Shining Light on Optoelectronic Tuning in Mixed Halide Perovskites Films

ABSTRACT

Mixed-halide perovskites have been found the most promising materials in the family of hybrid perovskite for photovoltaic applications. However, these advanced perovskite materials may undergo phase-segregation under continuous light illumination due to halide ion migration, affecting their optoelectronic properties. Our research explores how photo-excitation leads to phase-segregation effect in advanced mixed-halide (I, Br) perovskite film [1] and how it effects on Optoelectronic properties. Interestingly, these photoinduced changes are fully reversible and thermally activated when the excitation power is turned off. We have further studied to control the hybrid perovskite's optoelectronic properties in a new way with proton irradiation and defect engineering [2]. These findings will help to understand the key issues of perovskite phase stability and effective ways of optoelectronic tuning in perovskite materials for the development of efficient solar cells and optoelectronic devices.

References:

[1] S. K. Gautam, *et al.*, *Reversible photo-induced phase segregation and origin of long carrier lifetime in mixed-halide perovskite films*, Advanced Functional Materials 30 **(2020)** 2002622.

[2] S. K. Gautam, *et al.*, *Strain and optoelectronic tuning in mixed halide perovskites with ion irradiation*, Advanced Optical Materials **(2023)** 2300577**.**

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Dr. GAUTAM has received his Ph.D. degree in Physics from Jawaharlal Nehru University, New Delhi, India under the supervision of Dr. Fouran Singh. His Ph.D thesis focused on "structural phase-transformation and ions-irradiation induced modifications of optoelectronic properties in oxide-semiconductors thin films."

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