Air Products Research Alliance

with

University of California, Santa Barbara

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Venture Development Manager

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Who is Air Products?
Fast Facts

- Global $8BN gases, chemicals, equipment and services provider
- Serving technology, energy, healthcare and industrial markets
- Fortune 500 company
- Chemical industry safety leader
- Operations in more than 30 countries
- ~20,000 employees worldwide
- Known for our innovative culture and operational excellence
- 66 years old
Focused on Four Growth Markets

**Gases**
- EPI 28%
- Energy 20%
- Healthcare 12%
- Other 37%

**Chemicals**
- Advanced/Performance Materials 30%
- Paints & Coatings 18%
- Agricultural/Chem. Int. 20%
- Construction 9%
- Other 15%
- Auto/Aero/Appliance 7%
- Furniture 20%
- Adhesives & Sealants 11%

*Indicates R&D intensive areas*
Air Products has been Delivering the Difference in Growth Areas for 6 years

Growth businesses equal 30% of sales in FY’99;
50% of sales in FY’04  
67% increase over 5 years

60% of sales in FY’05  
100% increase over 6 years
Performance Materials: Launching 3 New Business Platforms

<table>
<thead>
<tr>
<th>Platforms</th>
<th>Offerings</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Solutions</td>
<td>Wetting agents, Defoamers and Grind aids</td>
<td>Aqueous Systems</td>
</tr>
<tr>
<td>Performance Products</td>
<td>Amine-based additives and Catalysts</td>
<td>Urethane and Epoxy systems</td>
</tr>
<tr>
<td>Personal Care</td>
<td>Acrylic polymers, PU dispersions</td>
<td>Hair and Skin-care</td>
</tr>
<tr>
<td>Energy Materials</td>
<td>Lithium battery electrolyte salts</td>
<td>Lithium battery electrolytes</td>
</tr>
<tr>
<td>Electronic Materials</td>
<td>Conductive Polymer Hole Injection Layer</td>
<td>Conductive Inks</td>
</tr>
<tr>
<td>Functional Coatings</td>
<td>Nanoparticle Dispersions</td>
<td>Aqueous, Solvent, Urethane, Epoxy…</td>
</tr>
</tbody>
</table>

PM Today

Advanced Materials
Focus of Advanced Materials is to apply new technologies

- Bring new capabilities to our customers
- Create new products with step-change performance improvement
- Create new businesses in adjacent markets
- Use strategic partnerships to access new technologies and shorten development time
- Leveraging Key Technical Competencies:
  - Materials & Surface Sciences
  - Fluorine Chemistry
  - High Purity Systems
  - Applications Technology Understanding
  - Theoretical Modeling
Where does R&D and Innovation fit in all of this?
Global R&D Capabilities

-～$120 million per year pure R&D spending
  - ~3/4 of spending is on our 4 growth platforms
  - Excludes engineering development spend
- 700+ employees world wide; 200+ PhD
- 2600 patent families issued since 1971
  - 100 new patents/year
- Chemical Industry Safety Leader
- Several university alliances
Partnerships Leverage In-House Capabilities

- In-House Capabilities: technology, marketing, business -- plus...
  - University Partnerships
  - Government Contracts
  - Development Partners
  - Suppliers
  - Channel Partners
  - Minority Equity and Venture

One Company Approach brings all capabilities to all businesses

20% joint or outside funding (60 university/government programs)
Corporate Technology Partnerships: Identify and Accelerate Solutions – ‘Open Innovation’

Sources
- VCs
- Partners
- Universities
- Network and Market Systems
- Research Institutes

Customer Solutions
- Electronic & Performance Materials
- Energy
- Healthcare

‘Nowhere is too far away to matter, now.’
‘Everybody makes an impact’

- James Burke. Knowledge Web: http://k-web.org/
Corporate Technology Partnerships
University Alliances

- Early access for company to new/emerging technology
- Linkages to new organizations/partners
- Leverage R&D through long-term collaborations and relationships
- Does NOT ‘outsource’ R&D in lieu of in-house R&D
- Utilizes R&D partners to accelerate commercialization
- University alliance approach pre-negotiates terms detailing future rights of parties
- Alliance approach:
  - 1. Live the partnership
  - 2. Make it real, then
  - 3. Expand opportunities
UCSB Strengths Flange with APCI Interests in Advanced Materials, Electronics

- Conductive Polymers
- Materials Science
- Personal Care
- Nanotechnology and Applications
- Electronics and Compound Semiconductor Devices
- Innovation and interdisciplinary approach
- Desire to develop long-term relationship
Add it up: UCSB and APCI are natural partners!

- UCSB has world class researchers in areas of interest to us
- UCSB produces world-class students and post-docs with leading edge experience
- UCSB’s College of Engineering Corporate Relations Program and Office of Technology and Industry Alliances were flexible in developing a strategic alliance agreement
- Global agreement has historically led to long-term relationships and faster start-up of projects
- Alliance removes agreement term barriers between researchers on both sides
- Status – alliance formalized in June, several joint discussions leading to proposals underway

We will:
- Engage people @ APCI, UCSB
- Match personalities
- Link project opportunities to APCI business priorities
Thank you
tell me more
www.airproducts.com

BEING THE BEST

COMPANY TO

INVEST IN  BUY FROM  WORK FOR
How do we serve the electronics industry?
Electronics Growth Platform
FY’05 Global Revenue ($1.3 B)

North America #1
Revenue 45%
by Region

Europe #1 10%

Asia ex-Japan #1 45%

* Electronics Technology Centers

TI
Micron
Motorola
IBM
Other

ST Micro
Infineon
Philips

Samsung
Hynix
LG Philips

TSMC
UMC
AU
Chi Mei

Sony
Sharp
Matsushita
Hitachi
NEC
Specialty Materials to support every step of the process………

Technology
- Design New Materials
- Process R&D
- Customer Applications Support
- Develop Analytical Methods
- Engineering & Pilot Plants
How do our performance materials serve a variety of industries?