



The Department of Mechanical Engineering presents:
The Master's Dissertation Defense of:
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**Phase Change Materials for Thermal Energy Storage
in Concentrated Solar Thermal Power Plants**

By

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Experimental studies are presented that aim to utilize phase change materials (PCM's) to enhance thermal energy storage systems for concentrated solar thermal power (CSP) systems. Both laboratory scale and prototype flow loop scale experiments were conducted. Background and motivation of the system is presented followed by experimental results and experimental system design.

Laboratory experiments were performed to determine the effectiveness of various surface treatments on changing the nucleation kinetics and enhancing heat transfer in the system. Experimental data is presented to show the effectiveness of both surface finish and surface material treatments.

A large scale flow loop was designed and built to determine real heat transfer during solidification. Extensive design calculations were performed along with CAD design before the apparatus was constructed. Once the system was built, systematic testing and development led to a fully functional system ready for actual heat transfer testing.

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