TECH PROFILE

1.	Title of Product/Process/Design/Equipment	Battery grade materials from spent catalysts, sludges, secondaries, effluents, primary and low-grade ores
2.	IPR Status Patent/Copyright/Trademark Secured in India/Abroad IPR Details	An improved single step process for production of battery grade alpha nickel hydroxide from nickel nitrate by electrochemical method. Patent No: 2370/DEL/2007.
3.	Application/Uses	Electrode materials for primary and secondary battery applications
4.	Salient Technical Features including Competing Features	Battery grade materials such as Electrolytic Manganese Dioxide (EMD), Nickel hydroxide, Cobalt hydroxide / oxide as per standards
5.	Level/Scale of Development	Pilot scale studies on preparation of Electrolytic Manganese Dioxide (EMD) from low grade resources. Process flow sheets developed for recovery of EMD, nickel hydroxide and cobalt hydroxide/oxide from various secondary resources and spent catalysts.
6.	Environmental Considerations	Employs hydrometallurgical unit operations which are environment benign processes.
7.	Status of Commercialization	Following technologies are available • EMD from low grade and secondary resources containing Mn. • Nickel hydroxide from secondary resources • Cobalt hydroxide / oxide from secondary resources
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/calcinations 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 from primary and seconadary 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)	 **Electrolytic Manganese Dioxide (EMD) suitable for battery applications produced through electrolytic process from low garde Mn resource**