

**Chemical Engineering Program**

# Thesis Defense

## Electrical output evaluation of a concentrated photovoltaic system coupled with a phase change material for Qatar weather conditions

**Ahmed Abbas**

**October 5, 1:00 – 2:00pm**

**LH 144**

Solar energy is a renewable energy resource and presents a ripe opportunity to meet international goals of reducing fossil fuel use and combating global warming, such as pledges made in the Paris Agreement. However solar energy has yet to make large market proliferation, accounting only for 1% of total electricity generation around the world. Technologies to harvest solar energy include Photovoltaic (PV) arrays.

Concentrator Photovoltaics (CPV) which uses concentrators (e.g. parabolic mirrors) to focus sunlight onto a smaller cell area provide a way to increase electrical conversion efficiency while using less of the expensive PV cell material.

A disadvantage of using CPV systems is the increase in cell temperature due to concentration of sunlight, which leads to reduced electrical output. Phase change materials (PCM) can passively cool a CPV cell by absorbing heat through phase change, while maintaining a near constant temperature in the process, all while keeping the system relatively simple and modular. The objective of this thesis is the development of a modified electrical model, to be coupled with a previously developed thermal-optical model, to predict the power output and temperature profile of a Concentrator Photovoltaic-Phase Change Material (CPV-PCM) system. A case study using the model is made using Qatar weather conditions, to predict power output and temperature profile of a CPV-PCM system and compare with a flat-plate PV system.



**Ahmed Abbas**

Ahmed Abbas is a graduate student pursuing a Master of Science Degree in Chemical Engineering at Texas A&M University at Qatar (TAMUQ). He received his B.Sc. in Electrical Engineering from TAMUQ in 2014.

Currently, he is doing his research on concentrated photovoltaics under the supervision of Dr. Konstantinos Kakosimos.

**FOR MORE INFORMATION:**

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