“Reshaping Portable Power”

10th Annual Nanobusiness/Nanomanufacturing Summit

September 27, 2011
Overview of Contour Energy Systems, Inc

- Spinout from Caltech with focus on Advanced Primary and Rechargeable Batteries
- Founded in June, 2007
- Two facilities:
  - Azusa, CA: HQ, cell manufacturing and R&D
  - Yuma, AZ: Electrode manufacturing
- Raised $50M (Series A, B and C)
  - CMEA, USVP, Harris and Harris, Schlumberger, and EDBI
- Growing rapidly
  - 42 employees (up from 17 a year ago)
  - Doubled manufacturing and R&D space
- First Products
  - Coin cell for 3D glasses
  - Developing World’s Longest Lasting D cell and 9 Volt battery
Blue Chip Technology Partners and Investors

California Institute of Technology

CMEA Capital

USVP

H&H

Schlumberger

edbi
## Contour’s World Class Founders and Management

### Founders

<table>
<thead>
<tr>
<th>Founder Name</th>
<th>Title</th>
<th>Experience Details</th>
</tr>
</thead>
</table>
| Dr. Robert Grubbs            | Founder and Director         | • 2005 Nobel Laureate  
• Professor of Chem., Caltech  
• Founder of several successful high tech companies |
| Dr. Andre Hamwi              | Founder                      | • Professor at Univ Blaise-Pascal  
• 30+ years electrochemistry experience  
• World-renowned expert in fluorine chemistry |

### Management

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Experience Details</th>
</tr>
</thead>
</table>
| T. Joseph Fisher  | CEO                    | • 30+ years battery experience  
• Extensive domestic and international management experience with Energizer |
| Dr. L.C. Chiu     | COO                     | • 25+ years experience in operations and scaling manufacturing  
• Former HP executive as well as a successful start up sold to JDS Uniphase |
| Dr. Simon Jones   | VP, Technology          | • 10+ years R&D experience  
• 30+ publications in emerging technologies (electrochemistry, electrolytes, nanotechnology) |
| Joe Carcone       | VP, Sales and Marketing| • 30+ years battery experience  
• Proven track record with Sanyo, General Electric and Powergenix |
| Lee Sailor        | VP, Finance             | • 20 years financial + operations experience  
• Proven executive with start up and mid size cos. |
Key Facts

- Successfully transitioning from a small start up to a fast moving, results oriented advanced technology and manufacturing company.....

  - Currently 42 employees, up from 17 one year ago
  
  - Five (5) Joint Development Agreements with 2 Global Strategics, leading to sales in 2012 and ramping up significantly in 2013
  
  - 43 patents and pending patent applications
  
  - Doubled Manufacturing and Lab space in last 6 months.
Key Technology Portfolio Strategies

• Develop and Commercialize our Proprietary Lithium CFX\textsuperscript{tm} Primary Batteries

• Develop and Commercialize our Next Generation Proprietary Rechargeable Batteries
Contour’s Primary Products Address a $1.5B Lithium Primary Market

Source: Frost & Sullivan and CFX Estimates

<table>
<thead>
<tr>
<th>Sector</th>
<th>Sales ($M)</th>
<th>Growth (%)</th>
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<tbody>
<tr>
<td>Portable Electronics</td>
<td>$475.1</td>
<td>7.3%</td>
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<tr>
<td>Military</td>
<td>$299.5</td>
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<tr>
<td>Industrial</td>
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<tr>
<td>Auto</td>
<td>$80.9</td>
<td>9.4%</td>
</tr>
<tr>
<td>Other</td>
<td>$268.5</td>
<td>9.2%</td>
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</table>
Contour Energy’s Fluorine Based Systems Deliver Superior Results Across the Board

1. Improved practical energy density
2. Increased power density
3. Improved low and high temp performance
4. Improved costs
Contour's Innovations Combine Nanomaterials with Proprietary Fluorination Conditions

- Carbon nanotubes and nanofibers with core-shell structures

- Graphitic materials with $sp^2$-nanodomains

$sp^3$ vs $sp^2$

$sp^2$ = weaker C-F bond, more conductive

Weaker C-F Bond + More Conductive = Higher Power
Contour’s Technology Demonstrates Superior Performance Across Various Discharge Rates

Tested on 2016 coin cell to 2V

Discharge Rate

- 10mA
- 4mA
- 1mA

mAh

- CFX Battery Cell
- Commercial LiMnO2
- Commercial CF1 Cell

Up to 8x Performance
Contour Energy’s Fluorine Based Systems Deliver Superior Results Across the Board: Power

Comparison with nanofibers

Powder material (independent testing)
Engaged with multiple OEMs and Organizations
Why *Contour* Fluorinetic™ Primaries ???

- Superior Runtime - Up to 8X Longer vs. existing products
- Superior Rate Capability – Due to Proprietary Cathode
- Superior Temperature Performance - -60C to 220C
- Superior Shelf Life – Up to 15 Years
- Environmentally Friendly - No heavy metals or toxic elements

Sales Ramp to $35mm by end of 2013 growing to over $100mm by 2015.
Key Technology Portfolio Strategies

• Develop and Commercialize Lithium CFx Primary Batteries

• Develop and Commercialize Next Generation Rechargeable Batteries
The Rechargeable Lithium market is large, with upside of the auto & smart grid sectors.

Source: ITT, March 2010

CAGR 20.3%

Source: Contour Energy Systems
Contour is working on all the key battery components

- **Advanced Lithium Ion Batteries**
  - Novel Anodes – Carbon Fiber Composites, Silicon
  - Novel Cathodes – Both Energy and Power
  - Novel Electrolytes – Liquid, Solid State and Ionic
  - Novel Separators – Improved safety, performance and lower cost
Contour is working on all the key battery components

- **Advanced Lithium Ion Batteries**
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We will focus this am on our exclusively licensed MIT “High Power Cathode”
Layer-by-Layer Nanotechnology for High-Power Rechargeable Batteries

Rapid Generation of Dense Nanotube Array
Advantages Of LbL Hybrid Cells

- Higher Packaged Gravimetric Energy Densities At Higher Gravimetric Power Relative To Li-ion Batteries
- Much Higher Gravimetric Energy Densities At Comparable Gravimetric Power To Electrochemical Capacitors
- No Binder Or Additives
  - All electrode material is active
- Excellent Cycle Life
  - Stable surface redox reactions
- Applicable To Many Substrates
  - Flexible, conformal electrodes
  - Thin-film cells
  - Larger cells under development
  - CFx Primary and Advanced Rechargeable

Nanotube Electrode Combines High Energy of a Battery with High Power of a Capacitor
Our Next Generation Rechargeable Batteries

- **Advanced Lithium Ion Batteries**
  - Novel Anodes – Carbon Fiber Composites, Silicon
  - Novel Cathodes – Both Energy and Power
  - Novel Electrolytes – Liquid, Solid State and Ionic
  - Novel Separators – Improved safety, performance and lower cost

- **Next Generation Rechargeable Batteries**
  - Improved Safety – No Lithium
  - Higher Voltage and Broader Temperature Range
  - Superior Performance – Gravimetric and Volumetric
Contour has identified a new, lithium-free high energy storage device

**FIB Concept:**

Anode: \( M + n \, F^- \rightarrow MF_n + n \, e^- \)

Cathode: \( M'^m + m \, e^- \rightarrow M' + m \, F^- \)

Or \( CF_x + y \, e^- \rightarrow CF_{x-y} + y \, F^- \)

**Related to LIB concept:**

Anode: \( LiC_6 \rightarrow 6 \, C + Li^+ + e^- \)

Cathode: \( Li_{1-x}MO_2 + x \, e^- + x \, Li^+ \rightarrow LiMO_2 \)
Potential Advantages of Fluoride-Based Redox Systems

- Fluorine is highly electronegative
  - Large $\Delta G$ between redox states e.g. $\text{MF}_3/\text{MF}$

- Redox processes can be multi-electron, metal-based
  - Increases energy density of system, monovalent anion migration

- Fluoride is “smallest” anion (130 pm) [$\sim K^+$]
  - Good mobility, smaller reorganization energy

- Impressive theoretical gravimetric and volumetric capacities
  - Up to 2600 Wh/kg, 5000 Wh/L

- Utilizes abundant, cheap materials
  - No heavy metals
Why *Contour* Advanced Rechargeables???

First, our new MIT Power Cathode will be ready for launch in 2013 featuring....

- **Up to 10X more power** than existing cathodes
  - Ideal for Hybrid Electric Vehicles, PHEV’s, Medical Devices and Power Tools

Then in 2014, we commercialize our “Lithium Free” Fluorion™ Rechargeable batteries which have....

- 3X Theoretical Specific and Gravimetric Energy Densities of Lithium Ion Batteries
- No Lithium
- Higher Voltage
Conclusion – Why Contour? Why Now?

- A “Hot” sector with huge markets and upside growth
- Game Changing, Disruptive, Next Generation Battery Technologies with Strong IP and Trade secrets
- Strong and Committed Partners
- Experienced and Proven Management Team
- Track record of hitting milestones

*Contour - RESHAPING* the World of Portable Power !!!
Thank You….. Questions????

- For more information, contact Joe Fisher at…

joe.fisher@contourenergy.com or (626) 610-0660

- Or go to our web at:

- www.contourenergy.com