A New Thermophotovoltaic Record

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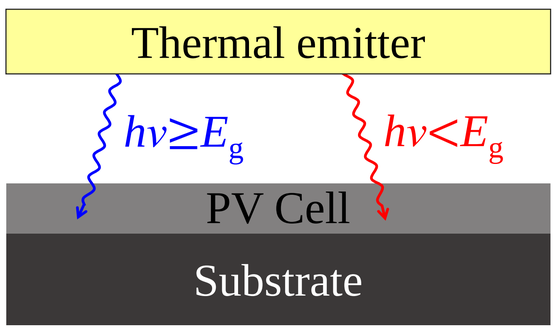
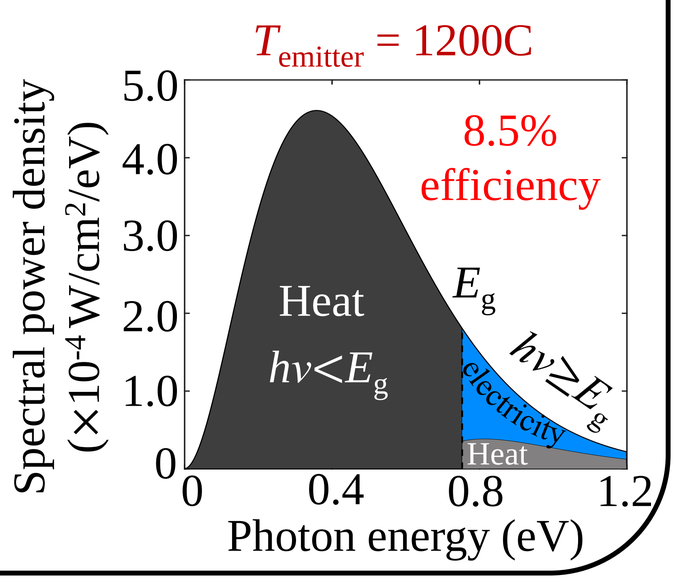
What is Thermophotovoltaics?

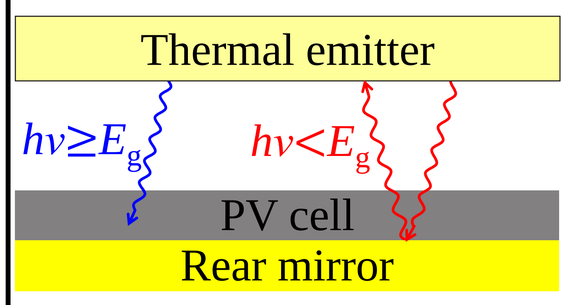
$$\text{Efficiency} = \frac{P_{\text{electrical}}}{P_{\text{emitted}}} \times 100$$

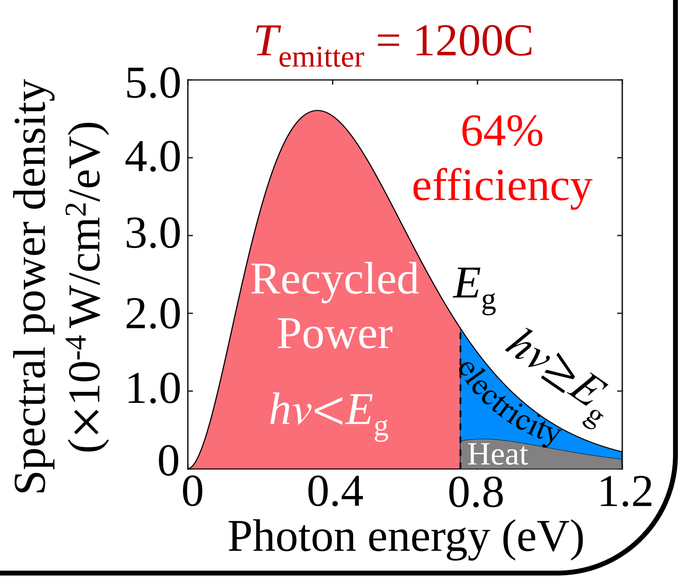




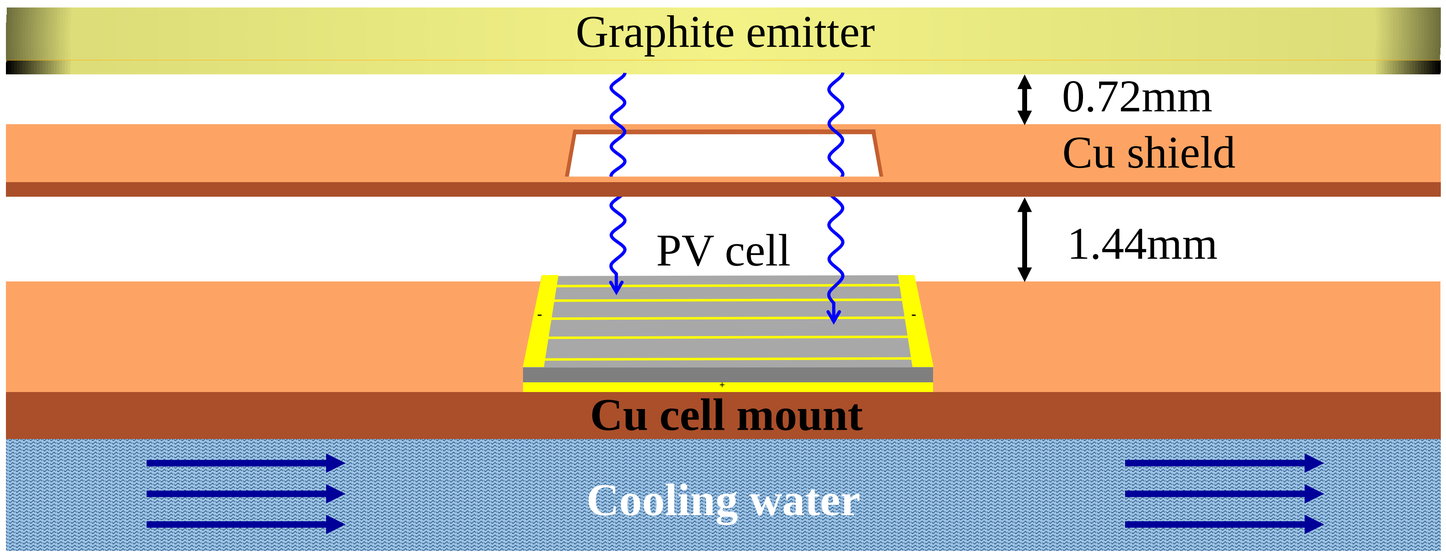
Band-Edge Spectral Filtering

$$\frac{P_{\text{electrical}}}{P_{\text{emitted}} - P_{\text{reflected}}} \times 100$$

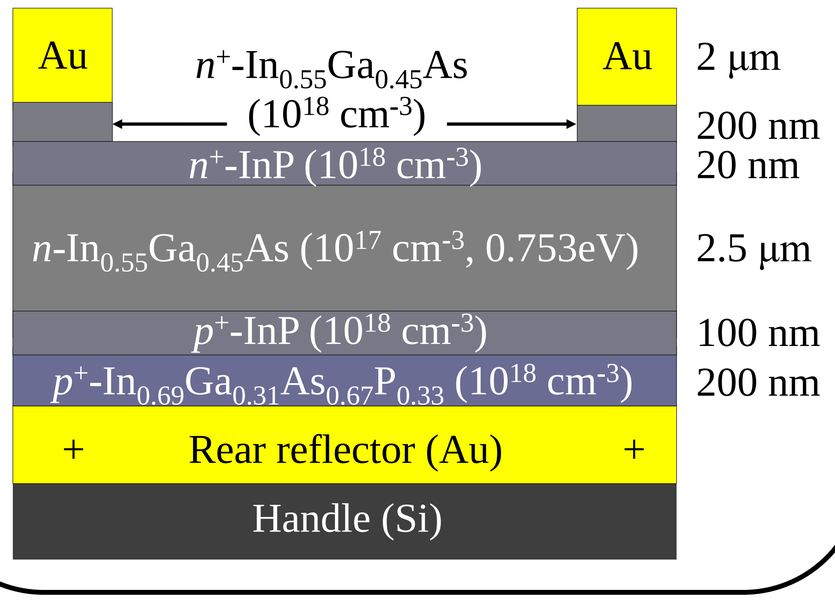




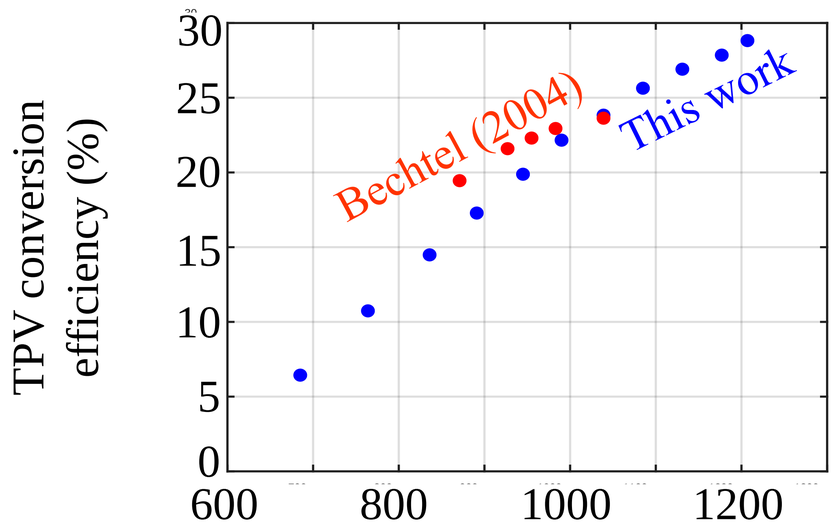
Experimental Setup



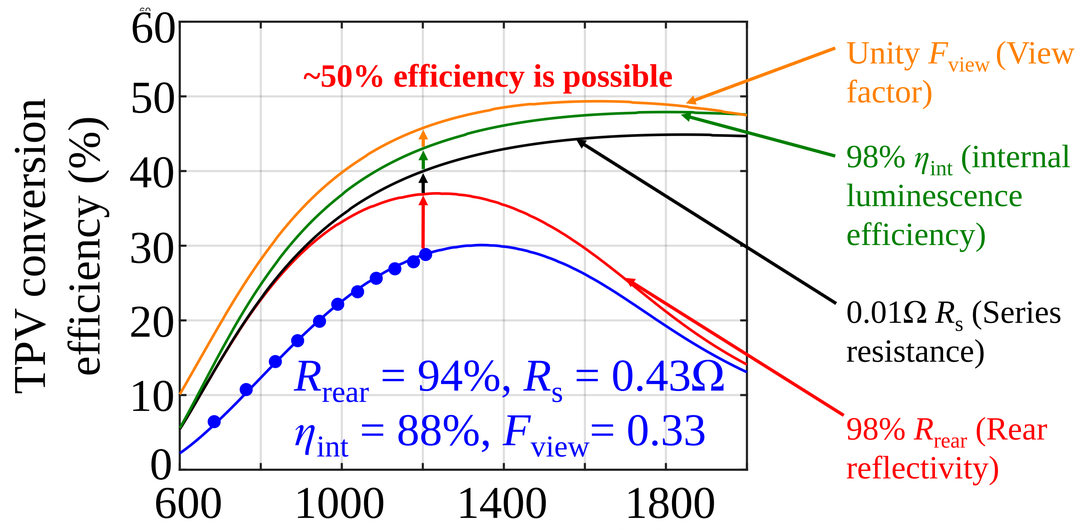
Device Structure



A New TPV Efficiency Record



Projected TPV Efficiency



Conclusion

- Photon re-use is necessary for high efficiency thermophotovoltaics.
- Band-edge of the photovoltaic cell can be used as the needed spectral filter, with a highly reflective rear mirror.
- Record 28.8±0.3% power conversion efficiency has been demonstrated.

Z. Omair et. al., “Pushing the limits of thermophotovoltaics”, *Proceedings of 4th World Conference Photovoltaic Energy Conversion*, 2018.

This work was supported by the DOE ‘Light-Material Interactions in Energy Conversion’ Energy Frontier Research Center under grant DE-SC0001293.