

Government of India
Ministry of Mines
Metal-4 Section

**Minutes of the 58th Meeting of Standing Scientific Advisory Group (SSAG) held on
18th December 2024 at 01:00 pm at Khanij Kaksh, Shastri Bhawan, New Delhi**

58th Meeting of Standing Scientific Advisory Group (SSAG) was held on 18th December, 2024 at 01:00 pm at Khanij Kaksh, Shastri Bhawan, New Delhi under the chairmanship of Shri V. L. Kantha Rao, Secretary, Ministry of Mines. The list of participants is enclosed at Annexure-A.

2. At the outset, Shri Shakil Alam, Economic Adviser, Ministry of Mines and Member Secretary, SSAG welcomed the members to the 58th SSAG meeting. Initiating the proceedings of the meeting, the Member Secretary briefed the SSAG about the evaluation and review process of the project proposals conducted by PERC before recommending these to the SSAG.

3. Thereafter, Shri Shakil Alam, E.A., Ministry of Mines, Member Secretary, SSAG made a presentation on the agenda items of the meeting. Thereafter, agenda items were taken up for discussion. The details of the deliberations and decisions taken during the meeting are presented in the succeeding para.

4. Agenda item no. 1: Consideration of 21 new Project Proposals recommended by 26th PERC

4.1 The Project proposals for directed R&D topics were invited online on SATYABHAMA portal of the ministry of mines i.e. research.mines.gov.in under the Science & Technology Scheme of Ministry of Mines. A total number of 129 project proposals were received on the SATYABHAMA portal till the last day of the deadline for receiving the proposal i.e. 25.11.2024 till 5 PM.. Thereafter a two-stage evaluation & review process was adopted to evaluate the proposals for making recommendation to Standing Scientific Advisory Group (SSAG). The first stage comprised of preliminary screening of the proposals which was done by a team of experts. Based on the guidelines as adopted in 14th PERC, the experts conducted pre-screening of the proposals. After screening, 44 proposals were short listed for further evaluation in the second stage by the PERC. The details of the discussion and the decisions taken on the project proposals are discussed in the following Paras.

4.2 Dr. Anupam Agnihotri, Director, JNARDDC made a detailed power point presentation on the proposals recommended by PERC before the SSAG. It was informed that the 26th meeting of PERC was held on 6th December 2024 at Nagpur. The 44 proposals which were recommended by a team of Experts were examined and evaluated after detailed discussion with the PIs concerned by 26th PERC. Out of these 44 project proposals, PERC recommended 21 projects for consideration of the SSAG in its next meeting.

4.3 After detailed deliberations the SSAG approved following 18 project proposals. Two proposals which were recommended by the PERC on certain conditions were deferred by the SSAG and one project was not approved. The details of the decision of SSAG in each of project proposals are as under:

1. Project no. : SNTMOM/1239/2024

Project Title	Assessment, mapping, and In-situ sampling of Lateritic Bauxite plateau deposits through integrated Hyperspectral sensor data and AI-powered heterogeneous Robotic systems
Trust Area	Geosciences and Exploration
Institute	Jawaharlal Nehru Aluminium Research Development and Design Centre, Indian Institute of Science Bengaluru, NATIONAL REMOTE SENSING CENTRE
Principal Investigator/ Constituent PI	Pravin G Bhukte pgbhukte@jnarddc.gov.in, 9960020724 <u>Co-PI:</u> Jishnu Keshavan kjishnu@iisc.ac.in, 9100473433, ISWAR CHANDRA DAS das_ic@nrsc.gov.in, 9491886475
Industry Partner /Contribution	ARTPARK (AI & Robotics Technology Park), Bangalore ₹40,00,000 (25.67% of total project cost)
Project Cost & Duration	₹1,55,79,066 2 Year
Contribution of MoM	₹ 1,15,79,066
Objective	The following objectives laid down for this project:- <ul style="list-style-type: none"> • Efficiently and thoroughly traverse the unexploited deposits with heterogeneous autonomous systems to comprehensively map its topography • Thickness estimation and 3D terrain model of the ore to ensure an accurate volume determination (Non-invasive). • Assessment of quality of bauxite deposit using hyperspectral remote sensing data. • Automatic sample retrieval and return
GSI Comments	The project was deferred in 57 th SSAG Meeting held on 19.06.2024 and it was desired that the comments of GSI may be obtained on the project. The comments of GSI are as under: <ol style="list-style-type: none"> 1. As the space-borne Hyperspectral data coverage is limited with lack of continuity in India, data availability in the target area has to be checked. 2. The thickness estimation procedure of bauxite bands and the overburden by remote sensing is not clear.

	<p>3. The use of all bauxite exploration reports and data synthesis procedures is not clear in the methodology.</p> <p>4. Linking and interpreting surface mineral alteration captured by the Remote sensor with Bauxitic horizons appears to be challenging as the ferritcrete is rich in iron and mostly this get reflected in the data.</p> <p>5. As the sampling depth is not clearly stated, it is not understood how bauxite horizons at depth will be sampled / identified.</p> <p>6. As per the project document, the classification into insitu, transported and composite nature based on genesis is not clear. This is important for bauxite exploration in coastal areas of Maharashtra-Konkan belt.</p> <p>The utility of automatic sample retrieval and return in a bauxite terrain is not at all clear.</p>
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REMARKS / SUGGESTION

SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <p>1. Total project cost: ₹ 1,55,79,066</p> <p>2. Industry – ₹ 40,00,000 and MoM - ₹ 1,15,79,066 to institutions and breakup of the contribution are as below:-</p> <p style="text-align: right;">(Amount in Rupees)</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>JNARDDC</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>2205000</td> <td>2625000</td> <td>4830000</td> </tr> </tbody> </table> <table border="1" style="width: 100%;"> <thead> <tr> <th>IISC</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>2124908</td> <td>2209158</td> <td>4334066</td> </tr> <tr> <td>Industry Partner</td> <td>4000000</td> <td>0</td> <td>4000000</td> </tr> <tr> <td>Grand Total</td> <td>6124908</td> <td>2209158</td> <td>8334066</td> </tr> </tbody> </table> <table border="1" style="width: 100%;"> <thead> <tr> <th>NRSC</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>1155000</td> <td>1260000</td> <td>2415000</td> </tr> </tbody> </table>	JNARDDC	1st Year	2nd Year	Total	MoM	2205000	2625000	4830000	IISC	1st Year	2nd Year	Total	MoM	2124908	2209158	4334066	Industry Partner	4000000	0	4000000	Grand Total	6124908	2209158	8334066	NRSC	1st Year	2nd Year	Total	MoM	1155000	1260000	2415000
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2. Project no. : SNTMOM/1281/2024

Project Title	Sustainable Recovery of Critical and Rare Earth Metals from E-waste using Integrated Aqueous Metallurgy
Trust Area	Extraction of strategic, critical minerals and REE
Institute	SRM University AP - Andhra Pradesh, (SRM TRUST AP)
Principal Investigator/ Constituent PI	Pankaj Pathak pankajpathak18@gmail.com, 7049606158

Industry Partner /Contribution	CRATON INFRA PRIVATE LIMITED ₹9,24,352 (15.24% of total project cost)	₹9,24,352 (20.4% of total project cost)																
Project Cost & Duration	₹60,64,848 3 Year	Revised Cost: ₹ 45,29,232 Revised Duration: 2 Year																
Contribution of MoM	₹ 51,40,496	Revised Contribution of MoM: ₹36,04,880																
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Development of greener, cost-efficient, and simple recycling technology for recovery of rare earth metals (REMs) from the e-waste includes electric vehicle magnet, EVM, metal hydride battery, MHB and Hard disc device, HDD. • Development and upscaling of the extraction method for the selective REMs from the leach liquor of e-waste. • More than 90 percent metal recovery of critical and rare earths (Li, Ni, Co, Mn, Ce, La, Pr, Y) will be achieved with close loop system. • Techno-economic analysis and life cycle assessment of critical and rare earth metals recovery from e-waste to establish the cradle to cradle circular material supply chain. 																	
REMARKS / SUGGESTION																		
SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> 1. Total project cost: ₹ 45,29,232 2. Industry – ₹ 9,24,352 & MoM - ₹ ₹36,04,880 contribution and breakup of the contribution are as below:- <p style="text-align: right;">(Amount in Rupees)</p> <table border="1"> <thead> <tr> <th>SRM University</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>2008764</td> <td>1596116</td> <td>3604880</td> </tr> <tr> <td>Industry Partner</td> <td>924352</td> <td>--</td> <td>924352</td> </tr> <tr> <td>Grand Total</td> <td>2933116</td> <td>1596116</td> <td>4529232</td> </tr> </tbody> </table>		SRM University	1 st Year	2 nd Year	Total	MoM	2008764	1596116	3604880	Industry Partner	924352	--	924352	Grand Total	2933116	1596116	4529232
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MoM	2008764	1596116	3604880															
Industry Partner	924352	--	924352															
Grand Total	2933116	1596116	4529232															

3. Project no.: SNTMOM/1285/2024

Project Title	AN EXAMINATION INTO THE INNOVATIVE APPLICATIONS OF ALUMINOTHERMIC REDUCTION TO RECOVER ZINC FROM ELECTRIC ARC FURNACE DUST
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Thrust Area	Metal Extraction (Metallurgical processes)	
Institute	Annamalai University	
Principal Investigator/ Constituent PI	P. PREMKUMAR ppklmeau@gmail.com, 9894977835	
Industry Partner /Contribution	NLC India Limited ₹9,24,600 (22.22 % of total project cost)	₹5,08,005 (cash-15% of total project cost) + ₹1,69,335 (5% kind)
Project Cost & Duration	₹41,61,000 3 Year	Revised Cost: ₹33,86,700 Revised Duration: 18 Months
Contribution of MoM	₹ 32,36,400	Revised Contribution of MoM: ₹27,09,360
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • 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. • 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. • 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. • 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. • Technological Development: To advance the technology involved in the aluminothermic reduction process, aiming to enhance its safety, reliability, and environmental compliance. This includes developing more efficient reactor designs and more effective emission control systems. • Stakeholder Engagement and Policy Recommendations: To engage with industry stakeholders, including steel manufacturers 	

	and environmental agencies, to gather input and build support for the project.
REMARKS / SUGGESTION	
SSAG Remarks	<ul style="list-style-type: none"> • The project was deferred. • Since electric arc furnace dust is a byproduct of the steel industry, SAIL is proposed to be onboarded as an industry partner. • A virtual meeting may be held via VC with the EA (Ministry of Mines), Dr. K. Balasubramaniam, PI of Annamalai University, NLC India Limited and SAIL to discuss the selection of an industry partner. • Thereafter, the project may be resubmitted.

4. Project No. : SNTMOM/1300/2024

Project Title	An integrated technology for critical elements recovery from e-waste and debromination of e-waste plastics	
Thrust Area	Extraction of strategic, critical minerals and REE	
Institution	Indian Institute of Technology Madras	
Principal Investigator	SREERAM KRISHNAMOORTHY KALPATHY sreeram@iitm.ac.in, 8277427874	
Industry Partner /Contribution	Alchemy Recyclers Private Limited, Gujarat ₹ 25,46,000 (20% of total project cost)	₹ 25,46,000 (20% of total project cost) industry support letter will be furnished within one week.
Project Cost & Duration	₹1,27,30,450 3 Years	Revised Cost:₹ 1,16,58,400 Revised Duration: 2 Year 06 Month
Contribution of MoM	₹ 1,01,84,450	Revised Contribution of MoM: ₹91,12,400
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Development of a simple solvothermal based metal recovery process from e-wastes (mainly PCBs) that works under the principle of delamination of PCB layers due to penetration and swelling of organic solvents. • To ensure the method is energy-efficient through a low temperature (< 200 C), low-pressure operation, offering simultaneous debromination of e-waste plastics which can be valorized. At the same time, to ensure that the metal recovery process is free from hazardous by-products. • Optimization of several experimental parameters such as stirring speed, reaction time, reaction temperature, solid to liquid ratio, PCB size in order to get high yield and separation efficiency of metals and Br-free plastics. • Segregation of metals and non-metals via methods such as cyclone separation and electrostatic separation post 	

	solvothermal method and recovery of critical elements such as Cu, Ni, Sn, Zn, Sb, Ge, Si as per their relative abundances and ease of recovering. V. Demonstrate scalability of the process and make it a zero-discharge process by regenerating the solvent so that it has potentiality for the industrial e-waste recycling sector.																				
REMARKS / SUGGESTION																					
SSAG Remarks	<p>Approved with the condition that the cash component (at least 15% of the total project cost) of the Industry Contribution should be credited by the sponsoring Industry into the bank account of the grantee Institute and with the following timeline for release of funds of the MOM contribution.</p> <p>1. Total project cost: ₹ 1,16,58,400 2. Industry – ₹ 25,46,000 & MoM - ₹ 91,12,400 contribution and breakup of the contribution are as below:-</p> <p style="text-align: right;">(Amount in Rupees)</p> <table border="1"> <thead> <tr> <th>IIT, Madras</th> <th>1st Year</th> <th>2nd Year</th> <th>3rd Year (6 months)</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>5576400</td> <td>1728950</td> <td>1807050</td> <td>9112400</td> </tr> <tr> <td>Industry Partner</td> <td>1273000</td> <td>1273000</td> <td>0</td> <td>2546000</td> </tr> <tr> <td>Grand Total</td> <td>6849400</td> <td>3001950</td> <td>1807050</td> <td>11658400</td> </tr> </tbody> </table>	IIT, Madras	1st Year	2nd Year	3rd Year (6 months)	Total	MoM	5576400	1728950	1807050	9112400	Industry Partner	1273000	1273000	0	2546000	Grand Total	6849400	3001950	1807050	11658400
IIT, Madras	1st Year	2nd Year	3rd Year (6 months)	Total																	
MoM	5576400	1728950	1807050	9112400																	
Industry Partner	1273000	1273000	0	2546000																	
Grand Total	6849400	3001950	1807050	11658400																	

5. Project No.: SNTMOM/1316/2024

Project Title	A study on development of effective beneficiation and extraction of critical minerals and REE from Khondalite in East Godavari district, Andhra Pradesh	
Thrust Area	Extraction of strategic, critical minerals and REE	
Institution	SRM University Andhra Pradesh (SRM TRUST AP), Indian Institute of Technology ISM Dhanbad, University of Allahabad	
Principal Investigator	Pankaj Pathak pankajpathak18@gmail.com,7049606158 <u>Co-PI:</u> Sahendra Singh sahendra@iitism.ac.in,9471191375 Prakash Kumar Singh pksingh@allduniv.ac.in,8879179660	
Industry Partner /Contribution	Craton Infra Private Limited Dhanbad ₹16,58,704 (15.04% of total project cost)	₹16,58,704 (17.92% of total project cost)
Project Cost & Duration	₹1,10,31,196 3 Year	Revised Cost: ₹92,48,464 Revised Duration: 2 Year
Contribution of MoM	₹ 93,72,492	Revised Contribution of MoM: ₹75,89,760
Objective	The following objectives laid down for this project:-	

	<ul style="list-style-type: none"> • Collation and compilation historical geological map and necessary geological/mineralogical data including NGCM, STM & Exploration / Drilling data of GSI, MOM of the Khondalitic terrain, which has already indicated at least reconnaissance stage occurrences of critical metals and rare earth elements (REEs). • Demarcation and localization of the proven mineralised occurrence area/zone over low/high resolution commercial satellite imagery along with DEM/DSM for understanding of the Khondalitic terrain and its occurrences pattern in the east Godavari district, Andhra Pradesh • Development of high resolution/large scale (1:5000 or less) geo-mineralogical map for the identification of ore body extension/defining possible mineralized zone. • Collection of drainage basin sample/slope wash sample and bedrock sample as per defined methodology and sample preparation for analysis. • Development a green and cost-efficient extraction technology for the recovery of critical metals and REEs from the Khondalites. • Cost benefit analysis and life cycle assessment of critical and REEs recovery from the Khondalites.
REMARKS / SUGGESTION	
SSAG Remarks	Project is not approved since the concentration of REE in Khondalite rock is not good as established by GSI.

6. 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	Kathirvelan J j.kathirvelan@vit.ac.in, 9500356597	
Industry Partner /Contribution	Galore Systems Pvt Ltd, Bangalore ₹9,19,431 (15 % of total project cost)	₹10,41,119 (cash-20 % of total project cost) + ₹ 2,60,280 (5% Kind)
Project Cost & Duration	₹61,29,536 3 Years	Revised Cost: ₹52,05,597 Revised Duration: 2 Year
Contribution of MoM	₹ 52,10,105	Revised Contribution of MoM: ₹39,04,198
Objective	The following objectives laid down for this project:- <ul style="list-style-type: none"> • 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. • Optimization of Deep Learning Algorithms for Ensemble Model Prediction for the first time in this domain: - Fine-tuning 	

	<p>deep learning algorithms within an ensemble model framework to accurately predict and classify metal scraps based on color, shape, and texture descriptors.</p> <ul style="list-style-type: none"> • 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. • Development of a High-Performance Control System for ROS-Compatible Robotic Systems in a cost effective manner: - Creating a cost-effective control system for ROS-compatible robots, focusing on high throughput and robust kinematic performance to ensure effective and accurate scrap handling and sorting.
REMARKS / SUGGESTION	
SSAG Remarks	<ul style="list-style-type: none"> • The project was deferred. • The Institute should onboard a big recycler in the country as the industry partner and resubmit the project.

7. Project No.: SNTMOM/1332/2024

Project Title	Design and development of Al alloy anode material and a prototype Aluminium-Air battery	
Thrust Area	Alloys, Rare Earths, Specialty materials and product	
Institution	Visvesvaraya National Institute of Technology Nagpur	
Principal Investigator/ Constituent PI	Amrut Vijay Agasti amrutagasti@mme.vnit.ac.in, 9960745975	
Industry Partner /Contribution	PROTO9 Materials Pvt Ltd, Mumbai -400059 ₹6,76,470 (20 % of total project cost)	₹5,54,880 (20 % of total project cost)
Project Cost & Duration	₹33,82,350 3 Years	Revised Cost: ₹27,74,400 Revised Duration: 2 Year
Contribution of MoM	₹ 27,05,880	Revised Contribution of MoM: ₹22,19,520
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Designing of a new Al alloy using thermodynamics software (ThermoCalc, Factsage) for battery anode application. • Optimization of rolling and heat treatment conditions of Al alloy with respect to its use as anode material. Crystallographic texture will also be optimized by using suitable thermomechanical process (random, rolling or cube texture maximization). • Optimization of the concentration of electrolyte and corrosion inhibitors (additives) to minimize anode corrosion/hydrogen evolution. • Development of prototype Al-air battery using combination of Al alloy, electrolyte, and air cathode. 	
REMARKS / SUGGESTION		

SSAG Remarks.	Approved with the following timeline for release of funds of the MOM contribution.		
	1. Total project cost: ₹ 27,74,400		
	2. Industry – ₹ 5,54,880 & MoM - ₹ 22,19,520 contribution and breakup of the contribution are as below:-		
	(Amount in Rupees)		
	VNIT, Nagpur	1st Year	2nd Year
MoM	1517070	702450	2219520
Industry Partner	554880	0	554880
Grand Total	2071950	702450	2774400

8. Project No.: SNTMOM/1340/2024

Project Title	Identifying trace element threshold limits in major rock-forming minerals as a guide to vector toward lithium-pegmatites in Rajgarh region, Rajasthan, India		
Thrust Area	Geosciences and Exploration		
Institution	Indian Institute of Science Education and Research Mohali		
Principal Investigator/ Constituent PI	Sourabh Bhattacharya sbiiserm@gmail.com, 8588940290		
Industry Partner /Contribution	Hindustan Zinc Limited ₹4,60,800 (20.23% of total project cost)	₹4,60,800 (21.26% of total project cost)	
Project Cost & Duration	₹22,77,500 3 Years	Revised Cost: ₹21,67,250 Revised Duration: 2 Year	
Contribution of MoM	₹ 18,16,700	Revised Contribution of MoM: ₹17,06,450	
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> The exploration of lithium-rich pegmatites is a cost- and time-intensive exercise. Often, the poorly exposed pegmatitic bodies pose challenges in mineral exploration, thus requiring drilling and blasting operations. Even if partially exposed, assessing the economic grade of pegmatite bodies is a tedious task due to absence of promising geological signatures in them. For instance, pegmatites often lack distinct metasomatic halos in surrounding rocks, and are apparently barren due to weathering-induced leaching of ore minerals. This proposal aims to address these challenges by using trace element chemistry in pegmatitic rock-forming minerals (RFMs) as an innovative exploration tool, following its success in projects like the GREENPEG initiative in Europe. Rock-forming minerals such as quartz, feldspar, and mica are highly resistant to erosion and weathering, making them accessible carriers of trace element signals indicative of lithium potential. 		

	<ul style="list-style-type: none"> This study aims to establish trace element thresholds and element ratios that correlate with Li mineralization potential and will represent findings using multivariate statistical analyses and data visualization. Specifically, the focus will be on evaluating the Rajgarh pegmatite field in Rajasthan, which hosts both metal-fertile pegmatites rich in lepidolite (\pmspodumene), columbite, and beryl, and barren pegmatites with or without tourmaline (Bhola, 1977). By comparing trace element chemistry in RFMs from fertile and barren pegmatites, this study aims to develop clear geochemical criteria for distinguishing Li-rich pegmatites in early-stage exploration. 																
REMARKS / SUGGESTION																	
SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> Total project cost: ₹ 21,67,250 Industry – ₹ 4,60,800 & MoM - ₹ 17,06,450 contribution and breakup of the contribution are as below:- <p style="text-align: right;">(Amount in Rupees)</p> <table border="1"> <thead> <tr> <th>IISE, Mohali</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>1244450</td> <td>462000</td> <td>1706450</td> </tr> <tr> <td>Industry Partner</td> <td>460800</td> <td>0</td> <td>460800</td> </tr> <tr> <td>Grand Total</td> <td>1705250</td> <td>462000</td> <td>2167250</td> </tr> </tbody> </table>	IISE, Mohali	1st Year	2nd Year	Total	MoM	1244450	462000	1706450	Industry Partner	460800	0	460800	Grand Total	1705250	462000	2167250
IISE, Mohali	1st Year	2nd Year	Total														
MoM	1244450	462000	1706450														
Industry Partner	460800	0	460800														
Grand Total	1705250	462000	2167250														

9. Project No.: SNTMOM/1341/2024

Project Title	Online estimation of gold, copper, platinum, palladium and silver content in recyclable PCBs through vision sensor and deep learning based image processing.	
Thrust Area	Circular Economy and Recycling of Non ferrous metals	
Institution	CSIR Institute of Minerals and Materials Technology	
Principal Investigator/ Constituent PI	DEBI PRASAD DAS dpdas@immt.res.in, 9777431311	
Industry Partner /Contribution	HINDALCO ₹8,00,000 (19.97 % of total project cost)	₹8,00,000 (19.97 % of total project cost) + ₹15,00,000 (capital by CSIR)
Project Cost & Duration	₹40,05,600 1 Years, 6 Month	Revised Cost: ₹40,05,600 Revised Duration: 1 Years, 6 Month
Contribution of MoM	₹ 32,05,600	Revised Contribution of MoM: ₹17,05,600
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> To develop an online camera-based sensor system which can estimate in the amount of Au, Ag, Pt, Pd and Cu present in the E-scrap PCBs containing various components with at least 90% accuracy. Description of the objective and Industry requirement The printed circuit board is used mainly in electronic devices. 	

	<ul style="list-style-type: none"> • It also contains valuable metals like Cu, Ag, Au, Pt, Pd as well as other non-metallic and hazardous elements. With increasing price of these metals and focus on reducing carbon footprint, it is most economical to recover them through recycling. • PCB comes from various sources and hence has large variation in metals concentration from ppm to %. Before processing the PCB, it is therefore imperative to know the concentration of these metals in the feedstock for better estimation & evaluation of their end-to-end recovery in the selected process. • The chemical method being used for measurement of metallic concentration in PCB is time taking and cumbersome. Moreover, it cannot be used on continuous basis. For such a high level of in-homogeneity in metallic concentration in PCB from source to source, it is necessary to develop sensor-based system for scanning and quick detection of metals along with their concentration in the PCB. • These data will be highly helpful in setting the right process parameters in the further process stages, thus avoiding excess energy and cost.
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REMARKS / SUGGESTION

SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> 1. Total project cost: ₹ 40,05,600 2. Industry – ₹8,00,000 (HINDALCO) + ₹15,00,000 (capital by CSIR) & MoM - ₹ 17,05,600 contribution and breakup of the contribution are as below:- <p style="text-align: right;">(Amount in Rupees)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>IMMT</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td style="text-align: right;">892900</td> <td style="text-align: right;">812700</td> <td style="text-align: right;">1705600</td> </tr> <tr> <td>CSIR</td> <td style="text-align: right;">1500000</td> <td style="text-align: right;">0</td> <td style="text-align: right;">1500000</td> </tr> <tr> <td>Industry Partner</td> <td style="text-align: right;">800000</td> <td style="text-align: right;">0</td> <td style="text-align: right;">800000</td> </tr> <tr> <td>Grand Total</td> <td style="text-align: right;">3192900</td> <td style="text-align: right;">812700</td> <td style="text-align: right;">4005600</td> </tr> </tbody> </table>			IMMT	1st Year	2nd Year	Total	MoM	892900	812700	1705600	CSIR	1500000	0	1500000	Industry Partner	800000	0	800000	Grand Total	3192900	812700	4005600
IMMT	1st Year	2nd Year	Total																				
MoM	892900	812700	1705600																				
CSIR	1500000	0	1500000																				
Industry Partner	800000	0	800000																				
Grand Total	3192900	812700	4005600																				

10. Project No.: SNTMOM/1344/2024

Project Title	Strengthening Jammu and Kashmirs Infrastructure Corrosion Resistant and High Strength 6082 T6 Aluminum Alloy for Bridges and High Structures
Thrust Area	Alloys, Rare Earths, Specialty materials and product
Institution	National Institute of Technology Srinagar
Principal Investigator/ Constituent PI	DEEPAK KUMAR NAIK deepak.kumar@nitsri.ac.in, 9776964252
Industry Partner /Contribution	National Aluminium Company ₹14,78,490 (20 % of total project cost) (Sending support letter from NALCO)
Project Cost & Duration	₹73,92,450 3 Years

Contribution of MoM	₹ 59,13,960																							
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> To enhance the strength capacity of the 6082 T6 alloy, commonly used in high-structure applications like bridges, by applying various hybrid machine learning methods. To examine the impact of process parameters on the anodizing treatment of 6082 T6 aluminum alloy for strength optimization. To explore the effects of high-alkaline solutions on the corrosion resistance of high-silicon aluminum casting alloys (6082 T6) with and without anodizing process. To study the microstructure effect on anodizing 6082T6 alloy under various surface condition and power modes / transition mode. To improve the thermal and electrical conductivity of 6082 T6 alloy by incorporating graphene and boron. 																							
REMARKS / SUGGESTION																								
SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <p>1. Total project cost: ₹73,92,450 2. Industry – ₹14,78,490 & MoM - ₹ 59,13,960 contribution and breakup of the contribution are as below:-</p> <p style="text-align: right;">(Amount in Rupees)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NIT, Srinagar</th> <th>1st Year</th> <th>2nd Year</th> <th>3rd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td style="text-align: right;">3162540</td> <td style="text-align: right;">1401960</td> <td style="text-align: right;">1349460</td> <td style="text-align: right;">5913960</td> </tr> <tr> <td>Industry Partner</td> <td style="text-align: right;">1478490</td> <td style="text-align: right;">0</td> <td style="text-align: right;">0</td> <td style="text-align: right;">1478490</td> </tr> <tr> <td>Grand Total</td> <td style="text-align: right;">4641030</td> <td style="text-align: right;">1401960</td> <td style="text-align: right;">1349460</td> <td style="text-align: right;">7392450</td> </tr> </tbody> </table>				NIT, Srinagar	1st Year	2nd Year	3rd Year	Total	MoM	3162540	1401960	1349460	5913960	Industry Partner	1478490	0	0	1478490	Grand Total	4641030	1401960	1349460	7392450
NIT, Srinagar	1st Year	2nd Year	3rd Year	Total																				
MoM	3162540	1401960	1349460	5913960																				
Industry Partner	1478490	0	0	1478490																				
Grand Total	4641030	1401960	1349460	7392450																				

11. Project No.: SNTMOM/1353/2024

Project Title	Recovery of Selenium, Tellurium and Copper from Processed Anode Slimes Cake of copper refineries	
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste	
Institution	CSIR Institute of Minerals and Materials Technology	
Principal Investigator/ Constituent PI	ABDUL RAUF SHEIK abdul@immt.res.in, 7735518646	
Industry Partner /Contribution	Vedanta ₹64,90,000 (25.4% of total project cost) and CSIR Contribution- 65,00,000/- (25.44% of total project cost)	Vedanta ₹64,90,000 (27.68% of total project cost) and CSIR Contribution- 65,00,000/- (27.72% of total project cost)
Project Cost & Duration	₹2,55,45,001 3 Years	Revised Cost: ₹2,34,45,000 Revised Duration: 2 Years
Contribution of MoM	₹ 1,25,55,001	Revised Contribution of MoM: ₹1,04,55,000
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> Process flow sheet development 	

	<ul style="list-style-type: none"> • Pilot scale testing for maximum recoveries, minimal water consumption and minimal energy consumption • Pilot scale data generation and mass balance (10 kg scale) 																				
REMARKS / SUGGESTION																					
SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> 1. Total project cost: ₹2,34,45,000 2. Industry – Vedanta- ₹64,90,000 and CSIR Contribution- ₹65,00,000 & MoM - ₹1,04,55,000 contribution and breakup of the contribution are as below:- <p style="text-align: right;">(Amount in Rupees)</p> <table border="1"> <thead> <tr> <th>IMMT</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>5070000</td> <td>5385000</td> <td>10455000</td> </tr> <tr> <td>CSIR</td> <td>5000000</td> <td>1500000</td> <td>6500000</td> </tr> <tr> <td>Industry Partner</td> <td>3000000</td> <td>3490000</td> <td>6490000</td> </tr> <tr> <td>Grand Total</td> <td>13070000</td> <td>10375000</td> <td>23445000</td> </tr> </tbody> </table>	IMMT	1st Year	2nd Year	Total	MoM	5070000	5385000	10455000	CSIR	5000000	1500000	6500000	Industry Partner	3000000	3490000	6490000	Grand Total	13070000	10375000	23445000
IMMT	1st Year	2nd Year	Total																		
MoM	5070000	5385000	10455000																		
CSIR	5000000	1500000	6500000																		
Industry Partner	3000000	3490000	6490000																		
Grand Total	13070000	10375000	23445000																		

12. Project No.: SNTMOM/1359/2024

Project Title	Development and Functionalization of Nickel Foams Enhancing Performance for Energy Storage and Thermal Applications	
Thrust Area	Alloys, Rare Earths, Specialty materials and product	
Institution	Technocrats Institute of Technology, Bhopal, India (CHANDRA VADAMI MAHILA SHIKSHA SAMITI)	
Principal Investigator/ Constituent PI	Hemant Jain rnd@technocratsgroup.edu.in, 9617441008	
Industry Partner /Contribution	Nordische Energy Systems Pvt Ltd, Bengaluru -560025 ₹5,00,000 (19.72 % of total project cost)	₹5,00,000 (21.06 % of total project cost)
Project Cost & Duration	₹25,35,000 3 Years	Revised Cost: ₹23,74,000 Revised Duration: 2 Years
Contribution of MoM	₹ 20,35,000	Revised Contribution of MoM: ₹18,74,000
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • To develop a reticulation technique for making Ni foams with controlled porosity, pore size, density and surface area (103 m²/cm³). • Functionalize nickel foams with nanostructure decorations and KOH/H₂SO₄ solution for energy storage devices and catalysts. • Optimize Ni foams characteristics for catalysts, super-capacitors and batteries applications. • Refine process parameters for cost-effective and sustainable production. • Explore applications in hydrogen generation and catalysts. 	

REMARKS / SUGGESTION			
SSAG Remarks.	Approved with the following timeline for release of funds of the MOM contribution.		
	1. Total project cost: ₹23,74,000		
	2. Industry – ₹5,00,000 & MoM - ₹18,74,000 contribution and breakup of the contribution are as below:-		
	(Amount in Rupees)		
	TIT Bhopal	1st Year	2nd Year
MoM	1192000	682000	1874000
Industry Partner	500000	0	500000
Grand Total	1692000	682000	2374000

13. Project No.: SNTMOM/1372/2024

Project Title	Protein based selective sequestration of critical minerals from various process streams of mineral-based industries	
Thrust Area	Beneficiation, Ore Dressing, Mineral Processing & Recovery from waste	
Institution	Amity University Maharashtra	
Principal Investigator/ Constituent PI	Bhuvana Kamath Shanbhag bkshanbhag@mum.amity.edu, 9141025750	
Industry Partner /Contribution	LOHUM ₹10,00,000 (15.02% of total project cost)	₹7,09,905 (15% of total project cost) + ₹2,36,635 (Kind)
Project Cost & Duration	₹66,55,950 3 Years	Revised Cost: ₹47,32,700 Revised Duration: 2 Years
Contribution of MoM	₹ 56,55,950	Revised Contribution of MoM: ₹37,86,160
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> Evaluate affinity and binding capacity of small metal-binding protein and metallothionein proteins for selective adsorption of Ni, Co, Cu and Cd. Screening of suitable polymer materials and preparation of biosorbent matrix incorporating metal-binding proteins Develop biosorbent matrix as resin beads or filter membrane and fabricate prototypes integrating matrix as a packed bed adsorber or membrane filtration system 	

REMARKS / SUGGESTION			
SSAG Remarks	Approved with the following timeline for release of funds of the MOM contribution.		
	1. Total project cost: ₹47,32,700		
	2. Industry – ₹9,46,540 & MoM - ₹37,86,160 contribution and breakup of the contribution are as below:-		
	(Amount in Rupees)		
	Amity University	1st Year	2nd Year
MoM	2298310	1487850	3786160

	Industry Partner	946540	0	946540
	Grand Total	3244850	1487850	4732700

14. Project No.: SNTMOM/1374/2024

Project Title	Development of an efficient process to recover Li, Co and Ni from spent lithium ion batteries.		
Thrust Area	Extraction of strategic, critical minerals and REE		
Institution	Indian Institute of Technology Hyderabad		
Principal Investigator/ Constituent PI	Gande Vamsi Vikram vamsigande@che.iith.ac.in, 8686528453		
Industry Partner /Contribution	HINDALCO ₹11,50,000 (20.95 % of total project cost)	₹11,50,000 (24.9 % of total project cost)	
Project Cost & Duration	₹54,88,800 3 Years	Revised Cost: ₹46,18,350 Revised Duration: 2 Years	
Contribution of MoM	₹ 43,38,800	Revised Contribution of MoM: ₹34,68,350	
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Develop a method for safely and efficiently discharging and disassembling lithium-ion batteries (LIBs) under inert atmospheric conditions. • Innovate and optimize ultrasonic-assisted delamination techniques for extracting cathode materials, combining organic solvents and oxidizing agents for enhanced efficiency. • Develop and optimize a Deep Eutectic Solvent (DES)- based leaching process for active cathode materials with a focus on the ionization potential of hydrogen bond donors in DES and solubility of target metal in DES. • Integrate ultrasonic-assisted leaching using DES under near-ambient conditions and conduct a techno-economic analysis to assess scalability and feasibility for large-scale implementation. • Design an efficient downstream process for recovering valuable metals (Li, Co and Ni) from leachate, ensuring high recovery rates and purity. • Scale up the entire process to a kilogram-level capacity for the processing of spent lithium-ion batteries, preparing for industrial-scale operations. 		
REMARKS / SUGGESTION			
SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> 1. Total project cost: ₹46,18,350 2. Industry – ₹11,50,000 & MoM - ₹34,68,350 contribution and breakup of the contribution are as below:- 		

(Amount in Rupees)			
IIT, Hyderabad	1st Year	2nd Year	Total
MoM	2319650	1148700	3468350
Industry Partner	1150000	0	1150000
Grand Total	3469650	1148700	4618350

15. Project No.: SNTMOM/1375/2024

Project Title	Development of Cu-Ce Alloys with Optimized Conductivity and Mechanical Properties from Recycled Cu Feedstock																		
Thrust Area	Alloys, Rare Earths, Specialty materials and product																		
Institution	Indian Institute of Technology Ropar																		
Principal Investigator/ Constituent PI	Nitish Bibhanshu nitishbibhanshu@gmail.com, 8762250793																		
Industry Partner /Contribution	Almerio Defence and Aerospace LLP, Punjab ₹6,83,439 (9.99 % of total project cost)	₹11,99,806 (20% of total project cost)																	
Project Cost & Duration	₹68,34,394 3 Years	Revised Cost: ₹59,99,032 Revised Duration: 2 Years																	
Contribution of MoM	₹ 61,50,954	Revised Contribution of MoM: ₹47,99,226																	
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Minimization of impurities from Cu scrap and preparation of Cu-Ce alloys. • Optimization of suitable processing conditions (deformation and annealing) to achieve a high percentage of special grain boundaries and uniform precipitate distribution in Cu-Ce alloys. • Optimization of SMAT treatment conditions to improve the strength and conductivity of the most promising Cu-Ce alloy. • Recommendation of the best crystallographic texture and microstructural combination to enhance the strength, ductility, and conductivity of the Cu-Ce alloy. 																		
REMARKS / SUGGESTION																			
SSAG Remarks	<p>NFTDC is added as institutional mentor in the project for guiding the research and scale up.</p> <p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> 1. Total project cost: ₹59,99,032 2. Industry – ₹11,99,806 & MoM - ₹47,99,226 contribution and breakup of the contribution are as below:- <p style="text-align: right;">(Amount in Rupees)</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>IIT, Ropar</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>3381810</td> <td>1417416</td> <td>4799226</td> </tr> <tr> <td>Industry Partner</td> <td>1199806</td> <td>0</td> <td>1199806</td> </tr> <tr> <td>Grand Total</td> <td>4581616</td> <td>1417416</td> <td>5999032</td> </tr> </tbody> </table>			IIT, Ropar	1st Year	2nd Year	Total	MoM	3381810	1417416	4799226	Industry Partner	1199806	0	1199806	Grand Total	4581616	1417416	5999032
IIT, Ropar	1st Year	2nd Year	Total																
MoM	3381810	1417416	4799226																
Industry Partner	1199806	0	1199806																
Grand Total	4581616	1417416	5999032																

16. Project No.: SNTMOM/1378/2024

Project Title	Microwave integration in urban mining processes for sustainable recovery of critical elements																		
Thrust Area	Extraction of strategic, critical minerals and REE																		
Institution	Indian Institute of Technology ISM Dhanbad																		
Principal Investigator/ Constituent PI	Aarti Kumari aarti@iitism.ac.in, 9304603155																		
Industry Partner /Contribution	Technology Innovation in Exploration & Mining Foundation (TEXMiN) ₹6,00,000 (14.38% of total project cost)	₹6,11,290 (15% of total project cost) + ₹2,03,763 (5% Kind)																	
Project Cost & Duration	₹41,71,660 3 Years	Revised Cost: ₹40,75,270 Revised Duration: 2 Years																	
Contribution of MoM	₹ 35,71,660	Revised Contribution of MoM: ₹32,60,217																	
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Development of integrated microwave-assisted hydrometallurgical processes for recovery of critical elements (REEs, Cu, Li, Ni, Co etc.) from urban ores (discarded PCBs, spent magnets and spent batteries). • Optimization of the microwave integrated processes for maximum metal recovery. • Comparison of kinetics of the microwave-integrated and conventional processes for techno-economic assessment. 																		
REMARKS / SUGGESTION																			
SSAG Remarks	<p>After development of technology in six month, a recycling industry should be onboarded as an industry partner to scale up of the recovery process. If additional funding is required, a proposal may be submitted to the Ministry of Mines.</p> <p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> 1. Total project cost: ₹40,75,270 2. Industry – ₹8,15,053 & MoM - ₹32,60,217 contribution and breakup of the contribution are as below:- <p style="text-align: right;">(Amount in Rupees)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">IIT (ISM) Dhanbad</th> <th style="width: 20%;">1st Year</th> <th style="width: 20%;">2nd Year</th> <th style="width: 30%;">Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td style="text-align: right;">2228277</td> <td style="text-align: right;">1031940</td> <td style="text-align: right;">3260217</td> </tr> <tr> <td>Industry Partner</td> <td style="text-align: right;">815053</td> <td style="text-align: right;">0</td> <td style="text-align: right;">815053</td> </tr> <tr> <td>Grand Total</td> <td style="text-align: right;">3043330</td> <td style="text-align: right;">1031940</td> <td style="text-align: right;">4075270</td> </tr> </tbody> </table>			IIT (ISM) Dhanbad	1st Year	2nd Year	Total	MoM	2228277	1031940	3260217	Industry Partner	815053	0	815053	Grand Total	3043330	1031940	4075270
IIT (ISM) Dhanbad	1st Year	2nd Year	Total																
MoM	2228277	1031940	3260217																
Industry Partner	815053	0	815053																
Grand Total	3043330	1031940	4075270																

17. Project No.: SNTMOM/1388/2024

Project Title	Development of low cost hydrometallurgical process for beneficiation and extraction of Indium values from Sphalerite ores																		
Thrust Area	Extraction of strategic, critical minerals and REE																		
Institution	Indian Institute of Technology ISM Dhanbad																		
Principal Investigator/ Constituent PI	Gaurav Jha Gauravjha@iitism.ac.in, 7488603830																		
Industry Partner /Contribution	TEXMIN ₹ 8,69,000 (19.98% of total project cost)	₹ 8,69,000 (24.61% of total project cost)																	
Project Cost & Duration	₹ 43,47,850 3 Years	Revised Cost: ₹35,29,900 Revised Duration: 2 Years																	
MoM contribution	₹ 34,78,850	Revised Contribution of MoM: ₹26,60,900																	
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Fundamental understanding of the mineralogy present in Sphalerite ores containing Indium through sampling, characterization, and liberation characteristics. • Development of a flow sheet comprising a combination of beneficiation, hydrometallurgy, and electrometallurgy • Development of an intermediate product that can be a feed for various streams • Identification of suitable refining practices to develop market-grade products • Comparative characterization of product/intermediate product with the marketed products 																		
REMARKS / SUGGESTION																			
SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <p>1. Total project cost: ₹35,29,900 2. Industry – ₹8,69,000 & MoM - ₹26,60,900 contribution and breakup of the contribution are as below:-</p> <p style="text-align: right;">(Amount in Rupees)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">IIT (ISM) Dhanbad</th> <th style="text-align: center;">1st Year</th> <th style="text-align: center;">2nd Year</th> <th style="text-align: center;">Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td style="text-align: right;">1905950</td> <td style="text-align: right;">754950</td> <td style="text-align: right;">2660900</td> </tr> <tr> <td>Industry Partner</td> <td style="text-align: right;">869000</td> <td style="text-align: center;">0</td> <td style="text-align: right;">869000</td> </tr> <tr> <td>Grand Total</td> <td style="text-align: right;">2774950</td> <td style="text-align: right;">754950</td> <td style="text-align: right;">3529900</td> </tr> </tbody> </table>			IIT (ISM) Dhanbad	1st Year	2nd Year	Total	MoM	1905950	754950	2660900	Industry Partner	869000	0	869000	Grand Total	2774950	754950	3529900
IIT (ISM) Dhanbad	1st Year	2nd Year	Total																
MoM	1905950	754950	2660900																
Industry Partner	869000	0	869000																
Grand Total	2774950	754950	3529900																

18. Project No.: SNTMOM/1390/2024

Project Title	Development of Sustainable Recovery Methods for Lithium and Nickel from Spent Lithium-Ion and Nickel-Metal Hydride Batteries
Thrust Area	Extraction of strategic, critical minerals and REE
Institution	National Institute of Technology Tiruchirappalli

Principal Investigator/ Constituent PI	Puppala Laxman Mani Kanta laxmanmanikanta@nitt.edu, 9474382725 , <u>Co-PI:</u> Sivaprasad Katakam ksp@nitt.edu, 9444192278																		
Industry Partner /Contribution	Enercell Materials Technology Pvt. Ltd. ₹31,08,274 (20 % of total project cost)	₹17,70,000 (20 % of total project cost)																	
Project Cost & Duration	₹1,55,41,368 3 Years	Revised Cost: ₹88,39,752 Revised Duration: 2 Years																	
Contribution of MoM	₹ 1,24,33,094	Revised Contribution of MoM: ₹70,69,752																	
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Development of sustainable and eco-friendly electrolytic plating technique of lithium and nickel from stacks/jelly rolls of spent batteries. • Development of pyrometallurgical processing and recovery of nickel/nickel compounds from electrode materials of used/waste batteries. • Structural, morphological and spectroscopic analysis of recovered lithium and nickel compounds for further utilization in synthesis of battery materials. • Development of scalable/industry relevant recovery methods where process efficiency or yield is >95 % in the recovered products. 																		
REMARKS / SUGGESTION																			
SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> 1. Total project cost: ₹88,39,752 2. Industry – ₹17,70,000 & MoM - ₹70,69,752 contribution and breakup of the contribution are as below:- <p style="text-align: right;">(Amount in Rupees)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td style="text-align: right;">4869876</td> <td style="text-align: right;">2199876</td> <td style="text-align: right;">7069752</td> </tr> <tr> <td>Industry Partner</td> <td style="text-align: right;">1770000</td> <td style="text-align: right;">0</td> <td style="text-align: right;">1770000</td> </tr> <tr> <td>Grand Total</td> <td style="text-align: right;">6639876</td> <td style="text-align: right;">2199876</td> <td style="text-align: right;">8839752</td> </tr> </tbody> </table>				1st Year	2nd Year	Total	MoM	4869876	2199876	7069752	Industry Partner	1770000	0	1770000	Grand Total	6639876	2199876	8839752
	1st Year	2nd Year	Total																
MoM	4869876	2199876	7069752																
Industry Partner	1770000	0	1770000																
Grand Total	6639876	2199876	8839752																

19. Project No.: SNTMOM/1398/2024

Project Title	Enhancing Recovery of Precious Metals from Electronic Wastes via Lixiviant Metabolic Engineering by Chromobacterium Violaceum and Pseudomonas Balearica
Thrust Area	Circular Economy and Recycling of Non ferrous metals
Institution	Kazi Nazrul University, Asansol, West Bengal

Principal Investigator/ Constituent PI	CHANCHAL BISWAS chanchal.biswas@knu.ac.in, 9733587845	
Industry Partner /Contribution	Vedam India Metallurgical Research Laboratory Pvt Ltd, Kolkata ₹10,88,725 (21.99 % of total project cost)	₹10,92,330 (27% of total project cost)
Project Cost & Duration	₹49,48,752 3 Years	Revised Cost: ₹ 40,45,668 Revised Duration: 2 Years
Contribution of MoM	₹ 38,60,027	Revised Contribution of MoM: ₹29,53,338
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • To recover precious metals from electronic wastes (e-wastes) using environmentally sustainable novel technologies, specifically the bioleaching process, involving Chromobacterium Violaceum and Pseudomonas Balearica, which presents an eco-friendly and cost-effective alternative for metal recovery from e-wastes. • Media compositions significantly influence microbial growth and the characteristics of the metabolites generated. Our proposed bioleaching method will involve optimizing the parameters to alter the ammonium medium, inoculum spore size, duration, temperature, and particle (mesh) size. The optimal parameters for bioleaching, encompassing pH, temperature, agitation-aeration, and pulp density, are also examined. • Various carbon and nitrogen sources will be identified. Our objective will also be to adjust the concentrations of glucose and ammonium chloride, as they are the optimal sources of carbon and nitrogen, respectively. The pH optimization of the medium will be conducted to determine the optimal growth conditions for the bacterial culture. Overall, a suitable media composition for quick growth will be identified. • To enhance the efficiency of biological systems by reducing the time required, increasing resilience and dependability, optimizing process parameters, and scaling up the bioleaching process. • To design a process suitable for industrial application. • A concise examination of microorganisms involved in the bioleaching of various forms of e-wastes, along with the biochemical reaction mechanisms involved in bioleaching and bio-oxidation processes. • The kinetic models of bioleaching processes will also be examined. Furthermore, the investigation of novel methodologies to comprehend the impact of microbes and their genetic modifications on various processes will be conducted. • FESEM-EDAX analysis of e-wastes will be conducted pre- and post-treatment to demonstrate morphological alterations in the e-wastes. 	
REMARKS / SUGGESTION		

SSAG Remarks	Approved with the following timeline for release of funds of the MOM contribution.		
	1. Total project cost: ₹40,45,668		
	2. Industry – ₹10,92,330 & MoM - ₹29,53,338 contribution and breakup of the contribution are as below:-		
	(Amount in Rupees)		
	Kazi Nazrul University	1st Year	2nd Year
MoM	1177754	1775584	2953338
Industry Partner	1092330	0	1092330
Grand Total	2270084	1775584	4045668

20. Project No.: SNTMOM/1403/2024

Project Title	Recovery of Nb₂O₅ and Ta₂O₅ from tin ore or slag through a Fluoride-free process		
Thrust Area	Extraction of strategic, critical minerals and REE		
Institution	CSIR Institute of Minerals and Materials Technology		
Principal Investigator/ Constituent PI	Bankim Chandra Tripathy bankimtripathy@gmail.com, 9861085358		
Industry Partner /Contribution	Sagar Mining and Metals Industries Pvt Ltd ₹20,00,000 (20.39% of total project cost)	₹20,00,000 (20.39% of total project cost), CSIR-₹24,52,500 (25% of total project cost)	
Project Cost & Duration	₹98,10,000 2 Years	Revised Cost: ₹98,10,000 Revised Duration: 2 Years	
Contribution of MoM	₹ 78,10,000	Revised Contribution of MoM: ₹53,57,500	
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • A simple fluoride-free dissolution route will be formulated for the recovery of strategic niobium (Nb) and tantalum (Ta) from Tin ore / Tin Slag. • Roasting of Tin ore/slag with suitable sulphur source at its melting temperature followed by water leaching to obtain metal values in sulphate form in liquid stream. • Separation of Nb and Ta by using novel phosphonic acid and phosphinic acid cyanex based solvents through solvent extraction route followed by precipitation of Nb₂O₅ and Ta₂O₅. 		
REMARKS / SUGGESTION			
SSAG Remarks	Approved with the following timeline for release of funds of the MOM contribution.		
	1. Total project cost: ₹98,10,000		
	2. Industry: Sagar Mining and Metals Industries Pvt Ltd- ₹20,00,000 and CSIR-₹24,52,500 & MoM - ₹53,57,500 contribution and breakup of the contribution are as below:-		

	(Amount in Rupees)			
	IMMT	1st Year	2nd Year	Total
	MoM	3105000	2252500	5357500
	CSIR	1000000	1452500	2452500
	Industry Partner	1000000	1000000	2000000
Grand Total	5105000	4705000	9810000	

21. Project No.: SNTMOM/1407/2024

Project Title	Sustainable process development for urban mining transition metals from end-of-life Li-ion batteries																		
Thrust Area	Extraction of strategic, critical minerals and REE																		
Institution	Amrita Vishwa Vidyapeetham Kochi																		
Principal Investigator/ Constituent PI	Dhamodaran Santhanagopalan kdams2003@gmail.com, 8098489233																		
Industry Partner /Contribution	MiniMines Cleantech Solutions Pvt. Ltd. ₹5,27,837 (15% of total project cost)	₹7,03,782 (20% of total project cost)																	
Project Cost & Duration	₹35,18,912 2 Years	Revised Cost: 35,18,912 Revised Duration: 2 Years																	
Contribution of MoM	₹29,91,075	Revised Contribution of MoM: ₹28,15,130																	
Objective	<p>The following objectives laid down for this project:-</p> <ul style="list-style-type: none"> • Disassemble end-of-life Li-ion batteries and recover all components • Separate all the components including cathode, anode, separator...etc. • Recover black-mass from the cathode strips and separate from its current collector. • Preprocessing for removal of binder and conductive additive • Process optimization of transition metal extraction (focusing: Ni, Co and Mn) • Identify high efficiency green acids, solid/liquid ratio, temperature, time to maximize transition metal extraction percentage • Ni, Co and Mn sequential extraction, quantification and purification 8. Process scale-up to 500g level. 																		
REMARKS / SUGGESTION																			
SSAG Remarks	<p>Approved with the following timeline for release of funds of the MOM contribution.</p> <ol style="list-style-type: none"> 1. Total project cost: ₹35,18,912 2. Industry: ₹7,03,782 & MoM - ₹28,15,130 contribution and breakup of the contribution are as below:- <p style="text-align: right;">(Amount in Rupees)</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>AVV</th> <th>1st Year</th> <th>2nd Year</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>MoM</td> <td>1560674</td> <td>1254456</td> <td>2815130</td> </tr> <tr> <td>Industry Partner</td> <td>703782</td> <td>0</td> <td>703782</td> </tr> <tr> <td>Grand Total</td> <td>2264456</td> <td>1254456</td> <td>3518912</td> </tr> </tbody> </table>			AVV	1st Year	2nd Year	Total	MoM	1560674	1254456	2815130	Industry Partner	703782	0	703782	Grand Total	2264456	1254456	3518912
AVV	1st Year	2nd Year	Total																
MoM	1560674	1254456	2815130																
Industry Partner	703782	0	703782																
Grand Total	2264456	1254456	3518912																

5. Agenda item no. 2: Consideration of final reports of 29 completed projects for acceptance and closure of the project by SSAG:

The final reports of the following 29 projects were considered by the SSAG. After deliberation, the SSAG accepted the final report and approved the closure of the following projects and release of remaining funds, subject to finalization of accounts and other relevant procedures.:

S. No.	File No.	Title	Institute
1.	14-8-2021	Extraction and isolation of Al, K, Li, Rb and Cs from Mica	CSIR-IMMT
2.	14-4-2021	Employing metallurgical silicon to develop new class of silicon composites for structural applications	IIT Bhubaneswer
3.	14-16-2021	Biobleaching of Lithium from minerals and low grade ores of Indian origin	CSIR-IMMT
4.	14-15-2021	Production of high pure manganese metal organic frameworks (MnMOFs) and their derivatives from low grade manganese ores for supercapacitor applications	CSIR-IMMT
5.	14-27-2021	Development of Alternative Flux Material from Red Mud for Steel Dephosphorization	CSIR-CERI
6.	14-5-2021	Sustainable ion exchange resin-based technology for rare earth extraction	IIT Madras
7.	14-29-2021	Exploring the Practicability of Extracting Platinum and Palladium from the Mineral Beds of Sittampudi Village in Salem District of Tamil Nadu An Experimental and Molecular Dynamics Approach	National Institute of Technology Trichy
8.	14-30-2021	Recovery of galena, sphalerite from lead zinc tailings by integrated energy efficient ultrafine comminution and novel shear floc-flotation and its impact on downstream Paste fill	IIT Hyd& CSIR-IMMT
9.	14-3-2021	Development of Ready-To-Use Assorted Sand for Construction Activities from Zinc Refining Wastes and Marble Powder	Manipal University Jaipur
10.	14-7-2022	Investigation on the development Al-Al Cladding Material through Compound Casting Process-Experiments and Numerical Simulations	MANIT, Bhopal
11.	14-9-2022	Un-diluted Recycling of Cast Aluminium Alloys Containing High Fe Impurity Suitable for SMEs	BML MUNJAL UNIVERSITY, JNA RDDC, SNR SONS CHARITABLE TRUST
12.	14-15-2022	Production of Onyx grade ATH (sodium bicarbonate route) using low grade bauxite from Kutch region of Gujarat	JNARDDC & KIIT

13.	14-16-2022	Synthesis, and Development of Hybrid Carbon Nanocomposites and Polymer Emulsions as Flocculants for Mining Industry	CSIR-NIIST
14.	14-01-2022	Solid-state recycling of aluminium chips (waste) for production of billets for pilot scale extrusion	JNARDDC
15.	14-04-2022	End to End Technology Development and Scale-up (TRL-7) for Cobalt Recovery, Cobalt alloy and components for Bio-Medical Applications	NFTDC, Hyderabad
16.	14-10-2022	Carbonaceous Nanomaterials from Graphite Sources of Arunachal Pradesh for Electrochemical Energy Storage and Sensor Applications	CSIR- NEIST
17.	14-14-2022	Recovery of metallic values from the discarded copper slag	CSIR-IMMT
18.	14-02-2023	Characterization of Orogenic Style Gold Mineralization in the BIFs of Dharwar-Shimoga Basin, Exploration Guides for Prospect-Scale targeting of subsurface Gold	NMIT, Bengaluru
19.	14-10-2021	Geo-technological evaluation of Bauxite and Laterite deposits of Chhattisgarh State by using Geospatial technology under Smart Mining 4.0	JNARDDC, Chhattisgarh Council of Science & Technology, Raipur
20.	14-18-2018	Investigation of the dynamics & mechanism of flocculation by polymers and biopolymer for separation of solid particles of high rate thickener in mineral processing industries	CSIR-NIIST
21.	14-27-2018	Integrated Geological, Geochemical and Geophysical studies for the delineation of Chromitite extensions in Nuggihalli Schist Belt and implications for Ni-Cu+-PGE mineralization	CSIR-NGRI & IIS Bangalore
22.	14-30-2018	Treatment of Acid Mine Drainage for Heavy Metal Removal	IIT Mandi, Kamand Campus
23.	14-13-2019	Direct production of Fe-Cr-Ni-Mn stainless alloy from mine waste by thermal plasma process	CSIR-IMMT
24.	14-200-2022	Techno Economic survey of copper recycling industry in India	JNARDDC
25.	14-201-2022	Techno-economic Survey of Lead Recycling Industry	JNARDDC
26.	14-202-2022	Techno-economic Survey of Zinc Recycling Industry in India	JNARDDC
27.	14-24-2021	Corrosion and wear resistant advanced coatings based on high entropy alloys for mining equipments	IIT, Delhi

28.	14-17-2022	Polymerized Molecular Receptor as Solid Sorbents for Size Selective Recognition and Separation of Rare Earth Elements	CSIR-CSMCRI
29.	14-8-2022	Utilization of chromite over burden (mining waste in Orissa) as an oxygen carrier material for clean energy (hydrogen) production using chemical looping technique	IIT Kharagpur

6. Agenda Item No. 3- Consideration of PERC recommendation for time extension of 11 ongoing Projects:

As per recommendations of PERC, time extension to following ongoing projects have been approved:

S. No.	File No.	Title	Institute	Time Extension Upto
1.	14-09-2021	Studying, modelling and evolving a new blasting technique for open cast mine excavations near the proximity of structures (beyond 50 m) using the structural response analysis and dynamic FEM	CSIR-CIMFR	Dec 2024
2.	14-17-2021	Design, analysis and development of Rheo gravity die cast Al15Mg2Si-4.5Si composite based light weight Bucket links for Mining Excavators	IISC Bangalore	Dec 2024
3.	14-2-2021	Development of Empirical Methodology for Design of Crown Pillar during transition from opencast to underground mining for Indian Mines	CSIR-CIMFR	March 2025
4.	14-18-2021	Determination of optimum safe distance of toe of dump from crest of open pit for stability of pit slope under different geo-mining conditions	CSIR-CIMFR	March 2025
5.	14-19-2021	Design, Synthesis and Fabrication of Donor-Acceptor Based Fluorescent Sensing Organic-Nanomaterials and Devices for Detection and Quantification of Rare Earth Elements in Minerals	University of Calcutta	Dec 2024
6.	14-18-2022	Definition of delay sequencing in blast designs using advance analytical techniques for optimization of blast fragmentation and improving mine economics in non-coal mines	CSIR-CIMFR, ANNA University & NIT	July 2025

7.	14-3-2022	Red Mud Valorization to Achieve Zero Waste, Conversion of Residue into Diagnostic X-Ray Shielding Tiles After Recovery of Scandium	CSIR-AMPRI & JNARDDC	Oct 2024
8.	14-13-2022	Novel Material Manufacturing method for Large Volume Cast Metal Matrix Nanocomposites (Ultra-Cast)	MNIT, Jaipur & CSIR-NIIST	Dec 2024
9.	14-6-2022	Development of medium strength Al-Mg-Si (AA6082 based) alloy for high end strategic applications (extruded or drawn tubes)	IIT Gandhinagar & JNARDDC	March 2025
10.	14-12-2022	Development of Novel Hydrometallurgical Technological Process Package for extraction and separation of Niobium, Tantalum and Rare Earths from Columbite and Tin Slag	CSIR-NML, Jamshedpur	January 2025
11.	14-199-2022	Bio-Reverent- Recover of Ga, Ge and in through innovative biotechnology and process integration	IIT Delhi	March 2025

7. Agenda item no. 4 : Consideration of foreclosure of 1 ongoing project recommended by PERC

As per recommendations of PERC, foreclosure of following one ongoing project has been approved:

S.No.	File No.	Title	Institute
1.	14-5-2023	Development of super capacitor devices for grid-level energy storage application based on natural mineral Chalcopyrite and bauxite residue.	IIT-Bhubaneshwar

8. Agenda item no. 5 : Consideration of dropping of a project approved by the SSAG in its last meeting on account of non-contribution from the industry

As per the recommendations of PERC, following one project has been approved for dropping due to non-contribution from the industry:

S.No.	File No.	Title	Institute
1.	14-27-2023	Setting up of a 100 kg Coal Fly-ash Pilot Processing unit to extract high-purity fumed Silica and Aluminium fluoride from CFA	JNARDDC

9. Following decisions were also taken for smooth running of the scheme for optimum and better output of the R&D projects to be funded from S&T Program of the Ministry

- i. The Secretary observed that strike rate is very low, as out of a total of 129 project proposals received on the SATYABHAMA portal, only 21 proposals have been recommended by PERC. He expressed that the role of the Ministry is not just limited to approving and funding the R&D Projects but also to reach out to other institutes and handhold them to improve the quality of research in the country. Therefore, he directed that a workshop with all the PIs whose proposals have not been considered/ rejected may be organised by Ministry of Mines for explaining the details of S&T Programme of Ministry, its thrust areas and the steps to be taken by the institutes for submitting the proposals on SATYABHAMA portal. Further, workshops should be organized for on boarding more institutes in the fold of S&T Programme of Ministry of Mines.
- ii. The Joint Secretary & FA indicated that there are very few proposals from women scientists. Therefore, the Ministry of Mines should make efforts to encourage more submissions from women scientists across India. In this regard, the Chairman suggested to organize workshop for the woman Scientists / Academicians of the eligible organizations and explain the details of S&T programme of the Ministry and the steps to be taken for submitting the proposals on SATYABHAMA portal
- iii. The Members highlighted that a considerable number of good projects were not considered in the absence of industry partner and funding. The Chairman suggested to evolve a mechanism for helping with Industry Partners in the such cases.
- iv. The SSAG appreciated that HINDALCO is sponsoring lots of project as industry partner. In this context, Secretary, Mines observed that apart from being an industry partner in R&D projects sponsored by Ministry of Mines, HINDALCO should also actively engage in serious R&D activities in the critical minerals sector. S&T section of the Ministry should evolve a mechanism to ensure coordination with HINDALCO and other industry partners regarding R&D activities undertaken by the Indian mining industry.
- v. The Secretary also directed that the PSUs under Ministry of Mines should step up their R&D work and the R&D activities of PSUs under the Ministry of Mines should be periodically reviewed by the Ministry of Mines through S&T section.

- vi. Shri R. Saravanabhavan, Dy. Advisor, NITI Aayog suggested that the focus on extracting critical minerals from tailings should be included in the next call for proposals. SSAG endorsed the proposal.
- vii. The Secretary (Mines) informed that the Ministry of Mines, has three technology-based MoUs/agreements: one with iCET (Initiatives on Critical & Emerging Technology) with the USA and technology initiatives with UK and Korea. Further, Prof S. Subramaniam informed that similar agreement exist between IIT Hyderabad and Australia. Dr. Anupam Agnihotri informed that JNARDDC has also entered into agreements with Russian Industry for undertaking R&D Projects. The Chairman desired that steps may be taken to call for joint international R&D Projects with these countries by talking to the Indian Embassies in these countries and explore ways to invite joint projects.
- viii. The SSAG also directed to ensure that the cash component (at least 15% of the total project cost) of the Industry Contribution should be credited by the sponsoring Industry into the bank account of the grantee Institute.

The SSAG meeting concluded with a vote of thanks to the chair, members and the experts.

LIST OF PARTICIPANTS OF 58th SSAG MEETING HELD ON 18th December 2024

Sl. No	Name	Designation
1.	Shri V. L. Kantha Rao	Secretary (Mines) / Chairman, SSAG
2.	Shri Shakil Alam	Economic Advisor
3.	Smt. Nirupama Kotru	Joint Secretary & FA
4.	Shri R. P. Gupta.	Director
5.	Shri Yogendra Singh Bhamboo,	Director (Technical)
6.	Shri Peeyush Narayan Sharma	CG, IBM
7.	Shri Siladitya Sengupta	DDG. GSI
8.	Shri R. Saravanabhavan	Dy. Advisor, NITI Aayog
9.	Mrs. Pronota Mitra Mukherjee	Director, FIMI-SMI
10.	Dr. M. Mohanty	Scientist-G & Head, DST
11.	Prof. Arvind Kumar Mishra	Director, CSIR-CIMFR (Online)
Special Invitee		
12.	Dr. K. Balasubramanian	Distinguished Scientist & Director, NFTDC (Online)
13.	Dr. Ramanuj Narayan	Director, IMMT Bhubneshwar (Online)
14.	Dr. Anupam Agnihotri	Director, JNARDDC (Online)
15.	Prof. S. Subramanian	IISc Bangalore (Online)
16.	Dr. Sripad R Naik	Scientist-V & HoD-NMD, NIRM (Online)