TECH PROFILE

1.	Title of Product/Process/Design/Equipment	High pure metals from spent catalysts, sludges, secondaries, effluents, primary and low-grade ores
2.	IPR Status Patent/Copyright/Trademark Secured in India/Abroad IPR Details	• A Process for extraction of Ni from low grade chromite ore, International Patent Nos.: WO 20055225, AU 2002348824, BR 200215990, EP 1697549. • Improvements in or relating to a process for the extraction of copper lead, zinc metal values from complex sulphide ores/concentrates, Indian Patent No.158990 (1985).
3.	Application/Uses	High pure (electrolytic grade) metals for manufacturing of industrial products and alloys.
4.	Salient Technical Features including Competing Features	Qualities of the final products are at par with metals produced from primary resources. Low grade, complex materials, industrial wastes, effluents and secondary resources can be successfully used as raw materials.
5.	Level/Scale of Development	• Pilot scale studies for production of Co, Cu and Ni cathodes from polymetallic nodules (tested in dedicated technology proving plant at 500 kg/day scale (nodules)) • Pilot scale studies for production of Ni and Co from Chromite Over Burden (tested in dedicated pilot plant at 10 tpd scale (COB)) • Established flexible pilot plant with pressure/atmospheric leaching, purification/cementation tanks, solid-liquid separation, 26 stages 200 lph solvent-extraction and electrolytic cells with 100 kg/day metal production capacity at CSIR-IMMT for processing complex sulphides • Pilot scale studies to recover Co from cobalt sludge/scrap • Pilot scale studies for recovery of Ni from refinery electrolyte (tested in 3000 L scale) • Carried out 1000 tons heap leaching for the processing of low grade Malanjkhand ore to recover copper through bio-heap leaching, solvent extraction and electrowinning unit operations. • Pilot scale studies for recovery of Ni from spent catalyst
6.	Environmental Considerations	Employs hydrometallurgical unit operations which

		are environment benign processes.
7.	Status of Commercialization	Following technologies have been transferred / commercialized • Recovery of nickel from refinery spent electrolyte (150 m^3/day, M/s Hindalco Ind. Ltd, Birla Copper Unit, Dahej) • Recovery of Co from Co sludge/scrap (100 tpa Co, M/s Rubamin Ltd., Baroda) • Extraction of Zn and Cu from brass ash, Zn ash (105 tpa Zn & 30 tpa Cu, M/s Pantnagar Fertilizers, Muzaffarnagar) • Recovery of Co from Co bearing slag of South Africa (135 tpa Co carbonate, M/s Shalina Trading Co Pvt. Ltd., Mumbai) • Recovery of Cu and Zn from spent catalyst (75 tpa Cu & 75 tpa Zn, M/s S K Enterprise, Kanpur) • Recovery of cobalt from Beta-cake leach liquor (18 tpa, M/s HZL, Udaipur)
8.	Major Raw Materials to be Utilized	Spent catalysts, sludges, secondaries, effluents, primary and low-grade ores. Commercial grade chemicals will be used in the process.
9.	Major Plant Equipment and Machinery Required	Leach reactors, precipitation tanks, solid-liquid separation units, solvent-extraction (optional depending on the process), electrolytic cells, pumps, instrumentation. Depending on the process requirement, pre-treatment unit operations for size reduction and roasting/calcination may be required.
10.	Techno-Economics	Return on Investment 20-40%
11.	Technology Package	IMMT can develop process flow sheets for recovery of metal values primary and secondary resources, carry out pilot scale studies (optional) with the existing pilot plant facility and prepare basic engineering process package.
12.	Contact Details	• Dr I N Bhattacharya Head, Hydro & Electrometallurgy Department CSIR-Institute of Minerals and Materials Technology, Bhubaneswar, Odisha, India 751 013 Email: inbhattacharya@immt.res.in • Dr Kali Sanjay Senior Principal Scientist Hydro & Electrometallurgy Department CSIR-Institute of Minerals and Materials Technology, Bhubaneswar Odisha, India 751 013 Email: ksanjay@immt.res.in Phone: +91 9338291970

13.	Photographs (please provide high quality photographs)	 **High pure Co, Cu and Ni metal cathodes produced from low grade resource**