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Using Multijunction Solar Cell Designs to Achieve High Efficiency

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Achieving high-efficiency requires minimizing the absorption and carrier-thermalization losses in solar cells. Multijunction solar cells do this by using multiple materials and matching their band gaps with the corresponding portions of the solar spectrum. The p-n junctions formed from each material must be near-perfect so as to avoid non-radiative recombination. The efficiency can be further increased by concentrating the incident light, which increases the generation rate of electron-hole pairs per semiconductor volume. Mirrors or lenses can concentrate the light onto a small area or light trapping can be used to concentrate the light into a thinner layer. The talk will describe the physics of how the different aspects of the design of multijunction cells contribute to achieving high efficiency. This abstract is subject to government rights.