Impact of Temperature on Degradation Rates in Solar Cells

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The study investigates the critical relationship between ambient temperature and solar cell degradation, a fundamental topic for the sustainable performance of photovoltaic systems. Solar cells are vulnerable to degradation over time, reducing the efficiency and lifespan of photovoltaic panels. Ambient temperature plays a significant role in this degradation process. Therefore, understanding how temperature affects degradation is crucial for improving energy efficiency and the durability of solar systems. The detailed analysis included data collection from photovoltaic systems in various climatic conditions and subsequent evaluation of temperature's impact. It was observed that higher temperatures are directly associated with faster degradation rates. Underlying mechanisms include increased thermal stress, mechanical strain, and accelerated undesired chemical reactions within the solar cells. The results of this study emphasize the critical importance of temperature control in maintaining efficiency and extending the lifespan of photovoltaic systems. Adequate cooling strategies, such as active or passive cooling, can help mitigate the negative impact of temperature on solar cells. Furthermore, opportunities arise for enhancing the efficiency of solar cell materials, making them more resilient to temperature fluctuations.

Keywords: photovoltaic; heat dissipation; solar cells; cooling strategies.

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