With the increasing demand for renewable energy resources, photovoltaic (PV) technologies are being rapidly developed. These technologies include methods of generating electrical power by converting solar radiation into usable energy, commonly using solar panels. However, to generate enough energy to meet the world’s electricity demands, it may be required that PV solar farms are installed in agricultural and desert areas, competing with food production, crops for biofuels, and/or the conservation of desert ecosystems. High efficiency solar cells may help with the land-use issues, but they are hard to manufacture at low costs.

This study proposes the solution of enabling wide scale development of low cost photovoltaic cell technology that can coexist on land used for algal biofuel. To do this, we compared the growth (optical density and chlorophyll a extraction per cell) and photosynthetic behavior (O$_2$ production) of different types of algae by exposing them to increasing intensities of light filtered through pink waveshifting photovoltaic (WSPV) polymer sheets. The sheets selectively absorb wavelengths between 400 and 600nm, allowing wavelengths above 600 to pass through. We will see how green algae grow under these conditions, and ultimately collect the unused light and convert it into electricity by the low cost polymer sheets.

**Methods**

Species of algae studied:
- *Chlorella vulgaris*
- *Spirulina platensis*

**Part One**

- A 50ml triplicate of each specimen will be grown in:
  - Sunlight filtered by pink photovoltaic polymer sheets
  - Regular sunlight
- As these specimens are particularly light and heat sensitive, the light will be decreased using neutral density screens and they will be grown in a cool water bath.
- The optical density and chlorophyll a will be measured daily.

**Part Two**

Photosynthetic activity of the two specimens will be monitored from darkness to 100% of white/sunlight and pink filtered light.
- The different light intensities will be determined by a combination of different neutral density screens and filters.
- Temperature will be kept at 26ºC and the samples will be constantly mixed to ensure proper O$_2$ detection in the overall sample.

**Data**

**Part One**

Optical Density Over Time of Cultures Grown Under Pink Filtered Light vs. White Light

Chlorophyll Production in *Chlorella* Grown in Pink Filtered Light vs. White Light

Chlorophyll production per cell appears lower when the culture is grown in the filtered light.

**Conclusion**

The small differences in cell and chlorophyll production in *chlorella vulgaris* grown under sunlight filtered through pink WSPV polymer sheets and regular sunlight is a good indicator that it may be very possible to combine this photovoltaic technology with algae biofuel farms. The photosynthesis/irradiance curves show that the two species of algae studied so far produce oxygen optimally at about 15% of sunlight. This may allow for the rest of the sunlight to be collected and converted into electricity. Many other species of algae, including ones that may have high biofuel yield, will be observed in continuation of this study.