



The Helios Building: Science for a Sustainable Planet

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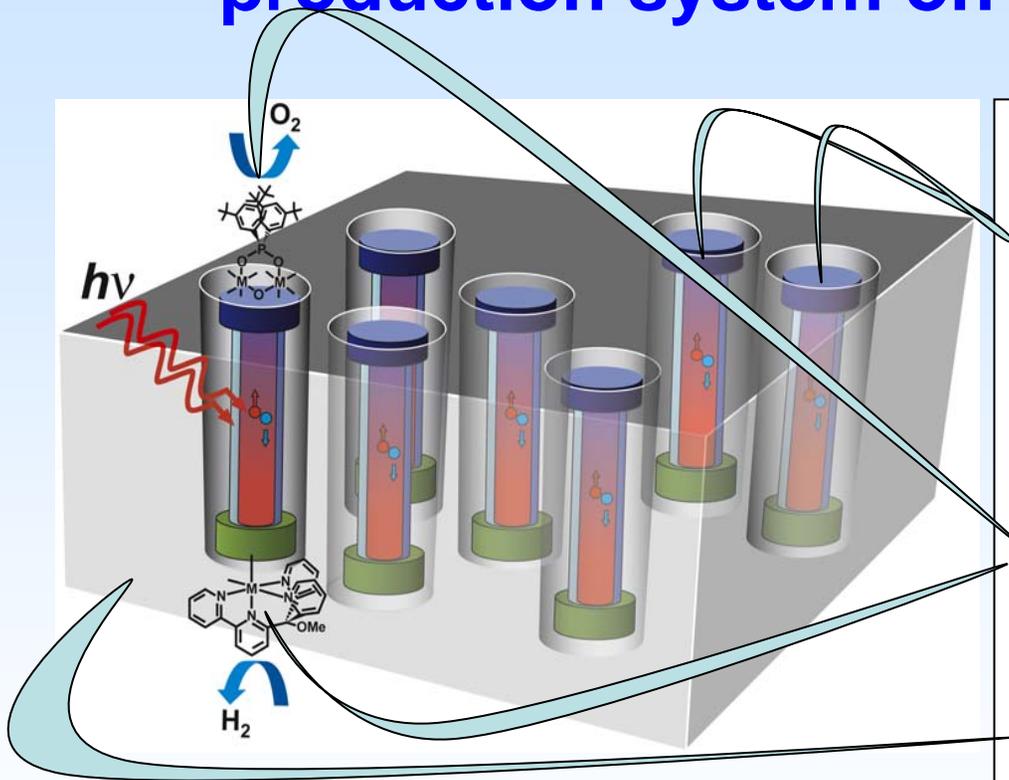
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The Helios Challenge: Carbon-Neutral Fuels from Sunlight

- Artificial methods to capture sunlight and create solar fuels from water and carbon dioxide
- Requires no arable land
- Uses nanomaterials and photosynthetic approaches

SERC Goal: An integrated solar fuel production system on a single platform



In the Helios Building

- Nano-photovoltaics synthesis, analytical instruments, and microscopes
- Catalyst development laboratory
- Membrane synthesis laboratories

A nano-photovoltaic is a tiny solar cell-- 0.0001 mm long!



The problem:

We need to meet the world's increasing demand for energy while simultaneously reducing the trend of global warming.

The solution:

Develop environmentally sound and sustainable alternative energy sources.



Some facts:

- The total amount of energy humans use annually is delivered to the earth in one hour from the sun
- Biomass serves only 11% of human energy needs, 2/3 of which is gathered unsustainably
- 80-85% of our energy comes from fossil fuels
- 70% of petroleum use is for transportation



One step toward the solution:

Energy Biosciences Institute

UC Berkeley

University of Illinois

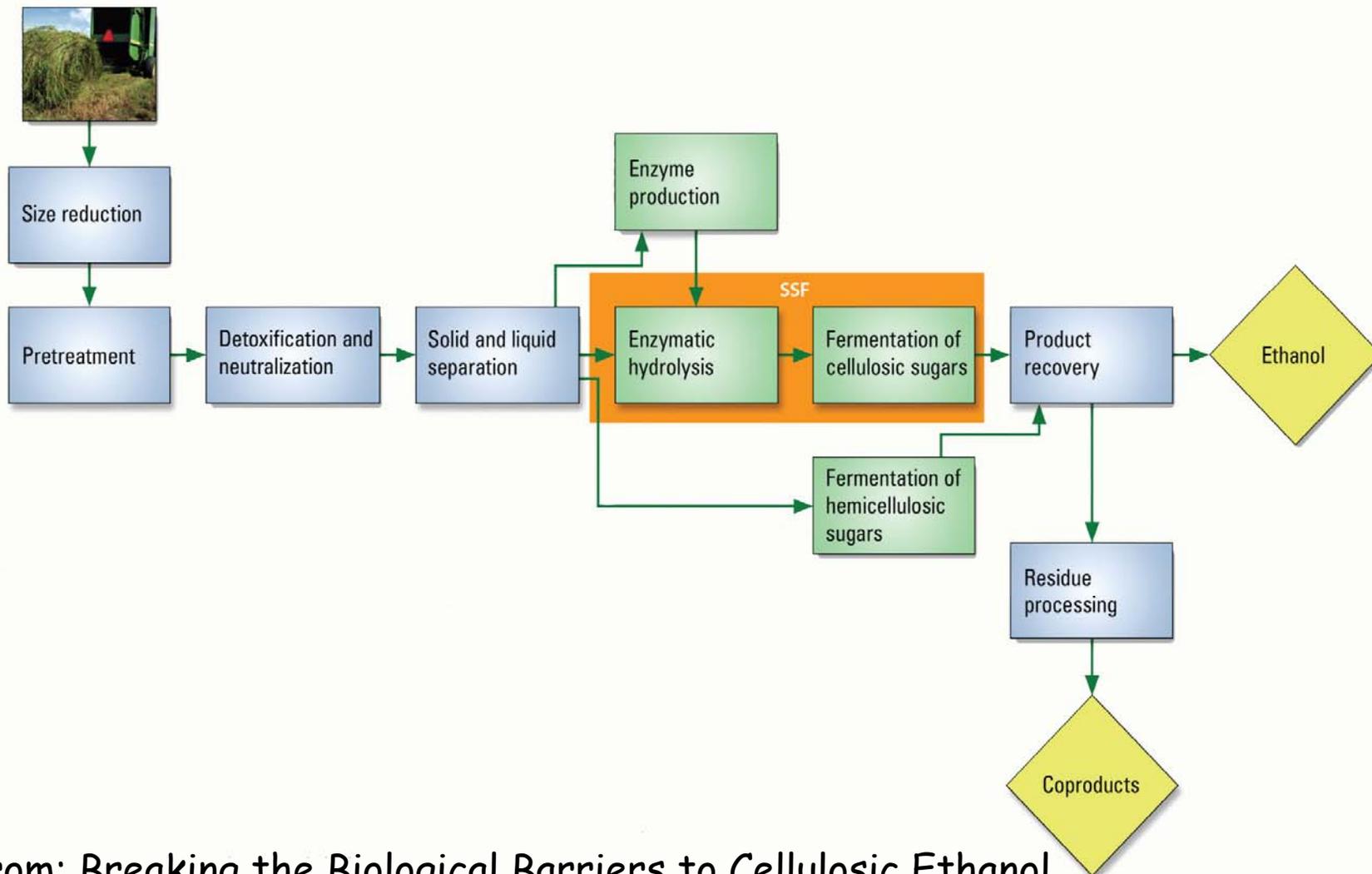
LBL



The Energy Bioscience Institute:

- Partnership between UCB, University of Illinois and LBNL
- Funded with \$500M over 10 years
- Goals include elimination of bottlenecks to biofuels, development of improved biotechnologies for fuel production, and education of scientists and engineers across the relevant disciplines

Steps in cellulosic ethanol production





Scientific Program

- **Feedstock Development**

 - Biomass Engineering

 - Lignin

 - Biotic Stress

 - Feedstock Production

 - Genetics & Plant Breeding

 - Environmental Impact & Sustainability

 - Harvesting Transport & Storage

- **Biomass Depolymerization**

- **Fossil Fuel Bioprocessing and Carbon Sequestration**

- **Biofuels Production**

- **Socio-Economic Systems**

 - Next Generation Assessment

 - Biofuels Markets and Networks

 - Social Interactions & Risks

 - Biofuels Evaluation and Adoption



EBI Broad Education Goals

- Provide BP investigators broad access to UCB, UIUC and LBL intellectual resources as visiting scholars
- Educate the next generation of energy scientists
 - Postdoctoral
 - Ph.D.
 - B.S.
- Educate the public
 - general public
 - public policy students
 - policy makers
 - K-12
- Provide extension activities targeting the greater agricultural community