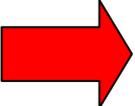
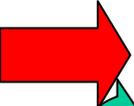


EFRI Topics for FY 2009

-  **1. BioSensing & BioActuation:
Interface of Living and
Engineering Systems (BSBA)**
-  **2. Interfaces for In-vivo Systems**
-  **3. Hydrocarbons from Biomass
(HyBi)**
-  **4. Renewable Electric Energy
Integration for a Sustainable
Environment**

BioSensing & BioActuation: Interface of Living and Engineering Systems (BSBA)

(Preliminary Ideas)

Key idea:

Develop and employ bio-derived and bio-inspired technologies for sensing and detection, monitoring, actuation and control of stimuli and the environment.

- to produce technological innovations for the hybrid integration of biosensing and bioactuation systems with embedded human-centric & bio-inspired intelligence and with auto-adaptive, self-monitoring, self-diagnostic, self-control and self-renewal capabilities.
- Understand data mining, prioritization & decision-making processes in living organisms, and emulate them to facilitate design of complex engineering systems in sensor rich environments.
- Engineering *in vivo* interfaces that provide real-time information, the ability to communicate with cells near the interface, and the means to selectively alter the interfacial conditions.

Hydrocarbons from Biomass (HyBi)

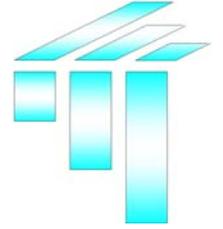
(Preliminary Ideas)



Key Idea:

Hydrocarbon biofuels such as green gasoline are an attractive alternative to ethanol; their production in a network of rural biorefineries can be accompanied by the distributed generation of electricity.

- Biology and biomass conversion: to engineer better biomass and better pathways to convert it to hydrocarbon fuels. A new paradigm in biofuels: “green gasoline”.
- Biorefinery and process design: to discover better unit operations, heat integration and co-generation strategies
- System design: to integrate small-scale resilient co-generating biorefineries with systems of distributed electricity production.



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