2011 DOE Vehicle Technologies Annual Merit Review

May 9-13, 2011

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Toda America Inc.

Project ID: ARRAVT017
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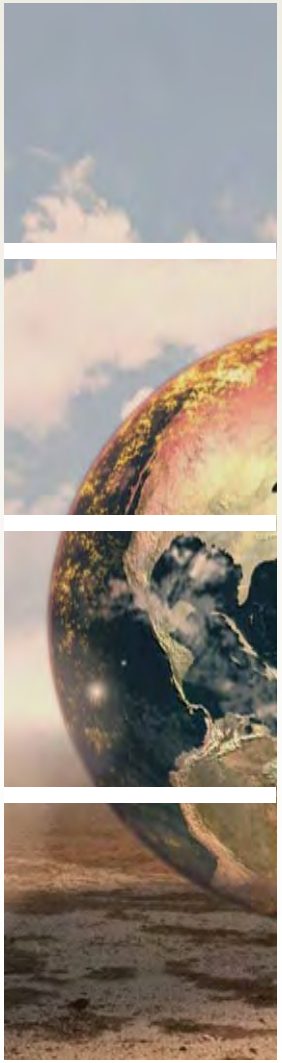

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Toda Cathode Materials Production Facility

ARRA VT017

Toda America Battle Creek Facility

Toda North American Facilities

Precursor
(Toda Advanced Materials)

Calcination
(Toda America Inc.)

Overview

TODA AMERICA

Li-ion Cathode Materials Production Facility

❑Timelines

- Start: February, 2010
- Finish: December, 2013
- 1st Line Schedule: Feb., 2011

Completed on Time!

❑Challenges

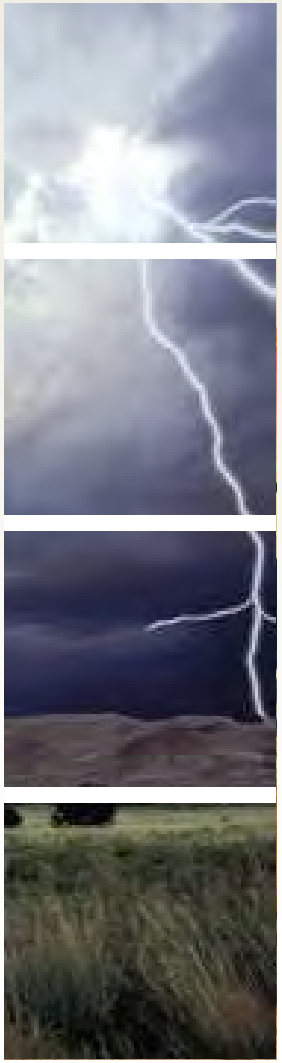
- Compressed schedule – first line production within 1 year of project start
- Timely product/process validation with customers

❑Budget

- $70MM total
- 50% Cost-shared with U.S. DOE ARRA grant

❑Partners

- ITOCHU Corporation
- Argonne National Labs (Li-ion cathode materials license)
- U.S. DOE/NETL



Toda America Background

TODA

- World's leading manufacturer of Solid State Chemistry Particles with 186 year history
- Broad product breadth of all key cathode materials, and precursor materials
- Quality leader with long experience of products, processes and application
- Large scale production of Li-ion materials and integrated supply chain
- Li-ion cathode materials supplied globally to key players in the battery industry
- Will produce DOE Argonne National Laboratory's next-generation cathode material technology

ITOCHU

- 50/50 JV partner with Toda in venture
- $120 billion transaction global diversified trading company
- Focused growth strategy ("L-I-N-E-s")
  - Life & Health, Infrastructure, New Technologies, Energy and Environment, and Synergies
- Core competencies in business management and partnerships, finance, trading and sales
- Complementary to Toda's strengths in Battery materials R&D and manufacturing

Project Milestones

TODA AMERICA

Fast-track project on schedule!

Milestone	Status / Target Dates
DOE Award Announcement	August 2009
DOE Award Agreement Signing	February 2010
Site Preparation Completed	March 2010
Phase 1 Construction Start	April 2010
Phase 1 – Step 1 Completion	December 2010
Production Validation Step 1	February 2011
Phase 1 – Step 2 Completion	Spring 2012
Decision for Phase 2 Start	Spring 2012
Phase 2 Construction Start	June 2012
Phase 2 Completion	December 2013

Completed

Application of Toda Products

Windpower

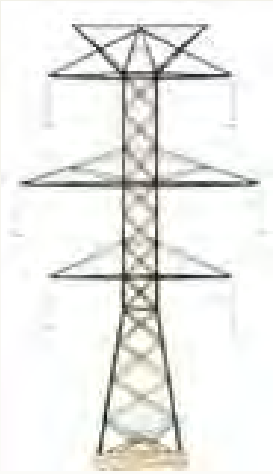
Power Tool

NiMeH Consumer

HEV, PHEV, BEV

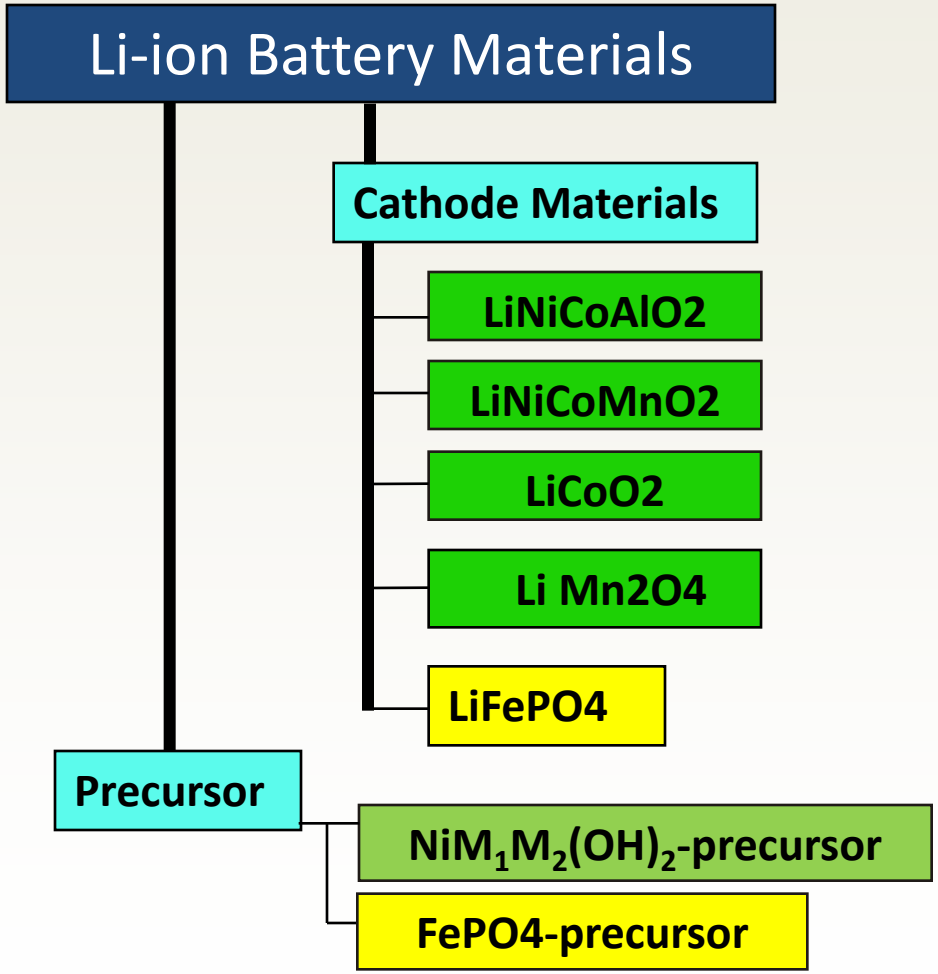
Mobile

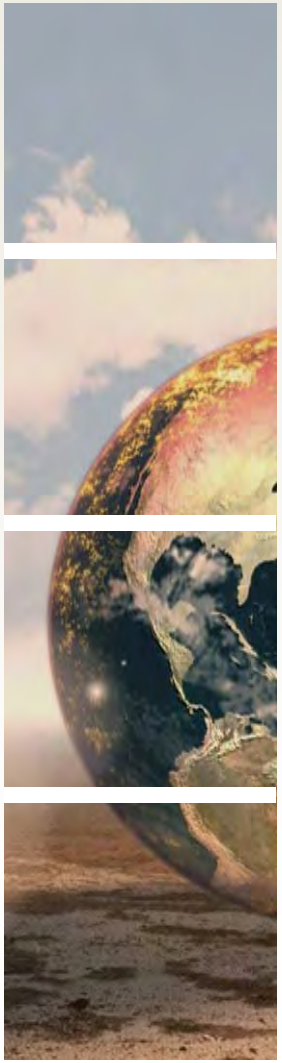
Smart Grid



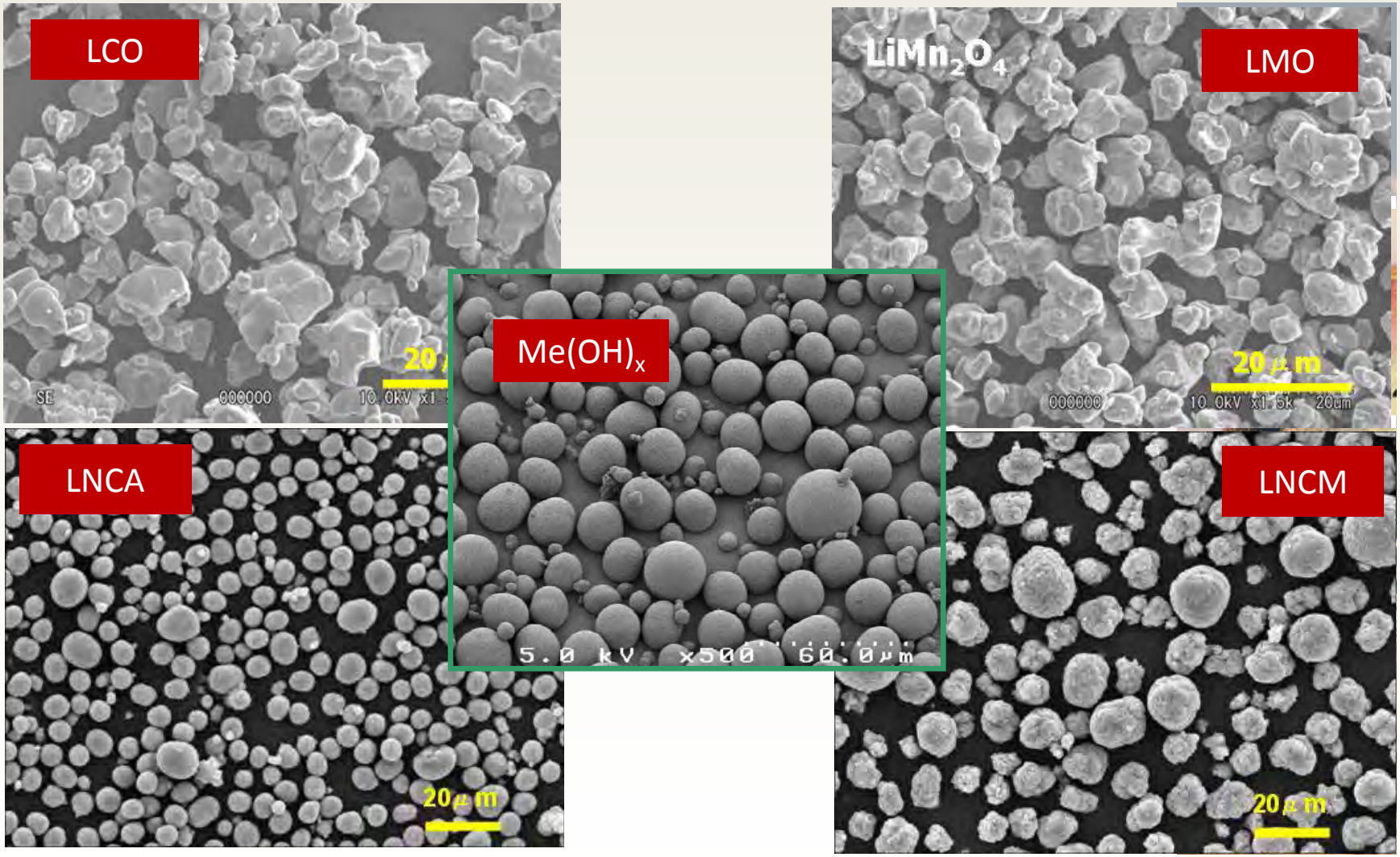
Toda Product Portfolio

TODA AMERICA

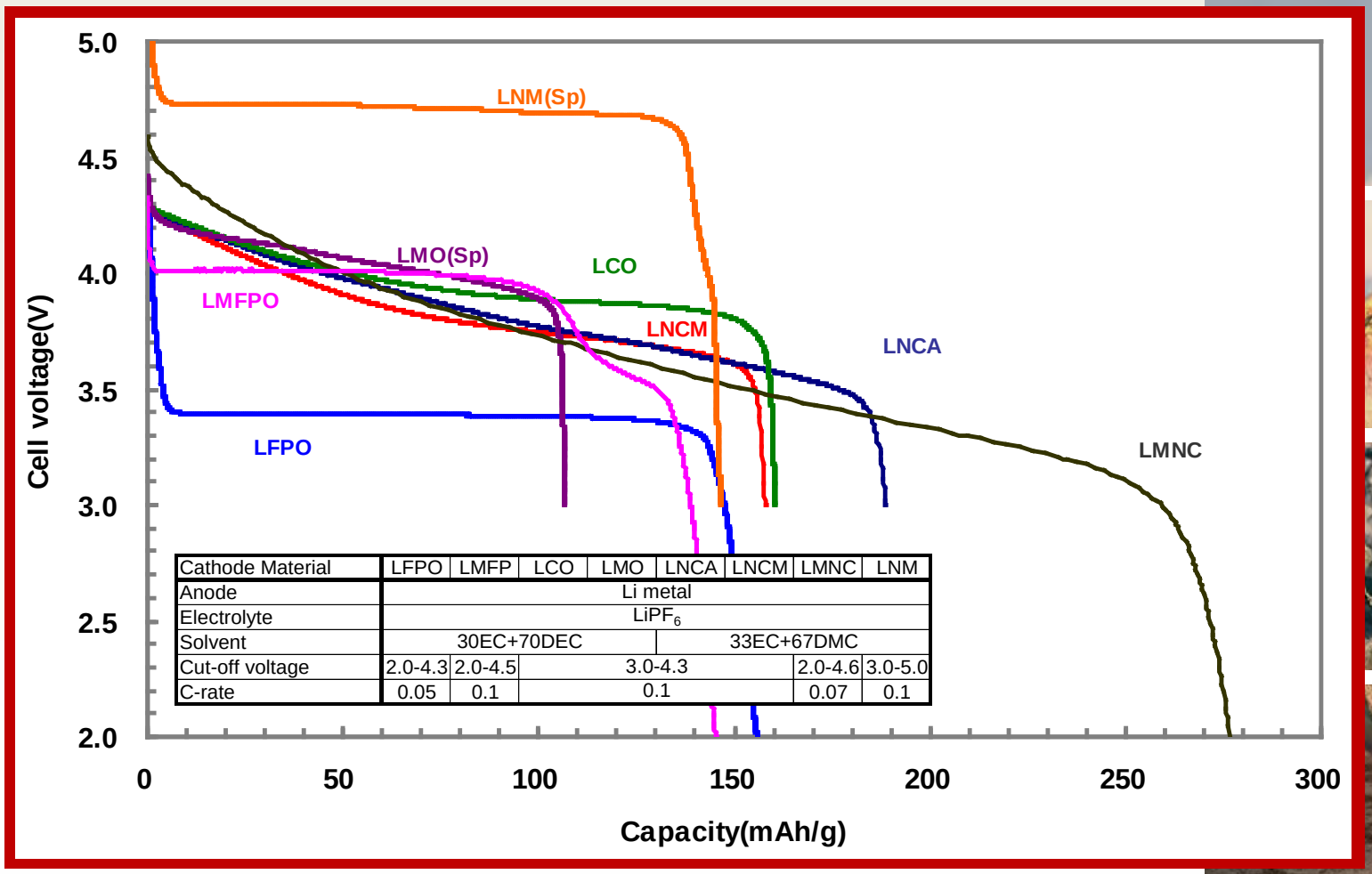




Toda Commercial Products for Cathode Materials



Toda Product Portfolio



Cathode Material	LFPO	LMFP	LCO	LMO	LNCA	LNCM	LMNC	LNM
Anode	Li metal							
Electrolyte	$LiPF_6$							
Solvent	30EC+70DEC				33EC+67DMC			
Cut-off voltage	2.0-4.3	2.0-4.5	3.0-4.3				2.0-4.6	3.0-5.0
C-rate	0.05	0.1	0.1				0.07	0.1

Technical Platform for Particle Design

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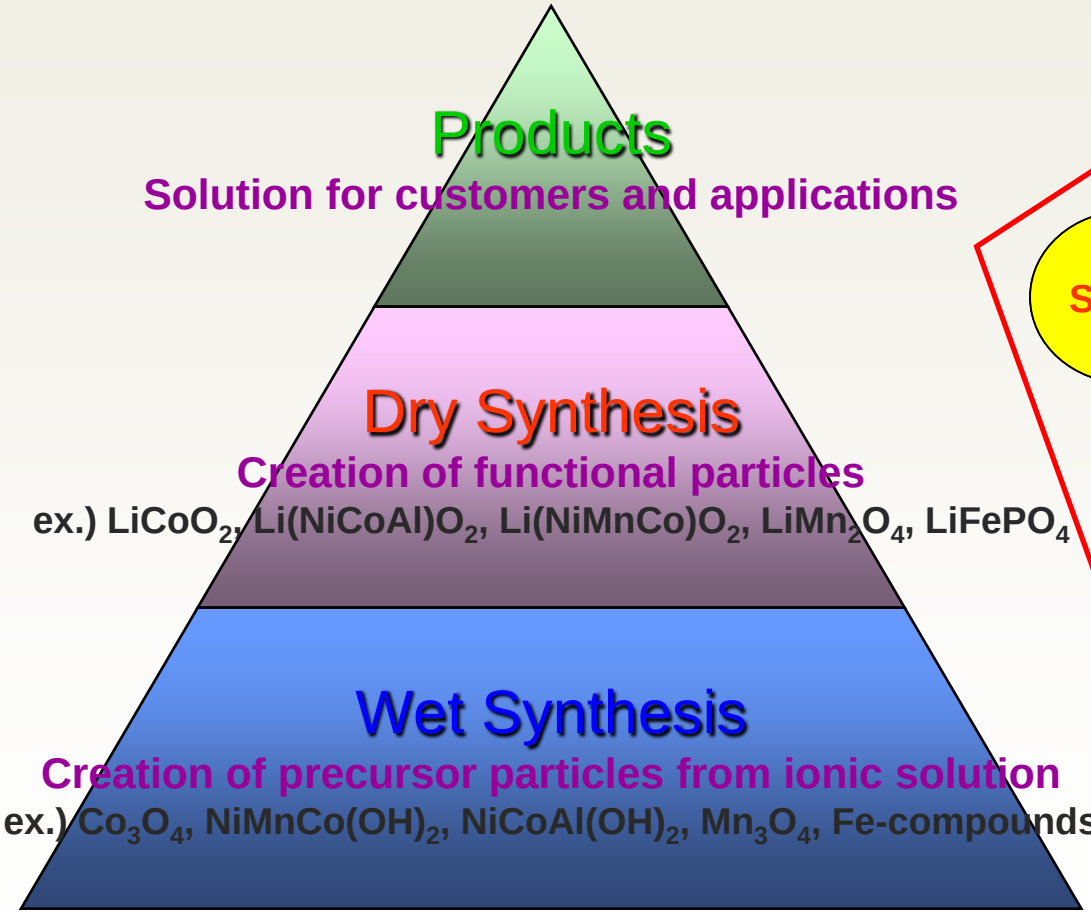

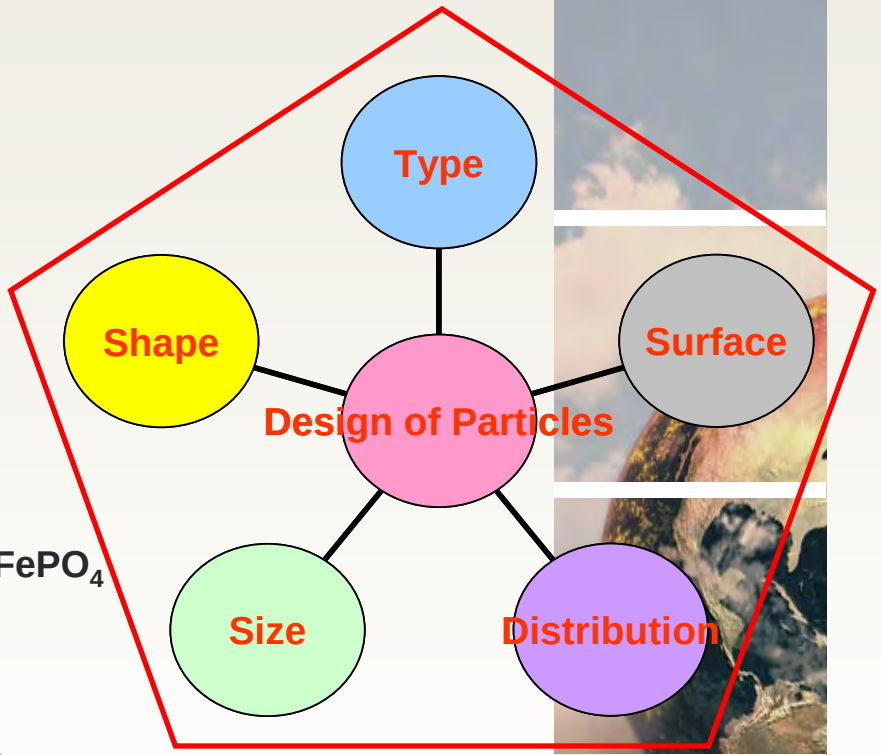

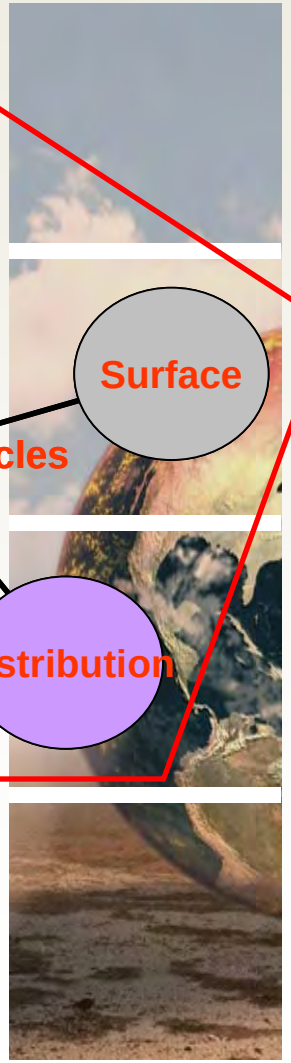

Summary

1. World leading solid state chemistry company with proven experience in scale manufacturing of Li-ion cathode materials
2. Production of DOE ANL's 2nd generation Li-ion technology
3. Building $70+ million Li-ion Cathode Materials plant with 4000 ton/yr product capacity in Battle Creek, Michigan
4. Step-wise capacity plan: Phase 1 Step-1 completion February 2011, Step-2 completion Spring 2012; and Phase 2 full completion by December 2013 depending on demand
5. Products that will be produced in Battle Creek Plant:
   - LiNiCoAlO2
   - LiNiCoMnO2
6. **Phase 1 construction and Line 1 Commissioning completed in February 2011 on schedule.**
7. **Grand Opening Ceremony in May 2011.**