Title: Intrinsic White-Light Emission from Layered Hybrid Perovskites

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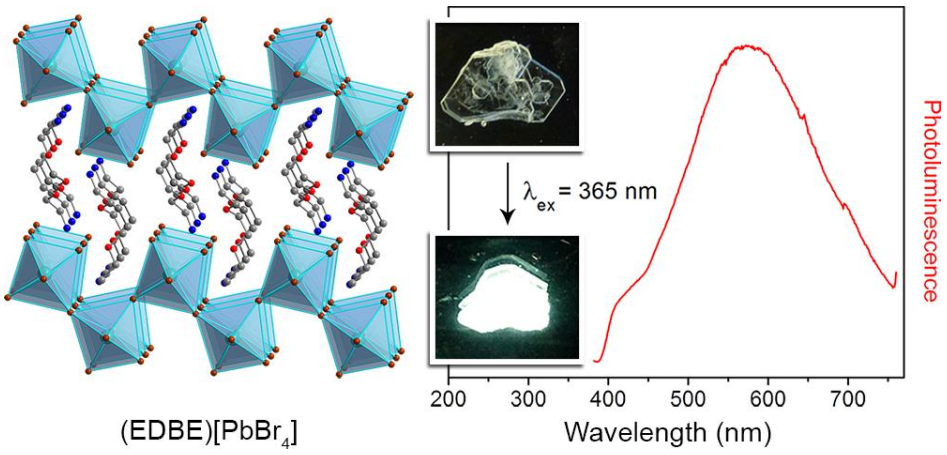
Abstract:

I will discuss the phenomenon of white-light emission from inorganic-organic layered perovskites with applications in solid-state lighting. To form these crystalline hybrids, we use organic cations to template the solution-state assembly of corrugated lead halide layers. These layered hybrids are wide bandgap semiconductors, which photoluminesce across the entire visible spectrum upon near-ultraviolet excitation. This strong broadband emission makes these materials promising as single-source white-light phosphors for use with ultraviolet light-emitting diodes in solid-state lighting devices. In these hybrids, lead halide sheets and organic cations are layered at the atomic level, forming quantum well structures that generate tightly-bound excitons. The exciton binding strength is further enhanced by the dielectric mismatch between the organic and inorganic layers. We believe that strong exciton-lattice coupling results in localization or "trapping" of the exciton, which leads to a broad red-shifted excitonic emission. We have used variable-temperature fluorescence spectroscopy on a series of lead halide layered hybrids to show that the kinetics of this charge-trapping process can be controlled by varying the orientation, distortion, and thickness of the metal halide layers. These well-defined and tunable structures provide a flexible platform for studying the mechanism of intrinsic broadband emission from bulk materials.



References:

1] Dohner, E. R.; Hoke, E. T.; Karunadasa, H. I. *Journal of the American Chemical Society* **2014**, *136*, 1718.
2] Dohner, E. R.; Jaffe, A.; Bradshaw, L. R.; Karunadasa, H. I. *Journal of the American Chemical Society* **2014**, *136*, 13154.