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Photovoltaic device innovation for a solar future

Author: Pierre Verlinden, et.al.

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SUMMARY

Photovoltaics (PV), also known as solar cells, are now found everywhere-in utility plants; on roofs of homes and commercial buildings; on platforms at sea; in agricultural fields; on vehicles, buildings, drones, and backpacks; and, in their longest running application, providing power in space. Continuous device innovation has led to increased efficiency and improved reliability for multiple PV technologies. Confronted with an urgent need to deploy PV at multiterawatt (TW) scale over the next two decades to mitigate greenhouse gas emissions, PV device innovation takes on new urgency and impact. This perspective reviews recent progress in device design and performance for PV technologies that are currently in commercial production at greater than 1 GW/year or enabling significant space-based power generation-Si, CdTe, CIGS, and multijunction III-V-and looks ahead to the next 5 years. We also identify

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device-related topics requiring cross-cutting research and innovation.

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