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EDITORIAL

The Continuing Emergence of Photovoltaics

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Photovoltaics (PV) continue to grow year after year in impact on global sustainable energy production. 2022 was the first year in which global installed PV capacity exceeded 1 TWdc,[1] during which 56% of global installed electricity generating capacity was from PV.[2] 2023 is expected to have yielded even more impressive progress with >400 GWdc of installed power, representing an astonishing 58% growth over 2022.[3] At the current pace, global installed PV capacity will exceed 2 TWdc by the end of 2024.[3] However, this is still significantly less than a long-term goal of ~75 TWdc global capacity projected to be needed to fully transition the world to a decarbonized energy future.[1] New PV materials and device and module designs are required to ensure this goal will be met. As stated by Dr. Nancy Haegel, the Director of the National Center for Photovoltaics at the National Renewable Energy Laboratory (NREL) and colleagues,[1] "Improved module efficiency will continue to be important to reduce both cost and space demands. The asymptotic approach to fundamental efficiency limits for single-junction Si solar cells is driving accelerated R&D of potential low-cost tandem structures, both for established (e.g., CdTe-Si) or emerging (perovskite-Si) material combinations."

Inspired by the continued progress of PV, and motivated by the challenges ahead, this latest issue of the *Journal of Photonics for Energy* features a status report on emerging photovoltaics[4] written by a community of forty-one researchers from across the globe. The report contains snapshots of a range of emerging PV technologies built upon new materials and device concepts, light management designs, and strategies for exceeding the detailed balance limit. Pathways to commercialization are also highlighted, along with topics in PV sustainability and environmental impact. The report concludes with a perspective section that summarizes the results of a survey given to all the authors regarding the future directions of the PV field. A conclusion that can be drawn from the latter section of the report is that it will be important for researchers to incorporate more and broader aspects of sustainability in their research activities and efforts in education and workforce development. In essence, the field will benefit from broadening the performance metrics by which a given technological approach is assessed to more holistically embrace sustainability and a circular-economy way of thinking.

We at JPE fully support such a philosophy and invite you to contribute your work, rooted in photonics and related science, to the journal in pursuit of this communal goal.

References

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