Contribution ID: **53** Type: **Poster**

Gas quenching process under ambient conditions for stable and efficient inverted perovskite solar cells

Friday 6 December 2024 13:45 (3 hours)

Inverted perovskite solar cells have gained significant attention due to their potential for high efficiency and stability. In the process, the active layer fabrication plays a key role in determining the performance of the solar cells. Gas quenching is an important technique in the preparation of perovskite solar cells, as it enhances film quality and cell performance by precisely controlling crystal growth and minimizing defects. This study explores the optimization of gas quenching under ambient conditions to enhance the quality of perovskite films. By systematically varying the quenching parameters, such as gas flow pressure and how long the gas flow is sustained, we demonstrate how a precise control over these conditions can improve the crystallinity and uniformity of the FA0.8Cs0.2Pb(I0.6Br0.4)3 layer. In this work, the influence of different ratios of DMF: NMP on the performance of gas-quenching assisted FA0.8Cs0.2Pb(I0.6Br0.4)3 solar cells are also explored. This approach provides a practical solution for scaling up the production of high-performance inverted perovskite solar cells while maintaining operational stability in real-world environments.

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Session Classification: Poster Session

Track Classification: Material Science