

Development of Efficient and Stable Perovskite Solar Cells and Modules

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Abstract

Perovskite solar cells (PSC) are a new paradigm in renewable energy because of their high efficiency reaching over 25%. The perovskite solar cells' high efficiency is due to their excellent optoelectronic properties, which were optimized by various cations and anions with different ratios. Another advantage of perovskite solar cells is their simple fabrication through solution-processing methods, either in n-i-p or p-i-n configurations. However, the long-term stability drags down the commercialization of PSCs technology.

We have developed strategies to enhance the stability by

using functionalized additives and interface engineering by hydrophobic 2-Dimensional perovskite materials, preventing ion migration and protecting the perovskite absorber. As a result, the long-term stability of unencapsulated devices under one sun illumination retains >95% of their original efficiencies after 1000 h ageing. In this talk, we present layer by layer deposition of 3-Dimensional and 2-Dimensional perovskites and compositionally engineered perovskite resulting in over 24% certified power conversion efficiency under one sun. Notably, a record efficiency of 22% for the perovskite module with an active area of 26 cm² was achieved.

Biography



Prof. Md. K. Nazeeruddin
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Nazeeruddin is a Professor of Chemistry at the EPFL Sion campus, and his current research at EPFL focuses on Perovskite Solar Cells and Light-emitting diodes. He has published more than 785 peer-reviewed papers, ten book chapters, and he is the inventor/co-inventor of over 90 patents. His work's high impact has been recognized by invitations to speak at over 300 international conferences. He appeared in the ISI listing of most cited chemists and has more than 150'335 citations with an h-index of 171. He teaches the "Functional Materials" course at EPFL and Korea University. According to the Web of Science in 2016, he is the 5th most cited chemist in the world and is one of the 19 scientists identified by Thomson Reuters as the World's Most Influential Scientific Minds in 2015. He has been named Thomson Reuters "Highly Cited Researcher" from 2014 to 2021 and listed among the Top 10 researchers in the perovskite solar cell research field by the Times Higher Education. He is directing and managing several industrial, national, and European Union projects. He has been appointed as World Class University professor by Korea University and Adjunct Professor by King Abdulaziz University, Jeddah. He has been elected to the **European Academy of Sciences, Fellow of The Royal Society of Chemistry, and Fellow of Telangana Academy of Sciences** and has won the **34th Khwarizmi International Award (KIA) Laureate in Fundamental Sciences, 2021.**

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