

Perovskite LEDs: A Next-generation Light Source

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Abstract— Perovskite LEDs have emerged as a next-generation light source technology. In this talk, we discuss some of the design principles behind efficient perovskite LEDs, and approaches for exceeding the current performance limits. Despite the high efficiencies, the poor operational stability of perovskite LEDs remains a grand challenge toward commercial applications. Recently we demonstrated, for the first time, perovskite LEDs with ultralong operational lifetimes comparable with that of organic LEDs. This breakthrough was enabled by the introduction of a dipolar molecular stabilizer, which suppresses ion migration under electric fields, preventing phase transformation and decomposition of the perovskite. These results have removed the critical concern that halide perovskite devices may be intrinsically unstable, paving the path towards industrial applications.

Dawei Di is a professor at Zhejiang University. He received B.Eng. and Ph.D. (in Engineering) from the University of New South Wales (2004–2012), and a second Ph.D. (in Physics) from the Cavendish Laboratory, University of Cambridge (2012–2017). He continued his work as a postdoctoral researcher in the same laboratory at Cambridge (2017–2018) before joining Zhejiang University in 2018. Dawei Di’s research interests include the physics and application of novel optoelectronic devices, with a current focus on perovskite and organic LEDs. His group recently demonstrated, for the first time, ultra-stable perovskite LEDs, and revealed the unified physics of ultralow-voltage LED operation. As corresponding or first author, he published their findings in leading journals including *Science*, *Nature Photonics*, *Nature Electronics*, *Nature Communications* and *Joule*. Dawei Di was an honouree of MIT Technology Review Innovators Under 35 (global, 2019). He is a recipient of the Kun-Peng Programme of Zhejiang Province (2020).

