



Halide perovskites: tailor-made excitons for lasers and photovoltaics

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■ Halide perovskites represent a rapidly emerging class of semiconductors with exceptional optical properties. Their tunable structure and solution-processable fabrication enable diverse morphologies—ranging from bulk crystals to thin films and nanoparticles—positioning them as low-cost, high-efficiency materials for optoelectronics. In photovoltaics, halide perovskites have achieved power conversion efficiencies up to 27%, and are key candidates for Si/perovskite tandem cells targeting over 34% efficiency. These materials are equally promising for light-emitting applications, such as LEDs and lasers. A core asset of halide perovskites lies in their ability to support tunable excitonic properties, with dimensionality ranging from 3D to 2D through simple compositional modifications. This presentation will explore how such flexibility allows for the design of tailor-made excitons to optimize performance in both photovoltaic and light-emission devices.

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