CBiRC Vision

CBiRC

Biobased Feedstock → BIOCATALYSIS → CATALYSIS → Biobased Chemicals

Center for Biorenewable Chemicals
Innovation Ecosystem
Education Program

- Biobased Foundry
  - Technology-led entrepreneurship course
  - Entrepreneurship mentoring
- Student-led research grants
- Undergraduate curriculum
- REU
  - Mentoring training
- STEM Summer Institute (K-12)
  - RET
  - Middle School Teachers
  - Elementary School Teachers
  - STEM course materials
    (>2500 students/yr)
- Symbi GK-12
  - 43 DMPS classrooms
Biobased Foundry

BIIOBASED
FOUNDRY

• Entrepreneurship Course
  • Stimulating Innovations
  • Only graduate students
  • Spring semester (15 students)

• Mentoring Program
  • Organizing Innovations
  • Business savvy mentor
  • Match technology to customer need
## Startups in Biobased Foundry

<table>
<thead>
<tr>
<th>Company</th>
<th>Date &amp; Contact</th>
<th>Funding</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>GlucanBio</td>
<td>2011 - David Alonzo</td>
<td>$2.0m</td>
<td>Partnering and Pilot scale.</td>
</tr>
<tr>
<td>OmegaChea</td>
<td>2012 - Shivani Garg</td>
<td>$0.4m</td>
<td>Technology development.</td>
</tr>
<tr>
<td>GrossWen</td>
<td>2012 - Martin Gross</td>
<td>$0.5m</td>
<td>Technology development.</td>
</tr>
<tr>
<td>SusTerea</td>
<td>2013 - Jenny Lee</td>
<td>$0.2m</td>
<td>Technology development.</td>
</tr>
<tr>
<td>AccuGrain</td>
<td>2013 - Ryan Augustine</td>
<td>$0.2m</td>
<td>Technology development.</td>
</tr>
<tr>
<td>VariFAS</td>
<td>2013 - Fuyuan Jing</td>
<td>$1.0m*</td>
<td>Technology development.</td>
</tr>
<tr>
<td>Phasica</td>
<td>2013 - William Lohry</td>
<td>$0.1m</td>
<td>Technology development.</td>
</tr>
<tr>
<td>WebChemi</td>
<td>2013 - Michael Nolan</td>
<td>$0.2m</td>
<td>Consulting and First Sales.</td>
</tr>
<tr>
<td>ARTIchar</td>
<td>2013 - Berni DelCampo</td>
<td>$1.0m*</td>
<td>Consulting and First Sales.</td>
</tr>
</tbody>
</table>
Biomanufacturing in Iowa

2013 Reality: 13B$+ annually

What’s Next Iowa?

Goal: Bridge Gap between R&D and Commercial Success

The Gap in Biomanufacturing Innovation

- **Research and Development**
- **Support from Government & Universities**
- **Commercial**
- **Private Sector**

Investment

The GAP

Pre-commercial Development Scale

Accelerating and improving the scaling path requires multiple innovations to speed the advancement from lab to commercial.
Typical NNMI Structure

State and Local Governments

High Tech Start-up Companies

Large Manufacturing Companies

Multiple Manufacturing Support Centers
Technology Needs Assessment
Technology Workshops
Mfg. Technology Services

Small and medium sized manufacturers

Universities & National Labs

Faculty, Students & Graduates
Technologies, Algorithms
Funding for High Priority and R&D

Community College Manufacturing Programs

Faculty, Students & Graduates

Manufacturing Innovation Institute

Applied Research
Technology Development

Prototype Labs/Shops
Mfg. Software Development

Education and workforce development
Several other Institutes have been successfully formed (2012-2015)

America Makes (Aug. 2012)
- Youngstown, OH
- $30M federal investment for Pilot hub establishment
- 94 member consortium made of manufacturers, universities, community colleges and non-profit organizations
- Focus: 3D printing (Additive manufacturing)

Power America (Jan. 2014)
- Raleigh, NC
- 25 members who matched DOE investment of $70 million
- Focus: Wide bandgap semiconductors

Lightweight Innovations for Tomorrow (LIFT) (Feb. 2014)
- Detroit, MI
- $70M federal investment (DOD) and matched by non-federal partners
- 60 companies, universities, nonprofits and research labs in consortium.
- Focus: Lightweight technology

Digital Manufacturing and Design Innovation Institute (DMDII) (Feb. 2014)
- Chicago, IL
- $70M federal investment (DOD) and matched by non-federal partners
- 73 companies, universities, nonprofits and research labs in consortium.
- Focus: Integrated digital design and manufacturing

Institute for Advanced Composites Manufacturing Innovation (IACMI) (Jan. 2015)
- Knoxville, Tennessee
- $70M federal investment (DOE) and $190M by non-federal partners
- 144 companies, nonprofits, universities and research laboratories in coalition with DOE to create a $260 million institute.
- Focus: Advanced fiber-reinforced polymer composites

The process has been initiated for four more institutes...
Biomanufacturing Institute Status

1. Will be led from USDA NIFA office

2. Teaming agreement with the National Renewable Energy Laboratory (Colorado)

3. State (IEDA) commitment received.

4. Talking with key potential member companies.
Thank you