Toda Material/Component Production Facilities

2012 DOE Vehicle Technologies Annual Merit Review
May 14-18, 2012

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Toda America Inc.

Project ID: ARRAVT017
esarravt017_han_2012_p

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Toda America Battle Creek Facility
Project Progression

Phase 1: 2,000MT/y

**STEP 1**
LNCA/LNCM Currently in operation and products are commercially available

**STEP 2**
LNCM Planned operation in 2013

Phase 2: 2,000MT/y
Completion and Operation expected by 2015
Toda North American Facilities

- Precursor (Toda Advanced Materials)
- Calcination (Toda America Inc.)

- Sarnia, Ontario
- Battle Creek, MI
## Overview

### Li-ion Cathode Materials Production Facility

<table>
<thead>
<tr>
<th>Timelines</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start: February, 2010</td>
<td>Investment timing to match with market development</td>
</tr>
<tr>
<td>Finish: 2015 Expected</td>
<td>Achieving next generation performance</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Line Operational February, 2011</td>
<td></td>
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<table>
<thead>
<tr>
<th>Budget</th>
<th>Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>$70MM+ total</td>
<td>LIB Resources/ITOCHU</td>
</tr>
<tr>
<td>50% Cost-shared with U.S. DOE ARRA grant</td>
<td>Argonne National Labs (Li-ion cathode materials license)</td>
</tr>
<tr>
<td></td>
<td>U.S. DOE/NETL</td>
</tr>
</tbody>
</table>
Company Profile

Toda America Inc.

Foundation: August, 1996
President: Tetsuo Ozaki
Shareholders: TODA Kogyo Corp 50%
           LIB Resources/ITOCHU 50%
Line of Business: Cathode Manufacturing for Lithium Ion Battery
Plant Location: 4750 W. Dickman Rd. Battle Creek, MI
Planned Capacity: Approx 4,000MT/year
Market Served: North America & Europe
## Project Milestones

In commercial production!

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Status / Target Dates</th>
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<tbody>
<tr>
<td>DOE Award Announcement</td>
<td>August 2009</td>
</tr>
<tr>
<td>DOE Award Agreement Signing</td>
<td>February 2010</td>
</tr>
<tr>
<td>Site Preparation Completed</td>
<td>March 2010</td>
</tr>
<tr>
<td>Phase 1 Construction Start</td>
<td>April 2010</td>
</tr>
<tr>
<td>Phase 1 – Step 1 Completion</td>
<td>December 2010</td>
</tr>
<tr>
<td>Production Validation Step 1</td>
<td>February 2011</td>
</tr>
<tr>
<td>Phase 1 – Step 2 Completion</td>
<td>June 2013</td>
</tr>
<tr>
<td>Phase 2 Construction Start</td>
<td>2013/2014</td>
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<tr>
<td>Phase 2 Completion</td>
<td>2015 expected</td>
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</tbody>
</table>

ISO 9001 Certified
Application of Toda Products

Windpower

HEV, PHEV, BEV

NiMeH Consumer

Power Tool

Smart Grid

Mobile
Toda Cathode Material Solutions

TODA Commercial:
- LNCA, Li-rich LNCM and LMO

TODA Development:
- LMNC (Li$_2$MO$_3$-LMO$_2$ composite material),
- LNM(Sp) and Olivine compounds

<table>
<thead>
<tr>
<th>Cathode Material</th>
<th>LFPO</th>
<th>LMFP</th>
<th>LCO</th>
<th>LMO</th>
<th>LNCA</th>
<th>LNCM</th>
<th>LMNC</th>
<th>LNM</th>
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<tbody>
<tr>
<td>Anode</td>
<td>Li metal</td>
<td>Li metal</td>
<td></td>
<td></td>
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<tr>
<td>Electrolyte</td>
<td>LiPF$_6$</td>
<td>LiPF$_6$</td>
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<tr>
<td>Solvent</td>
<td>30EC+70DEC</td>
<td>33EC+67DMC</td>
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<td></td>
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<tr>
<td>Cut-off voltage</td>
<td>2.0-4.3</td>
<td>2.0-4.5</td>
<td>3.0-4.3</td>
<td>2.0-4.6</td>
<td>3.0-5.0</td>
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<tr>
<td>C-rate</td>
<td>0.05</td>
<td>0.1</td>
<td>0.1</td>
<td>0.07</td>
<td>0.1</td>
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</table>
Technical Platform for Particle Design

Products
Solution for customers and applications

Dry Synthesis
Creation of functional particles
ex.) LiCoO₂, Li(NiCoAl)O₂, Li(NiMnCo)O₂, LiMn₂O₄, LiFePO₄

Wet Synthesis
Creation of precursor particles from ionic solution
ex.) Co₃O₄, NiMnCo(OH)₂, NiCoAl(OH)₂, Mn₃O₄, Fe-compounds

Design of Particles
- Type
- Shape
- Size
- Surface
- Distribution
TODA America Advantages

- Broad range of products
- Advanced technologies with ARGONNE License
- North American Supply Chain
- New and State-of-the-art facility (ISO 9001)
- Local support and quick response to the customer’s needs
- R&D Capability back up by Toda Japan
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 completed in 2011, Step-2 completion planned in 2013; and Phase 2 full completion expected by 2015 depending on demand
5. Products produced in Battle Creek Plant:
   • LiNiCoAlO2
   • LiNiCoMnO2
6. Phase 1 construction and Line 1 Commissioning completed in February 2011 on schedule.
8. Commercial shipments to customers underway!