Solar energy is the earth's most abundant energy resource. Despite the fact that solar energy supplied 0.85% of worldwide energy needs in 2013, global incentives are driving the solar energy development exponentially, allowing for a far higher solar energy contribution in the near future. Most of the solar technologies available today either offer high efficiency at a high cost, or low efficiency at a low cost. Micro-inverters are now being used rather than less efficient centralized inverters. Photovoltaic systems can further be made more affordable by implementing Zinc Oxide (ZnO) transistors and Thin Film Transistor Technology (TFT) to make solar PV systems more attractive to consumers and the renewable energy of choice.

Goal

Design a low cost and less complex DC to DC converter circuit by:

- Using TFT technology with ZnO Transistors
- Implementing MPPT Algorithm to achieve maximum DC output

Technology

Our design is a microprocessor controlled DC-DC step up converter used by on-glass solar cell

Challenges

- Use the specific devices from Lab
- Trade off design principle: less complex and more reliable function
- Limitation from Microelectronic Processing

Results

The full circuit have several parts, including Solar Simulator, Two-stage Converter, Current Sensor and Pulse Width Modulator.

When the microprocessor is attached to the circuit it will output a PWM signal which will allow the output power to be boosted like we intended. Also the Duty Cycle of the PWM signal will sweep between its upper and lower limits in order to find where the maximum value is. So the whole system does have the function of applying stable voltage output put, and it shows that the whole circuit can be built with the ZnO TFTs and Diode.

References