year
Contribution of MoM	₹ 62,55,500
Objectives of the project	i. Enrichment, acclimatization, isolation and identification of indium and strontium bioleaching microorganisms from potential sites. ii. Biomining of indium and strontium using microorganisms from electronic waste and optimization of the process. iii. Preparation of different biosolutions containing lixiviants and bioleaching of indium and strontium. iv. Two-step bioleaching of indium and strontium from electronic waste using biosolution followed by microorganism. v. Analysis of molecular mechanisms of indium and strontium bioleaching in microorganism using omics techniques. vi. Up-scaling of the indium and strontium bioleaching process up to pilot scale (5-20 liters bioreactor).
REMARKS/SUGGESTION:	
Recommended with	1. Project idea is good. 2. Deliverables should lead to bio-mining technology of

modifications	indium and strontium from selected e-waste target. 3. NFTDC will assist with the analysis by providing the ICP-OES analysis, but the analytical standards must be brought along. 4. A seed money of Rs. 10 lakhs is recommended to establish POC in 1 year.

50.	
Project No.	SNTMOM/1576/2025
Project Title	Pilot scale extraction of critical minerals upto 20 ton per day from urban waste using integrated biomining and biohydrometallurgy approach
Thrust Area	Circular Economy And Recycling of Non Ferrous Metals
Institution	Madan Mohan Malaviya University of Technology Gorakhpur, Indian Institute Of Technology Ism Dhanbad
Principal Investigator/ Constituent PI	Vitthal Laxmanrao Gole, 9423445086, vlgch@mmmut.ac.in Co.PI: Shravan Kumar 9771421510, shravan@iitism.ac.in
Industry Partner /Contribution	Spintech Tubes Private Limited, Kolkata ₹ 28,52,800
Project Cost & Duration	₹ 1,49,77,200 3 Year
Contribution of MoM	₹ 1,21,24,400
Objectives of the project	i. Recovery of essential minerals from urban waste with an integrated approach involving hydrometallurgy, bioleaching, bio-oxidation, and other physiochemical methods. ii. Selective green chemical leaching method for the recovery of important minerals, including rare earth elements, polyethylene glycol (PEG), and other minerals such as cobalt (Co), lithium (Li), tin (Sn), and nickel (Ni). iii. Integration of hydrometallurgy, chemical leaching, bioleaching, and bio-oxidation for the recovery of essential minerals. iv. Intensified pilot scale technology of 20 tons/day for the extraction of critical minerals from urban waste.
REMARKS/SUGGESTION:	
Not Recommended	1. The proof of concept and focus is absent. 2. Prior work is not completed, and the technique is not proven. 3. The focus should be greater on a specific feed. 4. Many recycling companies for e-waste & LiB are already operational and matured.

51.	

Project No.	SNTMOM/1583/2025
Project Title	Advancing circular economy - developing polymer inclusion membranes (pims) for rare earth element recovery from e-waste
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	National Institute of Technology Calicut
Principal Investigator/ Constituent PI	Noel Jacob Kaleekkal 8754557380, noel@nitc.ac.in
Industry Partner /Contribution	Nil
Project Cost & Duration	₹ 10,50,000 2 Year
Contribution of MoM	₹ 10,50,000
Objectives of the project	i. Fabrication and Characterization of novel scalable polymer inclusion membranes (PIMs) for selective extraction of REEs—PIMs include 3 keys: a. base polymer PVDF, b. extractants c. plasticizer ii. Evaluation of the efficiency of extractants such as a. di(2-ethylhexyl) phosphoric acid (P227), b. bis(2,4,4-trimethylpentyl)phosphinic acid (Cyanex 272) c. di-(2-ethylehexyl) phosphoric acid (D2EHPA) entrapped in the polymer matrix and quantification of REEs using inductively coupled plasma mass spectroscopy (ICP-MS). iii. Demonstration of continuous process for simultaneous stripping and recovery of REEs using counter-current flow membrane module. iv. Optimizing process conditions for obtaining enhanced flux, improved selectivity, and higher recovery of REEs. v. 5. Validation of the process with real waste streams from REEs recovered from hard disk, magnets and printed circuit boards
REMARKS/SUGGESTION:	
Recommended with modifications	1. Idea is good. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction upto Rs. 10 Lakhs

52.	
Project No.	SNTMOM/1584/2025
Project Title	Upscaled stirred tank leaching system for selective recovery of li and ni from spent lithium-ion batteries using deep eutectic

	solvents
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Indian Institute of Technology Patna, Birla Institute Of Technology
Principal Investigator/ Constituent PI	Subrata Hait, 9470648113, shait@iitp.ac.in Co.PI:- Tanushree Bhattacharya 7250247812, tbhattacharya@bitmesra.ac.in
Industry Partner /Contribution	MSME Greengine Environmental Technologies Pvt Ltd ₹5,60,000
Project Cost & Duration	₹55,92,520 3 Year
Contribution of MoM	₹50,32,520
Objectives of the project	The proposed project aims to develop and scale up a deep eutectic solvent (DES)-assisted leaching process with optimized parameters, followed by integrated downstream steps for efficient and selective recovery of metals from spent LIBs for resource recovery, while supporting the circular economy. The specific objectives of the proposed project are envisaged as follows: i. Bench-scale optimization of DES-assisted leaching process parameters, including temperature, water content, pulp density, and mixing speed for efficient and high-throughput metal extraction from spent LIBs cathode active material in a 250 mL reactor using response surface methodology (RSM), with a focus on DES regeneration to reduce chemical consumption and waste generation. ii. To design and optimize electrochemical methods or combinations of techniques comprising chemical precipitation, solvent extraction, and electrochemical processes for the selective recovery of high-purity metals such as Li, Ni, and Co from leached liquor obtained through DES-assisted leaching. • Scaling up the DES-assisted leaching process in a 10 L stirred tank reactor integrated with downstream units for the selective recovery of Li, Ni, and Co from leachates of NCM- and LCO-based spent LIBs, with process optimization conducted using the RSM statistical tool to enhance efficiency at scale. iii. To perform a comprehensive cost-benefit analysis (CBA) based on the scale-up study to assess the financial viability of the technology in terms of payback period, cost-benefit ratio, and overall impact on resource recovery and waste reduction, etc., to facilitate the commercialization of the developed technology, and iv. To transfer the developed technology to interested industries by creating a commercialization roadmap through industry partners, ensuring practical implementation, and

	fostering industry-academia collaboration for the safe and effective management of spent LIBs in the country without environmental or health hazards.
REMARKS/SUGGESTION:	
Not Recommended	1. The proposal is still at exploratory stage. 2. Interact with NFTDC and develop the DES process for assessing viability and process optimization. 3. Utilize the pilot facility at NFTDC for scale up 4. NFTDC will assist with the digestion and separation portion of the process and begin with the black mass available with NFTDC.

53.	
Project No.	SNTMOM/1588/2025
Project Title	Establishing Lithium Fertility Indices for Rare-Metal Pegmatites - Insights from In-Situ Mineral Geochemistry in Bhilwara, Rajasthan
Thrust Area	Geosciences and Exploration
Institution	Indian Institute of Science Education and Research Mohali
Principal Investigator/ Constituent PI	Sourabh Bhattacharya 8588940290, sbiiserm@gmail.com
Industry Partner /Contribution	Hindustan Copper Limited ₹ 9,80,000
Project Cost & Duration	₹ 45,67,910 3 Year
Contribution of MoM	₹ 32,18,807
Objectives of the project	While conventional geophysical and geochemical methods have advanced pegmatite exploration globally, their effectiveness declines where quartz- and feldspar-rich pegmatites exhibit subtle geophysical contrasts with host rocks, and where thick tropical weathering obscures both geophysical signals and surface geochemical patterns. In such settings, weathering dilutes pathfinder elements within quartz-dominated sediment matrices, while the irregular subsurface geometry of pegmatites restricts the surface exposure of metal-rich zones. Consequently, sampling often accesses barren or peripheral zones lacking any ore phase, undermining the reliability of traditional exploration indicators. Recent studies suggest that Li-rich ores crystallise from melts surpassing diagnostic Li thresholds, with these signatures faithfully recorded in the trace-element chemistry of gangue minerals and melt inclusions. Building on this understanding, the present study seeks to develop robust metal-fertility indices through in-situ trace-element analysis of gangue minerals and melt inclusions, focusing on the Potlan, Danta, and Bhunas pegmatite clusters in Bhilwara district. The primary objectives are:

	i. To develop quantitative trace-element fertility indices for Li-rich pegmatites by in-situ chemical analysis of quartz, tourmaline, mica, and feldspar, targeting Li, Al, Rb, Cs, B, Ge, and Ti. ii. To distinguish fertile and barren pegmatites by benchmarking generated data against Allapatna (Karnataka) and global reference datasets (e.g., Wolfsberg, Moylisha; GREENPEG project). iii. To define diagnostic geochemical thresholds and element ratios (e.g., Li/Al, Ge/Ti, K/Rb) for fertility screening in terrains with limited exposure or ambiguous mineralogy. iv. To integrate mineral-chemical data with multivariate statistics (PCA, DFA, MDS) for fertility classification and spatial targeting in Bhilwara. v. To generate a transferable and validated toolkit for national deployment.
REMARKS/SUGGESTION:	
Not Recommended	1. PI has not done the preliminary ground work. 2. GSI exploration didn't get the approval for Li in the proposed area hence comprehensive review is required. 3. Project lacks novelty. Extensive exploration already done in the proposed area 4. PI advised to collaborate with GSI

54.	
Project No.	SNTMOM/1592/2025
Project Title	Preferential extraction of tantalum from segregated e-wastes leached by using halide based reagents and subsequent separation of the metal through solvent extraction
Thrust Area	Circular Economy And Recycling Of Non Ferrous Metals
Institution	Kazi Nazrul University Asansol, Paschim Bardhaman District, West Bengal, India
Principal Investigator/ Constituent PI	Projjal Basu 7406409273, projjal63@yahoo.co.in Co.PI: CHANCHAL BISWAS
Industry Partner /Contribution	Techspark Electronics ₹ 8,45,589
Project Cost & Duration	₹ 56,37,260 3 Year
Contribution of MoM	₹ 47,91,671
	Separation of capacitors from e-wastes i. Controlled crushing and grinding of the capacitors for partial physical separation of metallic contents ii. Optimization of the chemical treatment process for the

Objectives of the project	separation of organic matters from metallic values iii. Extraction and purification of Tantalum iv. Chemical separation of Mn, Cu, Ag, Sn, and SiO2 from Ta and Ta2O5 v. Magnetic separation of Fe-Ni contents vi. Use of hydrofluoric acid as well as ammonium bifluoride as alternate for the leaching of Tantalum from e-wastes vii. Optimization of process parameters (time, temperature, reagent concentration) for the leaching of Tantalum viii. To investigate the effects of types of halides (fluoride and chloride) on the dissolution kinetics of Tantalum ix. Optimization of process parameters for the solvent extraction of Tantalum from leach liquor x. To compare the efficacy of various stripping agents xi. Complete characterization of the inputs and outputs at every stage of treatment xii. Characterization of the final metal product xiii. • To develop a suitable process flowsheet for the optimized recovery of Ta along with simultaneous recovery of other valuable metals
REMARKS/SUGGESTION:	
Recommended with modifications	1. Project idea is good. 2. Project duration should be 2 years with proportionate budget reduction to Rs. 40 Lakhs. 3. XRF budget is not required, PI advised for outsourced testing. 4. PI shall interact with NFTDC for any technical assistance.

55.	
Project No.	SNTMOM/1593/2025
Project Title	Advancing waste to energy- hydrogen production from aluminum dross in microbial electrolytic cells.
Thrust Area	Mining (Includes Rock Mechanics, Design, Equipments, Energy, Environment, Safety)
Institution	Vignans Foundation for Science Technology and Research Vadlamudi, Guntur, Andhra Pradesh, India
Principal Investigator/ Constituent PI	Kuppam Chandrasekhar 9160201554, chanduibt@gmail.com Co.PI: Satya Eswari Jujjavarapu 8919640943, satyaeswarij.bt@nitrr.ac.in
Industry Partner /Contribution	SUSTAINA Greens ₹ 5,00,000
Project Cost & Duration	₹ 30,20,000.4 2 Year
Contribution of	

MoM	₹ 25,20,000.4
Objectives of the project	i. Microbial degradation of aluminum dross using hydrocarbon-degrading bacteria ii. Develop MEC for efficient hydrogen production using aluminum dross feedstock. iii. To investigate the electrochemical and microbial mechanisms involved in the waste-to-hydrogen conversion process. iv. Evaluate hydrogen yield and aluminum dross degradation in microbial electrolytic cells.
REMARKS/SUGGESTION:	
Not recommended	1. Project not aligned with the above thrust area 2. Deliverables lack clarity 3. PI has not mentioned about lab scale setup 4. Scale up may not be feasible

56.	
Project No.	SNTMOM/1595/2025
Project Title	Process development of the recovery of nickel, cobalt, chrome and iron values from chromite overburden of the sukinda chromite mines
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery From Waste
Institution	International Pranagraf Mintech Research Centre Bhubaneswar, Odisha
Principal Investigator/ Constituent PI	Jitendra Kumar Sadangi 7978044894, jitendra@pranagraf.com
Industry Partner /Contribution	Balasore Alloys Limited ₹ 50,60,900
Project Cost & Duration	₹ 1,94,65,000 3 Year
Contribution of MoM	₹ 1,44,04,100
Objectives of the project	Development of appropriate process to recover the nickel, cobalt, iron and chrome values from chromite overburden by physical, pyrometallurgical and hydrometallurgical routes to make economical viable and environmental sustainable.
REMARKS/SUGGESTION:	
Not recommended	1. The centre is not DSIR recognised. ?? 2. Experimental work related to leaching for recovering nickel and cobalt values is yet to be performed. 3. Technical feasibility of the project as well as scalability is explained. 4. Industry partner is well established and contributing 26% of total project value.

57.	
Project No.	SNTMOM/1596/2025
Project Title	Extraction of zinc from eaf ash by using coal flyash based ceramic membrane system
Thrust Area	Metal Extraction (Metallurgical processes)
Institution	National Institute of Technology Raipur
Principal Investigator/ Constituent PI	Anandkumar Jayapal 09669715209, anandj.che@nitrr.ac.in Co.PI: Bhargavi Rani Anne
Industry Partner /Contribution	Nil
Project Cost & Duration	₹9,99,130 3 Year
Contribution of MoM	₹9,99,130
Objectives of the project	i. To develop a pilot scale tangential flow filtration system using coal flyash based inexpensive tubular membrane. ii. To characterize the tubular membrane by water flux, porosity, molecular weight cut-off, corrosion resistance (acid, base and bio), skin morphology and flexural strength. iii. Leaching of zinc from electric arc furnace (EAF) ash using suitable acidic/alkaline solutions. iv. To separate the zinc from the EAF ash leachate using coal flyash tubular membrane system. v. Optimization of membrane process parameters such as solution pH, metal concentration and applied pressure.
REMARKS/SUGGESTION:	
Recommended with modification	1. Idea is good. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction within Rs. 10 Lakhs

58.	
Project No.	SNTMOM/1597/2025
Project Title	Sustainable green technology for selective gallium extraction from bayer liquor using heterocyclic amino acid-enriched designer biosurfactant cross coupled carbon catalyst
Thrust Area	Extraction of Strategic, Critical Minerals And Ree
Institution	SRM Institute of Science And Technology Kattankulathur, Chennai, Tamil Nadu
Principal Investigator/	Ramani Kandasamy 9790738766, ramanik@srmist.edu.in

Constituent PI	Co.PI: Sekaran Ganesan
Industry Partner /Contribution	Shree Shyam Minerals ₹ 10,00,058
Project Cost & Duration	₹ 50,00,294 3 Year
Contribution of MoM	₹ 40,00,236
Objectives of the project	i. Microbially-mediated semi-pilot scale production (5-10 L Capacity) and molecular characterization of heterocyclic amino acid-enriched cationic lipoprotein biosurfactants (HE-CLB) a. Biochemical characterization of poultry slaughterhouse waste (PSW) b. ii. Microbial-induced synthesis of HE-CLB from PSW and molecular characterization of HE-CLB using instrumental techniques. ii. Selective gallium (III) sequestration at semi-pilot scale level using HE-CLB heterocyclic amino acid-enriched cationic lipoprotein biosurfactants i. Systematic batch sequestration studies for gallium(III) removal a. Studies on the Batch experimental conditions on the sequestration efficiency of gallium(III). b. Isotherm models and sequestration kinetics and quantification of gallium (III) using ICP-OES iii. Validation of mechanistic interaction between HE-CLB and gallium(III) using instrumental techniques and computational quantum mechanical modelling methods a. Confirmation of Electrostatic interaction and coordination bonding using comprehensive instrumental analysis b. Computational quantum mechanical modelling methods: Density Functional Theory (DFT) studies. c. Molecular Dynamics (MD) simulations to study dynamic interactions and complex stability. iv. Studies on reversibility of the gallium sequestration process and the efficient regeneration and reusability of the HE-CLB a. pH-responsive gallium desorption studies and optimization to monitor and quantify the sequestered gallium release using ICP-OES. b. Desorption kinetics, recovery efficiency, regeneration and reusability studies through multiple adsorption-desorption-regeneration cycles.

	v. Validation of pilot-scale performance of HE-CLB for gallium recovery from real-time Bayer liquor and its techno-economical analysis a. Design and construction of pilot-scale (100 Kg) continuous flow system for gallium (III) sequestration b. A techno-economic analysis (TEA) of the process will be conducted.
REMARKS/SUGGESTION:	
Recommended	1. Proof of concept is demonstrated for development of biosurfactant as selective complexing agent for gallium recovery from Bayer liquor. 2. Industry partner will facilitate to scale up the process developed. 3. Project duration reduced to 2 years with proportionate budget reduction up to Rs. 25 Lakhs. 4. Support for purchase of Equipment (AAS) is not recommended.

59.	
Project No.	SNTMOM/1598/2025
Project Title	Development of novel hydrogels for recovery of critical minerals from produced water of indian oil and gas fields
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	Indian Institute of Technology ISM Dhanbad
Principal Investigator/ Constituent PI	Vikas Mahto 9431711023, vikas@iitism.ac.in Co.PI: Mohammed Hamid Siddique
Industry Partner /Contribution	MSME, Royal Castor Products Limited ₹ 9,73,810
Project Cost & Duration	₹ 97,38,100 3 Year
Contribution of MoM	₹ 87,64,290
Objectives of the project	i. Design and synthesize novel hydrogels functionalized with chelating and ion-exchange groups tailored for binding critical minerals. ii. Characterize the physicochemical, mechanical, and sorption properties of the developed hydrogels. iii. Evaluate performance in real produced water from major Indian oil and gas fields. iv. Optimize mineral recovery efficiency of the developed hydrogels from the produced water of Indian oil and gas fields.

REMARKS/SUGGESTION:	
Not recommended	1. Proof of concept to be developed. 2. The experiments on the water samples from major Indian oil and gas fields have not been studied.

60.	
Project No.	SNTMOM/1600/2025
Project Title	Design, synthesis and characterization of mxene based membranes for effective separation of lithium from spent lithium ion battery
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Gandhi Institute Of Technology And Management, Visakhapatnam
Principal Investigator/ Constituent PI	Dr.Annapragada Ratnamala 07259956152, rannapra@gitam.edu Co.PI:- Phani Raja Kanuparthy
Industry Partner /Contribution	Academic Institute
Project Cost & Duration	₹ 10,01,725 3 Year
Contribution of MoM	₹ 10,01,725
Objectives of the project	i. Synthesis of MXenes based membranes ii. Characterization of the synthesized membranes iii. Evaluation of the membranes for separation of Lithium from other metals iv. Studying the mechanism through DFT calculations
REMARKS/SUGGESTION:	
Recommended with modifications	1. Project idea is good. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction to Rs. 8 Lakhs.

61.	
Project No.	SNTMOM/1603/2025
Project Title	Development of hybrid drilling techniques for efficient and sustainable critical mineral exploration and mining
Thrust Area	Geosciences and Exploration
Institution	Indian Institute of Technology ISM Dhanbad
Principal Investigator/ Constituent PI	Mohammed Hamid Siddique 8056175164, mhsiddique@iitism.ac.in Co.PI:

	Vikas Mahto
Industry Partner /Contribution	Nil
Project Cost & Duration	₹10,28,500 3 Year
Contribution of MoM	₹10,28,500
Objectives of the project	i. Design and development of a lab-scale hybrid rotary–ultrasonic drilling prototype rig. ii. Evaluate performance on real hard rock formations common in critical mineral deposits in India. iii. Assess energy consumption, bit wear, and drilling efficiency compared to conventional methods.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Idea is good. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 years with proportionate budget reduction upto Rs. 10 Lakhs

62.	
Project No.	SNTMOM/1605/2025
Project Title	Setting up a semi-pilot plant for converting aluminium extrusion die sludge into alumina, zeolite and recycled leachate
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	JNARDDC, Jawaharlal Nehru Aluminium Research Development and Design Centre
Principal Investigator/ Constituent PI	Amol Mankar 08861114550, amolmankar1505@gmail.com Co.PI: Suchita B. Rai Prachiprava Pradhan Megha Sudhir Panchal
Industry Partner /Contribution	Aluminium Extrusion Manufacturers Association Of India ₹7,80,000
Project Cost & Duration	₹1,55,72,554 1 Year
Contribution of MoM	₹1,47,92,554
Objectives of the project	i. Setting up semi-pilot plant for utilizing 50 kg of sludge for production of Calcined alumina (As per BIS standard IS 17441 (Part 1): 2021) ii. 2. Setting up semi-pilot plant for utilizing 50 lit of liquor for production of detergent grade Zeolite (As per BIS Standard IS 15267:2003)
REMARKS/SUGGESTION:	
	1. Detailed proof of concept already established by JNARDDC

Recommended with modifications	and lab scale studies successfully completed. 2. The commercialisation of the products developed and scalability of the project is explained in detail by PI. 3. Industry partner cash contribution to be increased to 8%.

63.	
Project No.	SNTMOM/1610/2025
Project Title	Development and indigenization of aa4032 and aa2618 aluminum alloy billets for lightweight automotive applications
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	Gandhi Institute Of Technology And Management and JNARDDC, Jawaharlal Nehru Aluminium Research Development and Design Centre
Principal Investigator/ Constituent PI	Ayyagari K Prasada Rao, 8296503823, kayyagar2@gmail.com Co.PI: Kola Immanuel Raju 9980574024, immanuelkola@jnarddc.gov.in
Industry Partner /Contribution	Abilities India Piston & Rings Limited ₹ 4,91,175
Project Cost & Duration	₹98,23,500 1 Year 6 Month
Contribution of MoM	₹ 93,32,325
Objectives of the project	i. To reduce dependency on imported AA4032 and AA2618 alloys by establishing a scalable, cost-effective manufacturing protocol for domestic production ii. To develop SoPs for obtaining uniform composition and microstructure while casting AA 4032 AA2618 alloy billets by integrating DC Casting with Ultrasonic Melt Processing (USP). iii. To validate the developed alloys' performance through microstructural characterization, mechanical testing, and electrochemical corrosion studies and impression creep behavior.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Concept is novel and will lead to significant import substitution for AA4032 and AA2618 alloys. 2. PI was suggested to use stator rotor / equivalent advanced system instead of ultrasonic stirring unit. CAPEX budget to be pruned to Rs. 15 lakhs instead of Rs. 30 lakhs. 3. Similarly travel budget should be pruned down to Rs 6 lakhs from Rs 9 Lakhs. 4. Overall project budget to be reduced to Rs. 80 Lakhs across two institutions. 5. Industry partner contribution should be at least 8 % in cash

64.	
Project No.	SNTMOM/1611/2025
Project Title	Upcycling waste aluminum chips swarf into novel al mofs for heavy metal removal in zinc foundry effluents
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	Kalinga Institute Of Industrial Technology
Principal Investigator/ Constituent PI	Rojalin Sahu 9778127994, rsahufch@kiit.ac.in, Co.PI: Harekrishna Panigrahi
Industry Partner /Contribution	Hollingsworth and Vose Advanced Materials Pvt. Ltd., Mysuru ₹ 8,84,085
Project Cost & Duration	₹ 67,77,985 2 Year
Contribution of MoM	₹ 58,93,900
Objectives of the project	i. To design and develop a scalable, sustainable, green and economical method for converting waste aluminium chips/swarf to high purity aluminium precursor for MOF synthesis ? ii. To synthesise novel robust Al-MOF by using O/N-donor linkers with targeted properties such as ultrahigh surface area, water stability, abundant active sites ? iii. To evaluate the performance of Al-MOFs for the removal of heavy metals Zinc foundry effluents
REMARKS/SUGGESTION:	
Recommended	1. Proof of concept is established. 2. Deliverables will lead to an economical method for converting waste aluminium chips/swarf to high purity aluminium precursor for MOF synthesis. 3. Industry partner will facilitate for the end uses of the MoF to remove heavy metals from zinc foundry effluents.

65.	
Project No.	SNTMOM/1613/2025
Project Title	Preparation of synthetic inorganic binder from iron ore tailings for iron ore pelletization
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	Indira Gandhi Institute of Technology
Principal Investigator/ Constituent PI	Kashinath Barik 9438546189, kashinath.barik@igitsarang.ac.in Co.PI:- Dipa Das
Industry Partner	Nil

/Contribution	
Project Cost & Duration	₹ 9,98,500 3 Year
Contribution of MoM	₹ 9,98,500
Objectives of the project	i. Development of an improved process for maximum extraction of kaolinite clay/synthetic inorganic binder from iron ore tailings and low- grade iron ore (< 45% Fe). ii. Use recovered kaolinite clay in iron ore pellet making by replacement/reduction of bentonite dosage as the binder. iii. Effectiveness and optimization to use kaolinite clay-rich iron ore as a binder to prepare the standard BF/DRI grade iron ore pellet w.r.t. variable iron ore mineralogy.
REMARKS/SUGGESTION:	
Recommeded with modifications	1. Idea is good. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction up to Rs. 8 Lakhs

66.	
Project No.	SNTMOM/1615/2025
Project Title	Developing of a Sustainable Process for the most critical metal Rhenium Extraction from Copper Recovery Waste Streams and other secondaries
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	LN Indtech Services Pvt Ltd Bhubaneswar, Odisha
Principal Investigator/ Constituent PI	Rupambika Mohanty 8895531415, rupps28@gmail.com Co.PI:- Subash Chandra Mallick 9922498715,lnindtech@gmail.com
Industry Partner /Contribution	Sagar Mining and Metals Industries Pvt Ltd ₹ 1,00,000
Project Cost & Duration	₹ 63,35,820 1 Year 6 month
Contribution of MoM	₹ 62,35,820
	The primary objective of the project is to develop an efficient, cost-effective, and environmentally sustainable process for the extraction and purification of rhenium from copper recovery waste and other industrial secondary sources in the Indian context. Specific objectives include: i. Recovery of Rhenium from copper-molybdenum concentrates, metallurgical waste streams, spent catalysts,

	and other residues that are currently underutilized. ii. Purification and Characterization of rhenium to meet industrial-grade specifications. iii. Development of a Laboratory-to-Pilot Scale Process Flow Sheet for future scale-up and commercial deployment. iv. Promotion of Indigenous Technology for strategic metal extraction in alignment with national missions. v. Patenting and Knowledge Dissemination to stakeholders in Indian industry and academia.
Objectives of the project	This project aims to: i. Recover Rhenium Effectively: Extract rhenium, a rare and expensive metal, from copper recovery waste streams (copper-molybdenum concentrates) that would otherwise go to waste. ii. Optimize Metallurgical Processes: Develop and continually refine processes such as roasting, leaching, solvent extraction, and refining to enhance rhenium recovery efficiency, reduce losses, and lower production costs. iii. Meet Market Demands: Address the increasing demand for rhenium in industrial applications, including aerospace, petrochemical, and advanced material sectors. iv. Promote Sustainability: Contribute to the circular economy by recycling industrial waste and minimizing environmental impact. v. Maximize Resource Utilization: Ensure that all valuable resources in copper-molybdenum concentrate are fully exploited, minimizing waste and enhancing the economic feasibility of mining operations.
REMARKS/SUGGESTION:	
Not Recommended	1. Lacks proof of Concept 2. Deliverables lack clarity. 3. Economic feasibility not ascertained. The source of concentrate intended for use in the experiment is not clear.

67.	
Project No.	SNTMOM/1616/2025
Project Title	Design and Development of Smart Electrospun Nanofiber Membranes (SENMs) for Targeted Metal Recovery in Waste Recycling Processes
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	National Institute of Technology Trichy
Principal Investigator/ Constituent PI	Karthik V 9788444987, karthikv@nitt.edu
Industry Partner /Contribution	Nil

Project Cost & Duration	₹9,98,550 1 Year
Contribution of MoM	₹9,98,550
Objectives of the project	This project proposes the design and development of innovative Smart Electrospun Nanofiber Membranes (SENMs) for highly efficient and targeted recovery of valuable metals from complex waste streams in recycling processes. Current metal recovery methods often suffer from low selectivity, high energy consumption, and significant secondary waste generation. SENMs, leveraging the high surface area and tunable properties of electrospun nanofibers, will be engineered with specific functionalities (e.g., chelating agents, pH-responsive polymers, magnetic nanoparticles) to selectively bind and release target metals (e.g., rare earth elements, precious metals, critical industrial metals) under controlled conditions. Further, this proposal aims to establish a strong proof-of-concept for SENMs, addressing critical challenges in sustainable resource management by enhancing metal recovery rates and reducing environmental impact. The objectives of the proposal: i. To design and synthesize novel polymer matrices and incorporate specific functional groups (e.g., ligands, chelating agents) onto electrospun nanofibers to achieve high selectivity for one pre-selected target metal (e.g., Cobalt, Nickel, Platinum Group Elements or a specific Rare Earth Element). ii. To integrate one type of "smart" element (e.g., pH-responsive polymers, functional groups or magnetic nanoparticles) into the nanofiber membranes to enable controlled adsorption and desorption of the pre-selected target metal. iii. To systematically optimize electrospinning parameters for the fabrication of uniform SENMs and characterize their physical, chemical, morphological, and structural properties. iv. To evaluate the adsorption capacity, selectivity, kinetics, and reusability of the developed SENMs for the target metal recovery. v. To demonstrate the feasibility and effectiveness of the developed SENMs in a bench-scale setup for targeted metal recovery from a simulated waste matrix.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Idea is good. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction within Rs. 10 Lakhs

68.	
Project No.	SNTMOM/1622/2025
Project Title	Development of an AI-Assisted Heavy Media Separation System for Efficient Scrap Sorting Based on Density Differentiation from Mining Waste
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste
Institution	MGR Educational Society, Dr. M.G.R. Educational and Research Institute, Chennai, Tamil Nadu
Principal Investigator/ Constituent PI	Bhargav Ram Rayapati, 9491648663, bhargav412@gmail.com Co PI: Pyla Ravi Kiran 9603649243, ravikiran436@gmail.com
Industry Partner /Contribution	Nil
Project Cost & Duration	₹9,25,000 2 Year
Contribution of MoM	₹9,25,000
Objectives of the project	i. Design and Development of AI-Driven Control System Develop an intelligent control unit integrated with sensors and machine learning algorithms for real-time monitoring and classification of scrap materials based on density and physical properties. ii. Prototype of HMS Setup with Sensor Fusion Build a lab-scale Heavy Media Separation (HMS) prototype integrated with AI modules and multi-sensor systems (e.g., vision, weight, float-sink sensors) for automated scrap sorting. iii. Optimization and Validation of Sorting Efficiency Optimize system parameters using AI techniques (such as neural networks or fuzzy logic) and validate the system's efficiency in sorting mixed metal/non-metal scraps through performance metrics like accuracy, throughput, and energy consumption. iv. Field Testing and Industrial Integration Feasibility Conduct pilot-scale testing with mining waste or industrial scrap and assess scalability, robustness, and cost-effectiveness for real-world deployment in recycling or mineral recovery units.
REMARKS/SUGGESTION:	
Not Recommended	1. Deliverables lack clarity. 2. Proponents' background does not match with the proposed concept. Advised to formulate the project in association with scrap recycling industry. 3. Suggested to omit mining waste from the title and resubmit a fresh proposal.

69.	
Project No.	SNTMOM/1626/2025
Project Title	Deep learning based single-pass vision system for detection and classification of metal scraps
Thrust Area	Circular Economy And Recycling of Non Ferrous Metals
Institution	Indian Institute of Technology Kharagpur
Principal Investigator/ Constituent PI	Debashis Sen, 7060758714, dsen@ece.iitkgp.ac.in Co.PI: Debashish Chakravarty 9434084681, profdciitkgp@gmail.com
Industry Partner /Contribution	Tata Steel Ltd ₹ 9,70,910
Project Cost & Duration	₹ 48,54,550 3 Year
Contribution of MoM	₹ 38,83,640
Objectives of the project	i. Development of metal scrap detector using single-pass deep learning-based vision system. ii. Development of multi-class metal scrap classifier based on deep feature extractor integrated with the detector. iii. Simulations for real-time performance verification of the developed detector and classifier on various types of irregular objects with metallic finish. iv. Validation of the invented technologies in a related operational environment similar to those in and around mines.
REMARKS/SUGGESTION:	
Not Recommended	1. Lack proof of Concept 2. Methodology does not clearly state the process of differentiation of metal from other materials.

70.	
Project No.	SNTMOM/1630/2025
Project Title	Phyto E Waste Harnessing Hyperaccumulator Plants and Biochar for Sustainable Metal Recovery and Road Binder Stabilization
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	National Institute of Technology Srinagar
Principal Investigator/ Constituent PI	Dr. Vivek 9805624478, vivak.k12@gmail.com Co.PI: Anshul Gupta 8708773750, anshul.nitsgr@gmail.com
Industry Partner /Contribution	Human Empowerment Organisation ₹ 7,40,000
Project Cost	₹ 73,60,921.5

& Duration	3 years
Contribution of MoM	₹ 66,20,921.5
Objectives of the project	i. To engineer a plant-based urban mining system using native or transgenic hyperaccumulator species for selective uptake of critical non-ferrous metals from e-waste substrate matrices, enabling in situ phytometallurgical detoxification. ii. To develop a dual-mode bioleaching process combining microbial consortia and nanostructured biosurfactants for efficient metal extraction from phytomass, ensuring minimal reagent usage, low thermal input, and high metal selectivity. iii. To synthesize functional biochar from post-extraction phytomass and tailor its physicochemical properties for use as a nano-structuring modifier in bituminous binders or as a geotechnical stabilizer for low-volume roads. iv. To create a modular, closed-loop “phyto-processing-to-pavement” pathway that seamlessly connects electronic waste recovery with infrastructure-grade material development under a unified circular economy framework. v. 5. To demonstrate the system at pilot scale by integrating phytoremediation units with downstream processing modules and real-world pavement trials, validating techno-economic feasibility and lifecycle sustainability.
REMARKS/SUGGESTION:	
Recommended with modifications	1. In addition to the Bio-Phyto method, bio-sorption is not a viable option, therefore PI should explore alternative methods. 2. The soil remediation/bio-remediation process is a better option. 3. The E-waste needs to be pre-processed first and specific e-waste is to be targeted. 4. Title to be modified accordingly to “Bio- remediation for removal of toxic elements from under-ground soil” or equivalent titles. 5. Focus on heavy and other toxic metals. 6. Project duration should be 2 years with proportionate budget reduction to Rs. 63 Lakhs.

71.	
Project No.	SNTMOM/1631/2025
Project Title	A hybrid method combining nanomaterials, ionic liquids, and biosorption for the separation of rare earth elements
Thrust Area	Extraction of Strategic, Critical Minerals And Ree
Institution	Indian Institute of Science Bengaluru
Principal Investigator/	Ashok M Raichur, 9449063238, amr@iisc.ac.in Co.PI:

Constituent PI	Yerriswamy Pateel 9980118930, ypateel@geoexpore.com
Industry Partner /Contribution	GeoExpOre Pvt. Ltd ₹ 24,00,000
Project Cost & Duration	₹ 2,13,75,000 2 Year
Contribution of MoM	₹ 1,89,75,000
Objectives of the project	i. Review and Evaluate Current REE Separation Technologies Assess the latest developments in REE mineral processing, focusing on advancements in solvent extraction, flotation, magnetic separation, and novel methods. ii. Identify Technological Gaps Analyze the limitations of current technologies, including efficiency, selectivity, cost, and environmental impact. iii. Propose a New or Improved Method of Separation Develop a novel or improved separation technique, integrating new technologies such as nanomaterials, ionic liquids, bio-based adsorbents, or hybrid approaches that can address current challenges in REE processing. iv. Evaluate the Feasibility and Sustainability Conduct laboratory-scale experiments to test the efficiency, selectivity, and environmental sustainability of the proposed method, comparing it with existing technologies.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Project idea is good. 2. Recommended for proof of concept only, as accepted by the Proponent. 3. Seed money of ₹ 10 lacs recommended to carryout POC. 4. Duration of the project to be reduced to 1 year.

72.	
Project No.	SNTMOM/1633/2025
Project Title	Enhancing Automotive Sustainability through Advanced Ceramic Nano coatings, A Scalable Technology Upgrade.
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	Christ University
Principal Investigator/ Constituent PI	Gowtham Sanjai S, 9994206828, gowthamsanjai.s@christuniversity.in Co PI: Gurumoorthy S Hebbar, 9880997000, gshebbar@rediffmail.com Kiran K, 9535339545, kirankavalli@gmail.com Ravikumar R, 9964167735, r.ravikumar64@gmail.com Dr Thejaraju R

	9902505740, thejaraju.r@christuniversity.in
Industry Partner /Contribution	Aadhya Tech Sol (MSME) ₹2,50,000
Project Cost & Duration	₹48,66,500 2 Years
Contribution of MoM	₹46,16,500
Objectives of the project	The main objectives of the research work are: i. To synthesize and optimize micron-sized plasma-sprayable powders from nano-sized ceramics (e.g., stabilized zirconia, alumina) using spray drying, focusing on particle morphology and flowability. ii. To optimize the use of synthesized micron-sized powders in plasma spray equipment to develop nano-structured coatings on aluminum and its alloys followed by characterization. iii. To apply optimized nano-structured plasma spray coatings on automotive components like pistons and gudgeon pins using synthesized micron-sized powders followed by characterization. iv. To evaluate the performance of a modified engine equipped with coated components (8YSZ on Al-Si piston head and a-Al2O3 on steel gudgeon pin) through 500 hours of endurance testing followed by characterization. v. To test and validate the mechanical and thermo-physical properties of the developed plasma spray coatings, ensuring their reliability and performance under operational conditions.
REMARKS/SUGGESTION:	
Not Recommended	1. Christ University and JNARDDC have successfully undertaken phase-1 of this project for 100 hours of endurance testing on CI run engine followed by filing of 2 patents. 2. The proposed project is an extension of the same work for a 500-hour endurance testing, which should be carried out by the PI as a proof of concept. 3. Project lacks novelty.

73.	
Project No.	SNTMON/1636/2025
Project Title	Recovery of potash from granitic gneiss (rock dust)
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	CSIR National Institute for Interdisciplinary Sciecne and Technology, Jawaharlal Nehru Aluminium Research Development and Design Centre
Principal	Dr. M. Sundararajan 8129075511, sundararajan@niist.res.in

Investigator/ Constituent PI	Co.PI: Upendra Singh 9422980366, singhu@jnarddc.gov.in
Industry Partner /Contribution	NS & Co (MSME) ₹12,45,060
Project Cost & Duration	₹83,00,040 2 Years
Contribution of MoM	₹70,54,980
Objectives of the project	• Extraction of potash involving acid-leaching process and develop flow sheet for the industrial adaptability and Production of potash value • Study the mobility behaviour of critical elements from rock dust during the acid leaching process. • Recovery, separation and purification of Potassium for fertilizer. • 4. Utilization of residue / sludge for the manufacturing of building materials for the Net Zero Waste Process (NZWP)
REMARKS/SUGGESTION:	
Recommended	1. Proof of concept is demonstrated. 2. Deliverables will lead to Recovery, separation and purification of Potassium for use in fertilizer industry. 3. Industry partner will facilitate to scale-up the process developed.

74.	
Project No.	SNTMOM/1639/2025
Project Title	Integrating machine learning for sustainable metal recycling operations
Thrust Area	Circular Economy And Recycling of Non Ferrous Metals
Institution	Christ University Ghaziabad, Uttar Pradesh
Principal Investigator/ Constituent PI	Beulah M, 09035309554, m.beulah@christuniversity.in Co Pi: Venkataswamy R, 7829222446, venkataswamy.r@christuniversity.in Varaprasad Janamala 9620446677, varaprasad.janamala@christuniversity.in
Industry Partner /Contribution	AA GOLEWALE ₹ 4,50,000
Project Cost & Duration	₹ 45,10,900 3 Year
Contribution of MoM	₹ 40,60,900
	Automate Metal Identification and Sorting: Develop machine learning models using image processing and sensor data to

Objectives of the project	accurately identify and categorize different types of metals in real time. Improve Recycling Efficiency: Optimize sorting and processing operations to reduce material contamination, improve recovery rates, and minimize manual intervention, addressing SDG 12. Enhance Environmental Sustainability: Reduce energy consumption, emissions, and landfill dependency through more precise and reduction of virgin metal extraction. Create a scalable smart recycling framework: Design a modular, adaptable system that can be deployed across various recycling facilities to standardize best practices and promote technological adoption (SDG9).
REMARKS/SUGGESTION:	
Not Recommended	1. Lacks proof of Concept and novelty 2. Deliverables lack clarity. 3. The actual requirements for sorting method need to be assessed through industry interactions.

75.	
Project No.	SNTMOM/1641/2025
Project Title	Investigation into Cemented Paste Fill as a Sustainable Artificial Roof Support in Underhand Stoping Method in Metal Mines
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	National Institute of Technology Karnataka Surathkal, CSIR Central Institute of Mining and Fuel Research
Principal Investigator/ Constituent PI	Sandi Kumar Reddy, 9448721700, skreddy@nitk.edu.in <u>CoPI:-</u> Dr. John Loui Porathur 9270800908, johnlouip@gmail.com Mr. Jagapthal Vinod Kumar 8639209285, jvinod@cimfr.res.in / jagapthalvinodkumar.243rt502@nitk.edu.in
Industry Partner /Contribution	Hindustan Zinc Limited
Project Cost & Duration	₹ 999900 3 Years
Contribution of MoM	₹ 999900
	i. To develop an appropriate material model for CPF incorporating strain-softening behaviour in numerical simulations using FLAC3D. ii. To evaluate the stability of cemented paste fill (Critical span of CPB) through numerical modelling, considering factors such as depth, stope dip angle, modulus ratio (rock deformation modulus to paste fill modulus), Plug fill height,

Objectives of the project	and the strength properties of the paste fill (cohesion and tensile strength). iii. To determine the optimum stoping sequence for underhand stoping with CPF, based on variables including depth, CPB plug height, rock deformation modulus, and three different stoping sequences. iv. 4. To evaluate the applicability of the findings in real mining scenarios and to develop predictive equations for determining critical spans (Required cohesion) of the stope below CPB, and required plug fill height. Thereby establishing design guidelines for paste fill roof stability.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Idea is good. 2. The project is recommended for support under the S&T clause of TRL-3 research project without industry participation with a ceiling of Rs. 10 lakhs within 10% of the total budget of the S&T budget. 3. Project duration should be 1 year with proportionate budget reduction up to Rs. 10 Lakhs.

76.	
Project No.	SNTMOM/1643/2025
Project Title	Development and Validation of roll bonded graphene-aluminium composite for cylindrical can cell lithium-ion battery casing
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	Kalinga Institute Of Industrial Technology
Principal Investigator/ Constituent PI	Sudesna Roy 9040009662, sudesna.royfme@kiit.ac.in Co.PI: Dr. John Loui Porathur 9270800908, johnlouip@gmail.com
Industry Partner /Contribution	Cellark Powertech Private Limited ₹5,00,000
Project Cost & Duration	₹68,26,000 3 Years
Contribution of MoM	₹63,26,000
Objectives of the project	i. Development of graphene reinforced aluminum (Al5XXX grade) composite through hot accumulative roll-bonding. ii. Simulation of the battery casing through finite element modelling for deep drawing of graphene-aluminium composite. iii. Application of optimized deep drawing die to ensure structural and sealing reliability. iv. Prototype fabrication through electrical redesign to use Al can as the positive terminal, with anode connections routed through insulated feed-throughs.

	v. 5. Validation of prototype and benchmarking with commercial steel-can cells.
REMARKS/SUGGESTION:	
Recommended with modifications	1. Project idea is good. 2. Project duration should be 2 years with budget reduction to Rs. 50 Lakhs. 3. PI advised to exclude hot rolling mill to ensure reducing the CAPEX. 4. The main process in this procedure is deep drawing. 5. Industry partner contribution should be at least 8 % in cash

77.	
Project No.	SNTMOM/1651/2025
Project Title	Human-Robot Collaborative Swarm for Safe and Efficient Underground Mining
Thrust Area	Mining (Includes Rock Mechanics, Design, Equipments, Energy, Environment, Safety)
Institution	Indian Institute of Technology Bhilai
Principal Investigator/ Constituent PI	Saikat Sahoo, 8768706871, saikat@iitbhilai.ac.in <u>Co PI:</u> Purnendu Das, 9477070643, purnendu@iitbhilai.ac.in Kedarisetty Siddhardha 7397287245, siddhardhak@iitbhilai.ac.in
Industry Partner /Contribution	Janyu Tech (MSME) ₹ 6,76,416
Project Cost & Duration	₹ 58,34,640 3 Year
Contribution of MoM	₹ 51,58,224
	The mining sector plays a crucial role in India's economic development by providing raw materials for industries across India and abroad. In general, mining involves humans operating underground in hazardous environments, making it unsafe and hard to conduct various tasks. Developing collaborative human-robots (cobots) over the conventional human-centric approach is essential for enhancing performance, precision, and consistency in normal underground mining tasks such as inspection, mapping, assembly, material handling, and rescue missions, while reducing human exposure to dangerous conditions. The objectives proposed for developing novel underground mining cobots are i. Heterogeneous-dual-arm autonomous mobile robot: Develop a tracked mobile robot equipped with two 4-Dof robotic arms—one with a scooper and mini-driller, and the other with a compliant gripper. The robot uses six motorized

Objectives of the project	wheels with tracks for enhanced grip and mobility on uneven terrain. The robotic arms can actively adjust to maintain the center of gravity, improving stability, preventing toppling during climbs or descents, and reducing the risk of slipping over rubble. ii. Compliance gripper: Design a soft adaptive gripper tailored for holding mining materials. To handle objects of varying shapes, the end-effector will be designed as a gripper using suitable elastic materials. iii. Swarm cobots: A swarm of three collaborative robots will be developed that respond to a designated human supervisor. The swarm can work cooperatively by interlinking into formations to climb rubble, bridge gaps, stabilize loads, or improve communication range. After each mission, the swarm reports to the supervisor and receives further instructions. iv. Hand gesture and voice-based communication: The supervisor uses IMU-equipped bands for hand gestures to select specific cobots and indicate desired directions of motion. Also using machine learning models, basic voice commands will be translated into actionable tasks.
REMARKS/SUGGESTION:	
Not Recommended	1. Deliverables lack clarity. 2. The set up is difficult to meet the drilling depth, as the depth required of drilling in mines is very high 3. The PI should target to design equipment specific to the mining industry 4. PI and his team must visit to an underground metal mine and discuss with mine officials.

78.	
Project No.	SNTMOM/1655/2025
Project Title	Optimizing Homogenization Practices for 6005 and 6082 Aluminum Alloys - SOP Development for the Recycling Industry
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	JNARDDC, Jawaharlal Nehru Aluminium Research Development and Design Centre
Principal Investigator/ Constituent PI	Ramavajjala Anil Kumar 9491318525, anilkumar@jnarddc.gov.in - <u>Co PI:</u> Kola Immanuel Raju, 9980574024, immanuelkola@jnarddc.gov.in Shweta Dhamande Naik 8408880695, shweta@jnarddc.gov.in
Industry Partner /Contribution	Yashoda Metals &Alloys ₹4,00,000
Project Cost	₹79,52,421

& Duration	1 Year
Contribution of MoM	₹75,52,421
Objectives of the project	i. Establish optimized homogenization windows for AA 6005 and AA 6082 alloys ii. Development of Standardized Operating Procedures: Create comprehensive, industry-ready SOPs for homogenization of AA 6005 and AA 6082 alloys specifically designed for recycling industries
REMARKS/SUGGESTION:	
Recommended with modifications	1. Relevant problem is identified and technically feasible solution is proposed. 2. Proof of concept is demonstrated. 3. Industry partner cash contribution to be increased to at least 6 Lakhs. 4. Raw material provided by industry partner should be at least 1 ton.

79.	
Project No.	SNTMOM/1657/2025
Project Title	Recovery of Rare Earth Elements from Mining Effluents using Indigenously Developed TiO2-Coated Multichannel Bentonite Ceramic Membrane
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery From Waste
Institution	National Institute of Technology Andhra Pradesh
Principal Investigator/ Constituent PI	Vinoth Kumar Raja 9442044040, vinoth@nitandhra.ac.in
Industry Partner /Contribution	VB Ceramics ,Chennai, Tamil Nadu 600041 ₹ 3,50,000
Project Cost & Duration	₹ 34,84,346 2 Year
Contribution of MoM	₹ 31,34,346
Objectives of the project	i. To create a low-cost, multichannel bentonite-based ceramic membrane support through an extrusion and controlled sintering process, optimizing mechanical strength, porosity, pore size, and chemical resistance. ii. To apply a uniform TiO2 coating to the surface of the multichannel support via dip-coating, aiming to enhance surface charge characteristics and enable the selective removal of REEs from acidic effluents. iii. To assess the performance of the developed bentonite–TiO2 composite membrane in treating coal mine drainage (CMD), focusing on the selective rejection of REEs under cross-flow conditions. iv. To conduct a life cycle assessment and techno-economic

	analysis to ascertain the environmental sustainability, scalability, and cost-effectiveness of the developed membrane system for CMD remediation with an emphasis on REE rejection.
REMARKS/SUGGESTION:	
Recommended	1. Proof of concept is demonstrated. 2. Industry partner will facilitate to scale up the technology.

80.	
Project No.	SNTMOM/1661/2025
Project Title	Development of TiC-Ni Cermet-Steel Brazed Joints A Sustainable, and Cost-Effective Alternative to WC-Co in Mining Tools
Thrust Area	Mining (includes rock mechanics, design, equipments, energy, environment, safety)
Institution	Indian Institute of Technology Ropar, G H Raisoni University
Principal Investigator/ Constituent PI	Avala Lavakumar 7077110110, lava@iitrpr.ac.in Damanapeta Narsimhachary 08763837646, vajraachary@gmail.com Co PI: Prince Kumar Singh 8299552983, princeks@iitrpr.ac.in Hariprasad Gopalan 7550265403, hariprasad.gopalan@iitrpr.ac.in
Industry Partner /Contribution	SGT Associates Pvt. Ltd. ₹8,76,474
Project Cost & Duration	₹87,64,740 2 Years
Contribution of MoM	₹78,88,266
Objectives of the project	i. To develop a crack-free brazing process using appropriate filler material for joining TiC-reinforced Ni-based cermet (TiC-Ni) with martensitic stainless steels (MSS). ii. To characterize the interfacial microstructure, phase evolution, and elemental diffusion in TiC-Ni/MSS joints, and compare with WC-Co/steel counterparts. iii. To evaluate the mechanical properties of the brazed joints, including microhardness, tensile strength, shear strength, and wear resistance properties. iv. To demonstrate application potential of the developed joints in mining tool prototypes, emphasizing improved durability and cost-effectiveness.
REMARKS/SUGGESTION:	
Resubmission in next PERC	1. Reduce the time to one year and resubmit with revised capital budget accordingly. 2. Recommended to explore the exact nature of the brazing

	process and its actual application in Mining through industry interaction.

81.	
Project No.	SNTMOM/1662/2025
Project Title	Development of closed cell aluminium alloy and composite foams from industrial scrap for impact damping and EMI shielding applications
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	CSIR National Institute for Interdisciplinary Sciecne and Technology
Principal Investigator/ Constituent PI	Dr. Sreejakumari.S.S 09442217259, sreejakumari@niist.res.in Co PI: Parijat Pallab Jana, 9735466880, parijatpallab.niist@csir.res.in A. Srinivasan, 9746473876, asrinivasan@niist.res.in T.P.D. Rajan 9447035439, tpdrajan@niist.res.in
Industry Partner /Contribution	Hindalco Industries Ltd, Vedanta Ltd, Jharsuguda ₹12,06,976
Project Cost & Duration	₹60,34,880 2 Years
Contribution of MoM	₹48,27,904
Objectives of the project	i. Characterize industrial aluminium scrap to evaluate its chemical composition and assess its suitability for aluminium foam production. ii. Develop aluminium alloy foams from scrap using liquid metal foaming techniques, including: o Foaming agent method (batch scale: ~10 kg/batch) o Gas injection method (continuous process) iii. Fabricate composite aluminium foams by incorporating ceramic reinforcements such as SiC and Al2O3 to enhance mechanical, thermal, and functional properties. iv. Evaluate the structural, physical, mechanical, and thermal properties of the foams for potential applications in: o Impact energy absorption o Electromagnetic interference (EMI) shielding v. Optimize process parameters (e.g., foaming temperature, gas flow rate, foaming agent content) to achieve uniform pore size distribution and improved foam morphology. vi. • Demonstrate scalable and continuous production of aluminium foams at an industrial scale (target: ~500 kg) using gas injection melt foaming technology.
REMARKS/SUGGESTION:	
	1. Project idea is good

Recommended with modifications	1. Project idea is good 2. Producing foam structures is challenging in the continuous process. 3. The MoM contribution capped to Rs. 40 lakhs. 4. PI advised to submit revised budget sheet accordingly.

82.	
Project No.	SNTMOM/1671/2025
Project Title	Development of a Verifiable, User-Friendly Data Wiping Software to Promote Secure IT Asset Disposal and promoting Circular Economy
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Indian Institute of Technology Delhi
Principal Investigator/ Constituent PI	Prof. Vireshwar Kumar 6299913515, viresh@cse.iitd.ac.in
Industry Partner /Contribution	Attero ₹ 80,00,000
Project Cost & Duration	₹ 3,28,00,000 2 Years
Contribution of MoM	₹2,48,00,000
Objectives of the project	i. To develop a secure, scalable, and standards-compliant data sanitization software for end-of-life IT assets (smartphones and laptops), integrating cross-platform support (Windows, Linux, Android) and advanced overwrite techniques including hidden-sector (HPA/DCO) and SSD-aware secure erase. ii. To eliminate public reluctance to recycle driven by data privacy fears by providing verifiable, tamper-proof, digitally-signed wipe certificates (PDF and machine-readable JSON), enabling third-party audit and transparency unprecedented in consumer-grade tools. iii. To make the tool publicly accessible under a government-regulated open-source or affordable one-time fee model, ensuring broad adoption without vendor lock-in and providing offline usability (bootable ISO) for low-connectivity regions. iv. To validate the tool through rigorous forensic testing by accredited labs (e.g., ADISA India, DHS CFTT), coupled with optional AI-based forensic verification to detect residual data artifacts, raising wipe assurance beyond conventional methods. v. To deploy pilots in collaboration with Attero Recycling through public recycling campaigns and municipal wipe kiosks, ensuring real-world scalability and integration into formal refurbishment and recycling workflows. vi. To promote the circular economy by unlocking millions of hoarded devices, thus boosting IT asset reuse, formal recycling, and creating secure data disposal pathways

	aligned with India's digital trust and environmental sustainability goals.
REMARKS/SUGGESTION:	
Resubmission in next PERC	1. Project idea is good. 2. Deliverables will lead to development of a software which will ensure certified deletion of data from various IT devices and promote recycling of IT assets. 3. The timeline should be 2 years with overall budget of Rs. 1.80 crores out of which Ministry of Mines contribution shall be Rs. One crore and balance from industry 4. PERC shall co-opt for two experts pertaining to the domain requirement of this project, whose feedback shall be obtained before evaluation of the project in next PERC. 5. The experts will also be a part of the evaluating team.

ANNEXURE-A

LIST OF PARTICIPANTS OF 27th PERC MEETING HELD AT JNARDDC, Nagpur on 18th & 19th July 2025

1.	Mr Shakil Alam Economic Adviser (Mines)
2.	Shri Yogendra Singh Bhamboo Director (Tech), Ministry of Mines
3.	Shri Ashish Saxena Deputy Secretary (Mines)
4.	Dr. Anupam Agnihotri Director JNARDDC Nagpur
5.	Dr K Balasubramanian Director, NFTDC, Hyderabad
6.	Prof S. Subramanian IISc Bengaluru
7.	Dr S P Das Chief Scientist, IMMT
8.	Prof Sagar Pal Dean (R&D) IIT-ISM, Dhanbad
9.	Dr Sripad R Naik Director (Addl. Charge) NIRM Bangalore
10.	Prof Debasis Deb (Mining Engineering) IIT Kharagpur
11.	Dr Autar Krishen Raina Chief Scientist, CIMFR Nagpur
12	

12.		Shri Parwez Akhter Senior Geologist (Metal-IV), Ministry of Mines
13.		Shri Anshul Sable Section officer (Metal-IV), Ministry of Mines