Enhanced Water Resistance of $CsPbI_3$ Perovskite Nanoplatelets through Graphene Flake Encapsulation

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Abstract:

The stability of halide perovskites, such as $CsPbI_3$, in humid environments remains a key challenge for their integration into durable photovoltaic and optoelectronic devices. [1, 2] This work investigates the use of graphene flake encapsulation as a method to enhance the water resistance of $CsPbI_3$ perovskite films. Given graphene's impermeable and chemically stable nature, we hypothesize that applying pristine graphene flakes that are amphithatic and conductive as a protective layer over the $CsPbI_3$ perovskite will mitigate moisture-induced degradation by creating an effective barrier against water ingress.[3] Our approach combines experimental fabrication and theoretical modeling (DFT calculation) to evaluate the structural and chemical interactions between the graphene flakes and the perovskite surface. By examining these interactions, we aim to gain insight into the encapsulation's protective efficacy under various environmental conditions. Although results are forthcoming, we anticipate that graphene encapsulation will significantly improve the water resistance of $CsPbI_3$, advancing the viability of perovskite-based technologies for practical applications.

References

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