

## Dye Sensitized Solar Cell (DSSC) LAB for ENG 230

This lab consists of 2 parts –

1. The final assembly of a Solar cell
2. Measurement of the power transfer characteristics with and without radiation

Part 1 – essentially the same as taught by Lawrence H of S

Parts will be prepared, and the students will do final assembly. This gives the students the experience of assembling a device, rather than just a circuit. It introduces them to a transparent conductor (Indium tin oxide).

The theory lecture will be given after the assembly, while the cells are “maturing”.

Part 2

A. Each team (2 students) will connect their cell to a variable resistor load, and measure the voltage output vs the current, using voltmeters and ammeters.

The power vs. current and power vs voltage will be plotted using excel.

If there is time, this will be done for 2 levels of radiation of white light to simulate the sun.

The key for engineering design is the maximum power point. This introduces students to the real world of non-linear devices, versus the linear internal resistance used in modeling voltage sources.

B The team will now apply the output of the cell to a voltage source, without radiation. Current drain into the cell will be measured against voltage applied.

If this drain is small, then the device can charge a battery or capacitor when illuminated, and most of the charge will be available to the load when there is no radiation. If the drain is large, then a diode (or switch) needs to be interposed, and this changes the design of the circuit.

C. Teams will join to put their devices in series and parallel to power a 1.2v light bulb.