Optical Density Sensor

ABOUT SOLIX

- Founded 2006
- Privately funded
- 35 full time employees
- Intellectual property business model
- Second largest producer of algae

• Algae makeup
  - Lipids 30-50%
  - Chemically: Biodiesel
  - Thermally: Green diesel

• Chemicals: Biodiesel
• Ethanol
• Methane gas
• Animal feed

CULTIVATION

- Solix uses a closed pond system
- More expensive
- Fewer contaminants
  - Allowing for a more controlled environment

CURRENT OPTEK MODEL

- Optek sensor
  - Accurate
  - Expensive

CURRENT OPTEK MODEL

- Optical path length
- Sapphire window
- Detector
- Daylight filter
- LED light source

EARLY CIRCUIT WORK

CIRCUIT #1
- Web design
- Low sensitivity
- No light filterings

CIRCUIT #2
- Very simple
- Too high irradiance
- Varied input voltage
- Output range too small
- Operating at 950 nm

CIRCUIT #3
- Neutral density filter
- Sensor alignment inaccurate

PROTOTYPE 1

- Low light sensitivity
- Good irradiance
- Testing proved results consistent

PROTOTYPE 2

- Allowed for underwater testing
- Need of a neutral density filter
- Sensor alignment inaccurate

PROTOTYPE 3

- Independent meter
- Sun visor
- Tight sensor alignment

LENS MOUNTING

EMITTER

1. Plastic mounting
2. O-ring
3. Sapphire lens
4. 800 nm cut-off
5. Foam mounting

RESEARCH

- When taking measurements below 700 nm
  you risk having chlorophyll give you inaccurate data

- Optimally wanted 750 nm for accuracy
  comparison with biologists

- Operating at higher wavelengths can give
  very little change in the output voltage

FILTERS VISIBLE LIGHT BETWEEN 400 – 700 nm

SCALABLE OUTPUT METER

- Take in 0-10 V or 4-20 mA
- Scalable output
- Non-linear information
- Data lookup table

- Working on data points for voltage vs. grams per liter (G/L)