Challenges in Biological Fuel Production from Cyanobacteria

- Engineering bioreactors that have low energy consumption (pump and flow designs, temperature stability, etc.), low construction costs (materials!), low maintenance costs (materials!) at LARGE scale
- Engineering cyanobacteria that produce large quantities of fuel over a broad range of conditions (temperatures, nitrogen, sulfur, etc.)
- Distribution of CO_2 and nutrients over the farm
- Energy efficiency and infrastructure costs for downstream processing (cracking bugs, extracting lipids, processing to diesel)

Challenges for Electrical Generation of Fuel

- Water splitting catalysts (efficiency, cost, current density and durability)
- Catalysts for fuel reduction (particularly carbon based fuel)
- Hybrid schemes (using some grid power and with a potential boost from light)

Challenges for Direct Solar to Fuel in Mimetic/Chemical Systems

- Getting holes and electrons efficiently separated
- Catalysts that are integrated into the potential generating systems
- Current densities