DR BARSHA DASH

Scientist-F | Hydrometallurgy & Extractive Metallurgy | Process Development
CSIR–Institute of Minerals and Materials Technology (CSIR-IMMT), Bhubaneswar, Odisha, India
Hydro & Electrometallurgy Department, ***20+ years R&D experience***

PROFESSIONAL PROFILE

Scientist-F with extensive R&D experience in hydrometallurgy, extractive metallurgy, mineral processing, waste valorization and recovery of strategic/critical metals from primary and secondary resources. Research experience spans laboratory investigations, process optimization, flowsheet development, pilot-scale studies, technology development and industrial R&D. Core expertise includes leaching, precipitation, adsorption, separation, process scale-up and sustainable recovery of valuable metals from ores, industrial wastes, catalysts and anode slimes.

RESEARCH EXPERTISE

Hydrometallurgy & extractive metallurgy	Leaching & dissolution kinetics	Precipitation & crystallization
Solvent extraction & separation	Adsorption & effluent treatment	Process flowsheet development
Critical/strategic metal recovery	Waste-to-wealth processing	Alumina & aluminium chemistry
Potassium/potash recovery	Mineral & material characterization	Hydrometallurgical scale-up

CURRENT & PREVIOUS APPOINTMENTS

Designation	Organization	Period
Senior Principal Scientist	CSIR-IMMT	Oct 2023 – Present
Principal Scientist	CSIR-IMMT	Oct 2018 – Oct 2023
Senior Scientist	CSIR-IMMT	Oct 2014 – Oct 2018
Scientist	CSIR-IMMT	Oct 2010 – Oct 2014
Junior Scientist	CSIR-IMMT	Oct 2007 – Oct 2010
CSIR Senior Research Fellow	CSIR-IMMT	Jul 2007 – Oct 2007
Project Assistant-II	RRL/CSIR-IMMT	Oct 2003 – May 2007

EDUCATION

Degree	Institution	Year	Details
Ph.D.	Sambalpur University	2012	Precipitation of hydrated oxides of aluminium from solutions of different sources and their dehydrated products
M.Sc.	Sambalpur University	2001	Chemistry – Inorganic Specialization; 67%, First Division
B.Sc. (+3 Science)	Sambalpur University	1999	Chemistry (Hons.); 60%, First Division
+2 Science	CHSE, Odisha	1996	PCBM; 68%, First Division
HSC	BSE, Odisha	1994	75.6%, First Division

QUALIFICATIONS & PROFESSIONAL ACHIEVEMENTS

- CSIR-NET (Life Sciences), qualified twice – June and December 2004.
- GATE 2005 – 93.55 percentile.
- CSIR Senior Research Fellowship – 2007.

Address for communication

Dr. Barsha Dash

Scientist F

Hydro, Bio & Electrometallurgy Department

Professor (Chemical Sciences, AcSIR)

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PATENTS

1. Process for production of crystalline boehmite by precipitating from supersaturated sodium aluminate liquor under atmospheric conditions at a temperature as low as 50°C. Indian Patent No. 267384; granted 16 July 2015.

2. Novel hydrometallurgical process for production of tellurium from high lead bearing copper refinery anode slime. CSIR Patent No. 2459DEL2013; 20 Aug 2013.

3. Hydrometallurgical process for recovery of tellurium from high lead bearing copper refinery anode slime. US2015/0053572 A1; granted US9630844B2, 25 Apr 2017.

4. Process for preparation of thermally treated composite of Zn-Al layered double hydroxide having antibacterial activity. CSIR Patent No. 2893DEL2013; granted 349714, 21 Oct 2020.

BOOKS & BOOK CHAPTERS

- *Precipitation and Dehydration of Hydrated Alumina* — Barsha Dash, I.N. Bhattacharya, B.K. Mishra; LAP Lambert Academic Publishing, 2013.
- *Layered Double Hydroxide Composites and their Antimicrobial Activity* — Geetanjali Mishra, Barsha Dash, Sony Pandey; LAP Lambert Academic Publishing, 2018.
- *Arsenic Removal from Industrial Effluents Through Ferric Arsenate Precipitation* — book chapter, Water Pollution & Waste Water Treatment.
- *Metal Nanoparticles as Potential Antimicrobial Agents* — book chapter, 2019.
- *Nepheline Syenite—An Alternative Source for Potassium and Aluminium* — Rare Metal Technology 2019, Springer, pp. 145–159.

AWARDS & RECOGNITION

- Prof. Dayanidhi Pattnaik Award, Orissa Chemical Society (2010).
- Prof. G.B. Behera Award for Best PhD Thesis, Orissa Chemical Society (2012).
- R.P. Das Memorial Award for contribution to Hydrometallurgy, Indian Institute of Metals (2020).
- Commendation Award, Hindustan Petroleum – New Generation Ideation Contest (2023).
- Featured in "SHE IS", recognizing 75 women in Chemistry, Red Dot Foundation in association with the Principal Scientific Adviser to the Government of India and the Royal Society of Chemistry, UK (2025).

PROFESSIONAL MEMBERSHIPS

- Life Member – Orissa Chemical Society
- Materials Research Society of India
- Indian Institute of Metals
- Indian Institute of Chemical Engineers

EDITORIAL & ACADEMIC SERVICE

- Editorial Board Member – SCIREA Journal of Materials.
- Editorial Board Member – Analytical Chemistry International.
- Guest Editor – Special Issue: "Minerals: Adsorption of Cations and Anions on Mineral Surfaces".

INVITED TALKS ABROAD

1. Deliver Keynote lecture at CSIRO-Perth on ***"Critical Minerals Technologies at CSIR-IMMT" October 2025***

2. Deliver invited lecture titled ***"CSIR IMMT's efforts on Critical Minerals Extraction Technologies in India"*** in the one-day workshop on **"Advance recovery of the Battery Material and REE from ores and wastes"** at the University of South Australia, Adelaide, October 2025.

SELECTED RESEARCH PROJECTS

- Extraction of tungsten values from Hutti Gold Mine tailings concentrate and scrap – flowsheet development, bench-scale studies and pilot-scale testing.
- Recovery of alumina from NALCO fly ash – modification and validation of flowsheet.
- Recovery of tellurium powder from anode slime.
- Waste-to-Wealth through hydro- and electrometallurgical processing.
- Lead recovery from de-copperized anode slime.
- Nickel recovery from refinery electrolyte – Phase I and Phase II.
- Laboratory testing of copper oxide ore for Mawarid Mining, Oman.

Technology Developed

Sl. No.	Title	Year of development	My contribution in the development
1	Recovery of Co and Ni values from scrap	2025	MIDHANI, Hyderabad
2	Recovery of tungsten from scrap and Hutti gold mine tailings	2020	DMRL (DRDO), Hyderabad
3	Recovery of alumina, silica and iron values from Indian fly ash	2019	National Aluminium Company (NALCO), Bhubaneswar
4	Splitting of sodium sulphate bearing effluent through electro-membrane process for the production of sodium hydroxide and sulphuric acid	2017	M/s Heavy Water Board, Mumbai
5	Recovery of Pd from spent nuclear fuel effluent (High level liquid waste) using ionic liquids	2015	Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam
6	Recovery of high pure Te, Cu and Pb from anode slime	2012	M/s Hindalco Industries Ltd., Dahej, Gujarat.

7	Nickel recovery from refinery electrolyte (Phase-I and Phase-II) **M/s Hindalco Industries Ltd., Dahej, Gujarat**	2011-2012	Neutralization of the liquor, bulk hydroxide precipitation, more importantly arsenic removal through precipitation of **ferric arsenate** and finally iron removal and copper cementation.
8	Laboratory testing of copper oxide ore **Mawarid Mining Company, Oman**	2011	Leaching of the copper oxide ore with optimization of parameters.
9	Recovery of Tellurium powder from anode slime **M/s Hindalco Industries Ltd., Dahej, Gujarat**	2012	Extraction of copper and tellurium from the original material to the aqueous solution through leaching.
10	Recovery of lead from anode slime **M/s Hindalco Industries Ltd., Dahej, Gujarat**	2012	Production of lead sulfide from the brine leached solution of waste anode slime.

PROFESSIONAL TRAINING

- Role of Innovation and Creativity Management in Research – ASCI, Hyderabad, DST-sponsored programme.
- Mineral Characterisation and Beneficiation Practices – IIME Bhubaneswar Chapter and CSIR-IMMT.
- Analytical Instrumental Techniques: Current Trends and Practices – hands-on training, RRL/CSIR-IMMT.
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PUBLICATION & RESEARCH RECORD

1. Bhagyalipi Tripathy, Sasmita Prusty, Manish Bhartia, A. Bandyopadhyay, Barsha Dash, Influence of mineral and organic acids on the structural, morphological and packing properties of silica sand, Journal of Engineering and Applied Science, (2026) 73:128
   https://doi.org/10.1186/s44147-026-00988-7

2. Sonidarsani Routray, Binapani Behera, Barsha Marandi, K. Sanjay, M.K. Ghosh, And Barsha Dash, Insight into Cu Extraction Using Deep Eutectic Solvent: Reaction Mechanism, METALLURGICAL AND MATERIALS TRANSACTIONS B, 56, 2025, 292-299.
   https://doi.org/10.1007/s11663-024-03320-x
   *Corresponding author

3. Jayashree Samantray, Amit Anand, Barsha Dash & Malay K. Ghosh, Low temperature hydrothermal processing to recover aluminum from nepheline syenite roast leach residue, Separation Science and Technology, 58:14, 2505-2518, DOI: 0.1080/01496395.2023.2260084 To link to this article: https://doi.org/10.1080/01496395.2023.2260084

4. Rashmirekha Samal, Surjeet Mahalik, Sonidarshani Routroy, Barsha Dash, Kali Sanjay, High Pure Co (II) Precursor Liquor From Spent Catalyst Leach Liquor, *Journal of Sustainable Metallurgy*, https://doi.org/10.1007/s40831-023-00693-2

   *Corresponding author

5. Sonidarshani Routray, **Barsha Dash**, Abdul R. Sheik, C. K. Sarangi and Kali Sanjay, Kaolin: An Alternate Resource of Alumina , Sustainable Chemical, Mineral and Material Processing, Select Proceedings of 74th Annual Session of Indian Institute of Chemical Engineers (CHEMCON-2021), 2022, 135-144.

   *Corresponding author

6. Surjeet Mahalik, A. R. Sheik, **Barsha Dash**, C. K. Sarangi & K. Sanjay, Reclamation of tungsten from spent HDS catalyst: a detailed study, **Indian Chemical Engineer** 2022, 64, 4, 416–429

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7. Jayashree Samantray, Amit Anand, Barsha Dash, Malay Kumar Ghosh, Ajaya Kumar Behera, Silicate minerals - Potential source of potash - A review, **Minerals Engineering,** 179 (2022) 107463

8. Geetanjali Mishra, Sanjit Das, Priyalisa Jena, **B. Dash**, Synthesis and characterization of template mediated mesoporous alumina nanostructure with efficient and fast adsorption of Congo Red from aqueous solutions, **Materials Advances**, 3, 2022, 3490-3499.

9. G. Mishra, **B. Dash**, A. R. Sheik, C. K. Sarangi, P. Vijetha, K. Sanjay, M. K. Ghosh, T. Subbaiah, Recovery of Lead as Lead Sulphide from Anode Slime Using Hydrometallurgical Technique, **J. Inst. Eng. India Ser. D,** 2021,

10. RR Samal, Aneeya K Samantara, S Mahalik, JN Behera, **B Dash**, K Sanjay, An anionic and cationic surfactant-assisted hydrothermal synthesis of cobalt oxide nanoparticles as the active electrode material for supercapacitors**, New Journal of Chemistry**, 45 (2021) 2795-2803.

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11. Geetanjali Mishra, S.Mahalik, **Barsha Dash**, K.Sanjay, M.K.Ghosh, Iron control in wet chemical leaching of polymetallic nodule through combined reagent, Analytical Chemistry Research, ACI, 1(1)2021, 9-14.

12. Sibani Mahapatra, Jyotsna Rani Sahu, Barsha Dash, Synthesis and characterizations of different aluminosilicate nano matrices, Materials Today: Proceedings, 35 (2021)186-192

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13. Jayashree Samantray, Amit Anand, Barsha Dash, Malay K. Ghosh, and Ajaya K. Behera

    Sustainable Process for the Extraction of Potassium from Feldspar Using Eggshell Powder, *ACS Omega* **2020** *5* (25), 14990-14998 DOI: 10.1021/acsomega.0c00586

14. Bibek Dash, Barsha Dash Swagat S. Rath, A thorough understanding of the adsorption of Ni (II), Cd (II) and Zn (II) on goethite using experiments and molecular dynamics simulation, **Separation and Purification Technology,** 240, 2020, 116649

15. R&D Efforts of CSIR-IMMT Toward Solving Some Issues Related to Aluminum Production, Ranjan Kumar Dwari, Chinmaya Kumar Sarangi, Syed Md. Mustakim, **Barsha Dash**, Bankim Chandra Tripathy, Malay Kumar Ghosh, Suddhasatwa Basu, Journal of Sustainable Metallurgy, 6, 2020, 9-17

16. Jayashree Samantray, Amit Anand, **Barsha Dash**, Malay K. Ghosh, Ajay K. Behera,Nepheline syenite—an alternative source for potassium and aluminium, Rare metal technology, 2019, **TMS Book chapter**, Springer Publication, page 145-159.

17. Geetanjali Mishra, **Barsha Dash,** Sony Pandey, Effect of molecular dimension on gallery height, release kinetics and antibacterial activity of Zn-Al layered double hydroxide (LDH) encapsulated with benzoate and its derivatives. **Applied Clay Science**, 181, 2019, 105230.

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18. J.Samantray, A. Anand, **B.Dash**, M.K. Ghosh, A.K.Behera, Production of potassium chloride from K-feldspar through Roast-leach-Solvent Extraction route, **Trans IIM, https://doi.org/10.1007/s12666-019-01730-z**

19. Geetanjali Mishra, **Barsha Dash,** Sony Pandey, Diptipriya Sethi, Ternary layered double hydroxides (LDH) based on Cu-substituted Zn-Al for the design of efficient antibacterial ceramics, **Applied Clay Science**, 165, 2018, 214-222.
    *Corresponding author

20. A.K.Tripathy, B.Behera, V.Aishwarya, A.R.Sheikh, B.Dash, C.K.Sarangi, B.C.Tripathy, K.Sanjay, I.N.Bhattacharya, Sodium fluoride assisted acid leaching of coal fly ash for the extraction of alumina, Minerals Engineering, 131, 2018, 140-145.

21. Meenakshi Rath, Laxmi Priya Behera, Barsha Dash, Abdul Rauf Sheik, Kali Sanjay, Recovery of dimethylglyoxime (DMG) from Ni-DMG complexes, Hydrometallurgy, 176, 2018, 229-234
    *Corresponding author

22. Geetanjali Mishra, **Barsha Dash,** Sony Pandey, Layered double hydroxides: A brief review from fundamentals to application as evolving biomaterials, **Applied Clay Science**, 153, 2018, 172-186. *Corresponding author
(Most downloaded paper of the journal may 2018 to till now)

23. Geetanjali Mishra, **Barsha Dash,** Sony Pandey, Diptipriya Sethi, C. Ganesh Kumar, Comparative Evaluation of Synthetic Routes and Antibacterial/Antifungal Properties of Zn–Al Layered Double Hydroxides Containing Benzoate Anion, **Environmental Engineering Science**, 35, 2018, 247-260, DOI: 10.1089/ees.2017.0062
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24. Geetanjali Mishra, **Barsha Dash,** Diptipriya Sethi, Sony Pandey, B.K.Mishra, Orientation of organic anions in Zn-Al layered double hydroxides with enhances antibacterial property, **Environmental Engineering Science**, 34, 2017, 516-527, DOI: 10.1089/ees.2016.0531
*Corresponding author

25. Geetanjali Mishra, **Barsha Dash**, Ajit Dash, I.N.Bhattacharya, Surfactant directed synthesis of mesoporous alumina and α-alumina single crystal, **Crystal Research and Technology**, 51, 2016, 433-440.
*Corresponding author

26. A.Biswal, S.Mahakud, Sandhyarani Bhuyan, **B.Dash**, C.K.Sarangi, Kali Sanjay, B.C.Tripathy, T.Subbaiah, I.N.Bhattacharya, Sung-HoJoo, Shun Myung Shin, K.H.Park, Recovery of Co metal and Electrolytic Manganese Dioxide (EMD) from Co–Mn sludge, **Hydrometallurgy**, 152, 2015, 159-168.

27. Ayon Bala Baral, **Barsha Dash**, Malay K.Ghosh, Tondepu Subbaiah, Manickam Minakshi, Pathway of Sucrose Oxidation in Manganese (Pyrolusite) Nodule, **Industrial Engineering and Chemistry Research**, 54, 2015, 12233-12241. DOI: 10.1021/acs.iecr.5b02881

28. N.K.Sahu, C.Sarangi, **B.Dash**, B.C.Tripathy, B.K.Satpathy, D.Meyrick, I.N.Bhattacharya, "Role of hydrazine and hydrogen peroxide in aluminium hydroxide precipitation from sodium aluminate solution, ***Trans. Nonferrous Met. Soc. China***, 25, 2015,615-521.

29. G. Barik, E. Pradhan, **B.Dash**, K.Sarangi, T.Subbaiah, "Preparation of layered nickel aluminium double hydroxide from waste solution of nickel", ***Minerals Engineering***, 69, 2014, 107-112.

30. Biswal, S. Mahakud, **B.Dash**, K.Sanjay, T. Subbaiah, "Influence of alternative alkali reagents on Fe removal during recovery of Mn as Electrolytic Manganese Dioxide (EMD) from Mn sludge", ***Hydrometallurgy***, 140, 2013, 151-162.

31. Geetanjali Mishra, **Barsha Dash**, Sony Pandey, Prangya Paramita Mohanty, "Antibacterial actions of silver nanoparticles incorporated Zn-Al layered double hydroxide and its spinel" ***Journal of Environmental and Chemical Engineering***, 1, 2013, 1124-1130.
*Corresponding author

32. Pinak Patnaik, Swagatika Mohanty, Sangitarani Pradhan, B. Dash, Ajit Dash, R. Sakthivel, T. Subbaiah, "Synthesis and characterization of fibrous nickel hydroxide obtained from nickel spent catalyst" ***Transactions of Nonferrous Metals Society of China,*** 23, 2013, 2977-2983.

33. Sangeeta R Pradhan, **Barsha Dash**, Kali Sanjay, T. Subbaiah, "Extraction of Ni (II) from spent hydrodesulfurization HDS catalyst through leaching and electroless precipitation of $Ni(OH)_2$", ***Metallurgical and Materials Transactions B***, 44 (2), 2013, 469-476.
*Corresponding author

34. A comparative study on the precipitation of hydrated alumina from different sources, **Barsha Dash**, B.C.Tripathy, I.N.Bhattacharya, T.Subbaiah, ***International Journal of Metallurgical Engineering***, 1(5), 2012, 78-82.
*Corresponding author

35. N. K. Sahu, **Barsha Dash**, Suchismita Sahu, I. N. Bhattacharya, T. Subbaiah,"Extraction of copper by leaching of electrostatic precipitator dust and two step removal of arsenic from leach liquor", ***Korean Journal of Chemical Engineering,*** 29 (11), 2012, 1638-1642.
*Corresponding author

36. Pravas Ranjan Behera, **Barsha Dash**, Prodip Kumar Sen, Tondepu Subbaiah and Raj Kishore Paramguru, "Studies on characterization and leaching of malachite ore", ***The IUP Journal of Chemical Engineering,*** Vol. III, No. 3, 2011, 51-61

37. ***Barsha Dash**, I.N.Bhattacharya, B.V.R.Murthy, R.K.Paramguru, "Preparation and characterization of molybdenum trioxide from spent HDS catalyst", ***Korean Journal of Chemical Engineering***, 28(7), 1546-1549 (2011).
*Corresponding author

38. ***Barsha Dash**, B.C.Tripathy, I.N.Bhattacharya, B.K.Mishra, "Additive action on boehmite precipitation in sodium aluminate solution", ***Dalton Transaction***, 39 (2010), 9108-9111.
*Corresponding author

39. ***Barsha Dash**, B.Das, "Adsorption of Pb (II) ions from Aqueous Solutions using a Low-Grade Iron Ore as an Effective Adsorbent", ***Adsorption Science and Technology***, 27(5) 2009, 479-491.
*Corresponding author

40. Manganese recovery from medium grade ore using a waste cellulosic reductant, D. Hariprasad, **B. Dash**, M.K.Ghosh, S.Anand, ***Indian Journal of Chemical Technology,*** 16(4), (2009) 322-327.

41. **B. Dash**, B.C.Tripathy, I.N.Bhattacharya, S.C.Das, C.R.Mishra and B.K.Mishra; Precipitation of boehmite in sodium aluminate liquor", ***Hydrometallurgy***, Volume 95, Issues 3-4, February 2009, Pages 297-301.

42. **B. Dash**, B.R. Das, B.C. Tripathy, I.N. Bhattacharya and S.C. Das; Acid dissolution of alumina from waste aluminium dross", ***Hydrometallurgy***, Volume 92, Issues 1-2, May 2008, Pages 48-53. ***(Top 20th article of Hydrometallurgy 2008).***

43. D.Hariprasad, **B. Dash**, M.K.Ghosh and S.Anand; "Leaching of manganese ores using saw dust as a reductant", ***Minerals Engineering***, Volume 20, Issue 14, November 2007, Pages 1293-1295.

44. **B. Dash,** B.C.Tripathy, I.N.Bhattacharya, S.C.Das, C.R. Mishra and B.S.Pani; "Effect of temperature and alumina/caustic ratio on precipitation of boehmite in synthetic sodium aluminate liquor", ***Hydrometallurgy***, Volume 88, Issues 1-4, August 2007, Pages 121-126.

45. B.R. Das, **B. Dash**, B.C. Tripathy, I.N. Bhattacharya and S.C. Das; " Production of η-alumina from waste aluminium dross", ***Minerals Engineering***, Volume 20, Issue 3, March 2007, Pages 252-258

46. ***B. Dash**, B.C.Tripathy and I.N.Bhattacharya; "Adsorption of Copper and Cadmium on Calcined Aluminium Hydroxide Prepared from Waste Aluminium Dross", ***Mines and Minerals Reporter***, Volume 3, No.8, December 2006, pages 28-31.

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