

Abstract Submitted  
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**Improved electrical response of photovoltaic devices by photonic structuring** JEREMY MUNDAY, University of Maryland — We describe the use of dispersion engineered photonic materials to develop a new photovoltaic technology that can achieve much higher efficiencies than traditional devices through the modification of spontaneous emission. The limiting efficiency of photovoltaic energy conversion was determined by Shockley and Queisser using the theory of detailed balance, which described the balance between absorption and emission of photons. However, when the solar cell is formed from a photonic crystal or a similar material is placed on top of a solar cell, both the absorption and emission of photons is modified, a fact not considered in the original formalism. Here we show that photonic crystal structuring can improve the cell efficiency by either effectively modifying the semiconductor bandgap energy or reducing the spontaneous emission within the device, leading to higher carrier concentrations and hence higher open circuit voltages.

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