

Space Photovoltaics – Current State of the Art and Emerging Technologies

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Abstract:

The first application of photovoltaics was for providing power to satellites. Today's terrestrial solar cells would not be possible without the research conducted in the interest of spacecraft power. As spacecrafts grew in size and complexity, so did their power requirements; creating the need to develop lighter and more efficient solar cells. The state-of-the-art in solar cell technology represents over 50 years of research and improvements to provide effective, reliable, and affordable power in space. A variety of materials are particularly qualified for space solar cells including silicon, various III-V materials, and thin film devices. Future space solar cells may potentially take advantage of emerging technologies utilizing quantum dots and novel manufacturing processes such as Inverted Metamorphic (IMM) devices. Continual advancements in photovoltaic technology will open the possibility for more advanced programs aimed to benefit space science as well as terrestrial renewable energy demands.