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Editorial

Advancements in Photovoltaic Cell and System Technologies

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Renewable energy undergoes a continuous development and improvement being driven by the growth in energy demand, the need to reduce pollution, and the increase in investment and policies at national and international levels. The photovoltaic solar energy lately became an important pillar for renewable energy to reach global and European targets in the share of renewable electricity. The first target for the energy generated by photovoltaic systems is 10% from the total European electricity production until 2020 [1], and until 2050, 60% from electricity generation has to be from photovoltaic solar energy and wind [2].

The global cumulative installed PV capacity reached over 500 GW in the end of 2018 following an exponential growth [3, 4]. In 2018, the 100 GW of a new added PV capacity has been reached for the first time; this was also the third consecutive year when PV had by far the largest new capacity addition among all energy technologies. This trend is expected to continue [3–5]. The price of the PV module is continuously decreasing, so at each doubling of the production, the price goes down by 24% [5, 6]. All of these are possible due to the common effort of the researchers, R&D centers, industry communities, and government policies.

There is ongoing interdisciplinary research on the design of advanced photovoltaic technologies and photovoltaic systems contributing to the increase in cell and module efficiency, PV system reliability and durability, maximization of solar energy harvested, and overall system yield. Furthermore, advanced PV-based configurations and hybrid systems, including PV, Solar Thermoelectric Generators (STEG), PV/T, and concentrated or conventional PV systems, integrated with STEG, STC, and energy storage can lead to an increase in the electrical and thermal energy generated and in system lifetime.

This special issue includes articles within the scope of advancements in photovoltaic cell and system technologies. These range from articles addressing the increase in photovoltaic cell efficiency through advancements in their structure or composition and enhancements in photovoltaic module performance targeting the decrease in photovoltaic cell temperature by passive cooling using recyclable materials or phase change materials. Optimal solutions for a wide range of applications are presented along with concepts for enhancing the efficiency of the photovoltaic systems and the final energy yield, including among others sun-tracking systems, reflective and refractive systems, the most commonly applied cooling methods, and maximum power point tracking techniques.

Conflicts of Interest

The editors declare that they have no conflicts of interest regarding the publication of this special issue.

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