



# INDIGENOUS ELECTRODE MATERIALS, LITHIUM IRON PHOSPHATE (LFP) AND LITHIUM TITANATE (LTO) For Electric Vehicle Applications

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## Overview

ARCI has developed nano-structured electrode materials by cost-effective and upscalable process for application in EV batteries. Amongst the electrode materials,  $\text{LiFePO}_4$  (cathode) and  $\text{Li}_4\text{Ti}_5\text{O}_{12}$  (anode) have been successfully synthesized at pilot scale manufacturing plant and exhibits promising electrochemical performance compared to commercial electrode materials.

### Lithium Iron Phosphate (LFP)

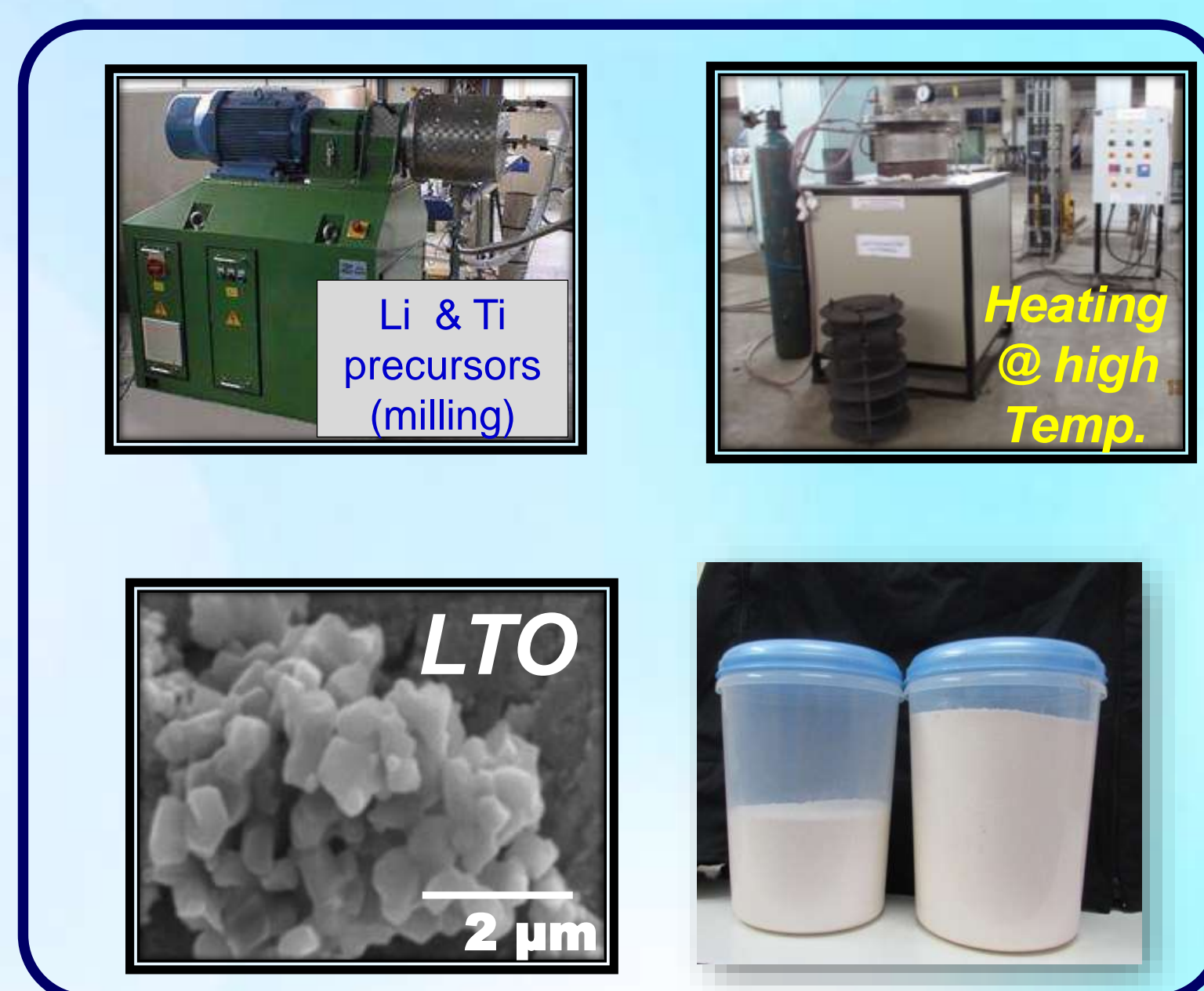
#### Technology Highlights:

- Identified sources of cost-effective lithium and iron precursors
- The processing cost of 1 Kg of LFP is Rs. 3144 developed at ARCI. Cost can be reduced by 20% by designing suitable cost-effective large capacity furnace and optimum heating cycles with less time
- ARCI developed LFP's electrochemical performance in terms of specific capacity; cyclic stability and rate capability is at par with the performance of the commercially available LFP

### Lithium Titanate (LTO)

#### Technology Highlights:

- Identified sources of cost-effective lithium and Ti precursors
- The processing Cost of 1 Kg of LTO is Rs.1700 developed at ARCI. Cost can be reduced by 20% by designing suitable cost-effective large capacity furnace and optimum heating cycles with less time
- ARCI developed LTO's electrochemical performance in terms of specific capacity; cyclic stability and rate capability is at par with the performance of the commercially available LTO



## Upscaling

- Considering the existing facilities for both LFP and LTO, the batch size is 29 kgs and 72 kgs per day respectively is being produced.
- Establishment of pilot plant facility to produce 29 kgs and 72 kgs per day of LFP and LTO respectively resulting in 12T and 14T per year to cater for the production of 5 MWh each LFP and LTO based batteries, required investment cost of about 18 Crs and 16 Crs respectively.
- By designing large capacity furnace and optimizing the heating cycle, the production rate can be increased and at the same time production cost will be minimized.

#### \*Intellectual Property Development Indices

IPDI	1	2	3	4	5	6	7	8	9	10
Activities	Basic concepts and understanding of underlying scientific principles	Shortlisting possible applications	Research to prove technical feasibility for targeted application	Coupon level testing in stimulated conditions	Check repeatability/ consistency at coupon level	Prototype testing in real-life conditions	Check repeatability/ consistency at prototype level	Reassessing feasibility (IP, competition technology, commercial)	Initiate technology transfer	Support in stabilizing production
Status										