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Analysis of a Concentrated Solar Thermophotovoltaic System with Thermal Energy Storage HAMID REZA SEYF, ASEGUN HENRY, Georgia Institute of Technology — We analyzed a high temperature concentrated solar thermophotovoltaic (TPV) system with thermal energy storage (TES), which is enabled by the potential usage of liquid metal as a high temperature heat transfer fluid. The system concept combines the great advantages of TES with the potential for low cost and high performance derived from photovoltaic cells fabricated on reusable substrates, with a high reflectivity back reflector for photon recycling. The TES makes the electricity produced dispatchable, and thus the system studied should be compared to technologies such as concentrated solar power (CSP) with TES (e.g., using a turbine) or PV with electrochemical batteries, instead of direct and intermittent electricity generation from flat plate PV alone. Thus, the addition of TES places the system in a different class than has previously been considered and based on the model results, appears worthy of increased attention. The system level analysis presented identifies important cell level parameters that have the greatest impact on the overall system performance, and as a result can help to set the priorities for future TPV cell development.

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