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Perovskites in the Quantum Age: Bridging Materials Science and Technologies

Getting affordable and clean energy is the 7th UN Sustainable development goal. One way of achieving this goal is to ensure that renewable energy sources like solar, wind, and thermal energy are accessible at reasonable prices to everyone. Solar energy is recognized as an effective way to deal with environmental pollution and global warming and, most importantly, make electricity accessible to everyone. Most of the photovoltaic cells were silicon-based. Discovered in the 1830's, the existence of perovskites revolutionized the world of science 180 years later. Indeed, it was only in 2010 that Tsutomu Miyasaka highlighted its potential in the photovoltaic industry. Due to their characteristics, perovskite materials have significant technical significance across various real-world applications such as solar cells, photocatalysts, light-emitting devices, energy conversion and storage, spintronic devices, gas sensing, etc... [1 - 4]. This paper includes a review of the literature summarizing the reported advancements in the properties of the perovskite type RTX₃, which are potentially important materials for technological applications, especially in solar cells, including their potential in advanced battery systems, solar cells, catalysis, and magnetic devices. Finally, the review highlights the challenges and future prospects for the development of RTX₃ materials in both fundamental research and practical applications.

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