Light Science & Applications

Tin halide perovskite electro-optic devices and physics

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Lead-based halide perovskites have shown great potential in the fields of third-generation thin-film solar cells, displays and lighting, high-sensitivity ultra-high spatiotemporal resolution detectors, and information technology, due to their advantages such as continuously adjustable bandgap, long carrier diffusion length, high fluorescence quantum yield, potentially low cost, and solution processability. Despite this, the commercial prospects of lead-based halide perovskite optoelectronic devices face the biocompatibility and environmental compatibility issues of Pb elements. Therefore, how to remove lead from the best-performing perovskite light-emitting diodes (PeLEDs) without compromising their high external quantum efficiencies remains a challenge.

Tin (Sn) has been regarded as a viable replacement for lead in metal halide perovskites because it has a similar valence electron configuration and ionic radius as lead. Moreover, the decomposition product of divalent Sn(II) in tin-based halide perovskites is SnO_2, which is considered to be biologically safe. In this presentation, I will take tin-based PeLEDs as an example, focusing on the design of tin-based perovskite optoelectronic materials, stability strategies, device photophysics, fine-tuning of exciton behavior, and the impact of interface characteristics on luminescent behaviors.

Short Bio:

Ning Wang received his B.Sc. degree from Jilin University and his Ph.D. degree from The University of Chinese Academy of Sciences. He is currently a Professor of Physics at College of Physics, Jilin University, China.