

Manish Kumar Sinha

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SUMMARY

Metallurgist with strong expertise in extracting base, rare earth, and critical metals from e-waste, industrial solid and liquid wastes, and low-grade ores using advanced hydrometallurgical processes. Dedicated, adaptable, and self-driven professional with a passion for developing sustainable hydro- and pyrometallurgical technologies for resource recovery and circular economy applications. Eager to collaborate with innovative teams to deliver strategic insights and practical solutions that drive company growth and technological advancement.

TECHNICAL SKILLS

- **Processes:** Leaching, Solvent extraction, Precipitation, Precipitation-stripping, Hydrothermal/Solvothermal synthesis, digestion, flux fusion.
- **Analysis:** Wet chemical analysis of ferrous and non-ferrous metals.
- **Instrumentation:** Operation of ICP-OES, AAS, UV Visible Spectrophotometer, TG-DTA and Pressure Autoclave, Induction furnace, XRD, SEM.
- **Software:** MS-Office, Chemdraw, Origin, ThermoCalc, FactSage.

RESEARCH INTERESTS

Sustainable hydrometallurgical process development, Base/Precious/Critical and Rare-earth metals extraction, Hydrometallurgical treatment of industrial waste, Recycling of waste electronic and electronics equipment, Advance separation processes, Pyrometallurgical treatment of waste, Nano-Material Synthesis, Aluminum recycling.

RESEARCH EXPERIENCE

Worcester Polytechnic Institute – Metal Processing Institute, Worcester, MA

Assistant Research Professor | June 2023 - Present

- Removal of Fe, Mn, Si from scrap secondary aluminum alloys
- Recovery of Eu and Tb from waste CFLs
- Recovery of Nb and Ta from Columbite concentrate

- Zn and Mg distillation from aluminum and magnesium alloy scraps

Postdoctoral Research Fellow | Oct 2021 - June 2023

- Development of process to remove metallic impurities from wrought and cast aluminum alloys
- Rare earth recovery from e-waste

University of the Free State – Department of Chemistry, Bloemfontein, South Africa

Postdoctoral Research Fellow | July 2018 - June 2021

- Manganese recovery from various low to medium grade manganese ores
- Synthesis of LiMn_2O_4 from the recovered manganese
- Separation of titanium and iron from Ilmenite
- Solvent extraction of REEs from the leach liquor of monazite
- Recovery of metal values from spent lithium-ion batteries
- Recovery of Pd from spent catalysts

Rubamin Limited, Vadodara, India

Senior R&D Executive Chemist | March 2018 - April 2018

- Solvent extraction of vanadium from spent catalyst leach solution

CSIR-National Metallurgical Laboratory, Jamshedpur, India

Research Assistant | March 2009 - March 2017

- Manganese recovery from various low to medium grade manganese ores
- Separation of Zn and Fe from spent iron pickling solution and synthesis of high value zinc and iron oxides
- Separation of Cu and Zn from spent brass pickling solution and synthesis of Cu-metal and ZnO powders
- Recovery of rare earth elements from waste fluorescent lamps, SmCo and NdFeB magnet
- Extraction of acids and lanthanides using ionic liquid as an extractant
- Recovery of Cu and Ni from the PCBs
- Separation of Cu from copper bleed solution and solvothermal synthesis of Cu-metal powder

EDUCATION

- **Doctor of Philosophy – Chemistry (Hydrometallurgy)** Banaras Hindu University, Varanasi, India (Dec 2012 – Nov 2017)

- **Master of Science – Chemistry (1st class)** Vinoba Bhave University, Hazaribag, India (Dec 2005 – Mar 2008)
- **Bachelor of Science – Chemistry (1st class)** Vinoba Bhave University, Hazaribag, India (Sep 2002 – Aug 2005)

PATENTS

- Sinha, M., Hiscocks, J., Das, S., Davis, B., Mishra, B., Grosko, T. and Pickens, J., Phinix LLC, 2024. **Selective Removal of Impurities from Molten Aluminum**. U.S. Patent Application 18/495,280.
- Sinha, M., Tanvar, H., Mishra B., 2025. **Critical metals recovery from waste fluorescent lamp phosphor dust**. US Provisional application 63/862,919.

JOURNAL PUBLICATIONS

1. M.K. Sinha, H. Tanvar, B. Mishra. Hydrometallurgical Recovery of Critical Metal Values from Heterogeneous Trichromatic Phosphor Waste. Accepted. **Journal of Sustainable Metallurgy**, 2025.
2. M.K. Sinha, B. Mishra, S.K. Das, T. Grosko, Influence of Si, Mn, and Cr on the Iron Removal from Aluminum Scrap: A Thermodynamic and Experimental Analysis. **JOM**, 2025, pp.1-14.
3. M.K. Sinha, H. Tanvar, S.K. Sahu, B. Mishra. A Review on Recovery of Terbium from Primary and Secondary Resources: Current State and Future Perspective. **Mineral Processing and Extractive Metallurgy Review**, 2023, pp. 1-24.
4. S. Pramanik, A. Kumari, M.K. Sinha, B. Munshi, S.K. Sahu. Valorization of phosphor powder of waste fluorescent tubes with an emphasis on the recovery of terbium oxide (Tb₄O₇). **Separation and Purification Technology**, 2023, 124332.
5. H. Tanvar, M.K. Sinha, J.B. Habinshuti, B. Mishra. Extraction of Niobium and Tantalum Oxides from Columbite Concentrate Using Microwave Processing and Solvent Extraction. **Metallurgical and Materials Transactions B**, 2023, pp. 1-14.
6. M.K. Sinha, R. Jordaan, W. Purcell. Hydrometallurgical Recovery of Manganese from Ferruginous Manganese Ore by Reductive-Acid Leaching with Sodium Dithionite. **Journal of Sustainable Metallurgy**, 8, 2022, pp. 783–794.
7. M. Saldaña, E. Gálvez, R.I. Jeldres, C. Díaz, P. Robles, M.K. Sinha, N. Toro. Optimization of Cu and Mn Dissolution from Black Coppers by Means of an Agglomerate and Curing Pretreatment. **Metals**, 10(5), 2020, pp. 1-12.
8. M.K. Sinha, W. Purcell, W.A. Van Der Westhuizen. Recovery of manganese from ferruginous manganese ore using ascorbic acid as reducing agent. **Minerals Engineering**, 154, 2020, 106406.
9. W. Purcell, M.K. Sinha, A.Q. Vilakazi, M. Nete. Selective precipitation study for the separation of iron and titanium from ilmenite. **Hydrometallurgy**, 191, 2020, 105242.
10. A.M. Ngcephe, M.K. Sinha, W. Purcell. Solvent extraction and separation of palladium from platinum group Elements: Synthesis and characterization of 2-mercaptopyridine N-oxide-palladium (II) complex. **Journal of Molecular Structure**, 1199, 2020, 127009.

11. M.K. Sinha, W. Purcell. Reducing Agents in the leaching of Manganese Ores: A Comprehensive Review. **Hydrometallurgy**, 187, 2019, pp. 168-186.
12. A. Kumari, M.K. Sinha, S. Pramanik, S.K. Sahu. Recovery of rare earths from spent NdFeB magnets of wind turbine: Leaching and kinetic aspects. **Waste Management**, 75, 2018, pp. 486-498.
13. M.K. Sinha, S. Pramanik, A. Kumari, S.K. Sahu, L.B. Prasad, M.K. Jha, K. Yoo, B.D. Pandey. Recovery of value-added products of Sm and Co from waste SmCo magnet by hydrometallurgical route. **Separation and Purification Technology**, 179, 2017, pp. 1-12.
14. A. Kumari, M.K. Sinha, S.K. Sahu, B.D. Pandey. Solvent Extraction and Separation of Trivalent Lanthanides using Cyphos IL 104, A Novel Phosphonium Ionic Liquid as Extractant. **Solvent Extraction and Ion Exchange**, 34, 2016, pp. 469-484.
15. M.K. Sinha, S.K. Sahu, S. Pramanik, L.B. Prasad, B.D. Pandey. Recovery of high value copper and zinc oxide powder from waste brass pickle liquor by solvent extraction. **Hydrometallurgy**, 166, 2016, pp. 182-190.
16. A. Kumari, M.K. Sinha, S.K. Sahu, B.D. Pandey. Investigation of a novel ionic liquid, Cyphos IL 104 for the solvent extraction of mineral acids. **Hydrometallurgy**, 166, 2016, pp. 159-165.
17. M.K. Sinha, S. Pramanik, S.K. Sahu, L.B. Prasad, M.K. Jha, B.D. Pandey. Development of an efficient process for the recovery of zinc and iron as value products from the waste chloride solution. **Separation and Purification Technology**, 167, 2016, pp. 37-44.
18. M.K. Sinha, S.K. Sahu, P. Meshram, B.D. Pandey. Low temperature hydrothermal synthesis and characterization of iron oxide powders of diverse morphologies from spent pickle liquor. **Powder Technology**, 276, 2015, pp. 214-221.
19. P. Meshram, B.K. Purohit, M.K. Sinha, S.K. Sahu, B.D. Pandey. Demineralization of low grade coal – A review. **Renewable and Sustainable Energy Reviews**, 41, 2015, pp. 745-761.
20. M.K. Sinha, S.K. Sahu, P. Meshram, B.D. Pandey. Solvent extraction and separation of zinc and iron from spent pickle liquor. **Hydrometallurgy**, 147–148, 2014, pp. 103-111.
21. Abhilash, S. Sinha, M.K. Sinha, B.D. Pandey. Extraction of lanthanum and cerium from Indian red mud. **International Journal of Mineral Processing**, 127, 2014, pp. 70–73.
22. B.C. Patel, M.K. Sinha, D.R. Tipre, Abhilash, S.R. Dave. A novel biphasic leaching approach for the recovery of Cu and Zn from polymetallic bulk concentrate. **Bioresource Technology**, 157, 2014, pp. 310–315.
23. P. Meshram, M.K. Sinha, S.K. Sahu, P. Khan, B.D. Pandey, T.R. Mankhand. Solvothermal synthesis of high value copper powder from copper bleed solution of an Indian copper smelter. **Powder Technology**, 233, 2013, pp. 335-340.
24. M.K. Sinha, S.K. Sahu, P. Meshram, B.D. Pandey, V. Kumar. Solvent Extraction and Separation of Copper and Zinc from a Pickling Solution. **International Journal of Metallurgical Engineering**, 1, 2012, pp. 28-34.

HONORS AND AWARDS

- **Qualified GATE (Chemistry), All India Rank-1079 (2012)**

- **Best Poster Award** at 67th NMD-ATM, Varanasi, India (2013)
- **Best Paper Award** at ICSTAR-2015, Kerala, India (2015)
- **Best Poster Award** at CSMAT-2017, Kerala, India (2017)

PROFESSIONAL MEMBERSHIPS

- **Member:** The Minerals, Metals & Materials Society (TMS)
- **Life Member:** Indian Institute of Mineral Engineers, India (IIME)
- **Student Member:** Indian Institute of Metals, Kolkata, India (IIM)