Thermal regulation of photovoltaic modules using thermal energy storage units with PCMs

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Framework

High operating temperatures reduce the performance of commercial polycrystalline silicon photovoltaic (PV) devices by reducing the efficiency of solar to electrical energy conversion in the PV cells.

Major Goals

• To develop a real-scale experimental apparatus to evaluate the performance improvement of PV/PCM systems incorporating thermal energy storage (TES) units filled with free-form PCMs. The TES units are intended to control the temperature rise in the PV cells;
• To carry out an experimental parametric study to evaluate the influence of different configurations of the TES unit (horizontally and vertically oriented cavities) and the impact of different phase-change temperature ranges of the PCM – the PCMs RT22HC, RT25HC and RT28HC from RUBITHERM® will be used;
• To provide reliable experimental results for numerical validation purposes.

Experimental Apparatus

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