ASIA-PACIFIC SOLAR RESEARCH CONFERENCE

# How much Caesium is enough in Perovskite Solar Cells?

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Hybrid organic-inorganic perovskite (HOIP) materials have attracted a lot of research and development attention as light harvesters in solar cells due to their marvellous opto-electronic properties. The power conversion efficiencies of perovskite solar cells (PSCs) have boosted unprecedentedly from merely 3.8% to 24.2% in only a decade. The evolution of PSCs suggests a switch of light harvesters from $MAPbI_3$ to $FAPbI_3$ which agrees well with the Shockley–Queisser limit utilising its lower bandgap attribute. However, $FAPbI_3$ has a relatively less stable phase. Caesium ($Cs^+$), Methylammonium ($MA^+$), Bromide ($Br^-$) or a combination of these have been incorporated into $FAPbI_3$ precursor solution to fabricate efficient and stable PSCs. Due to the volatile nature of $MA^+$ and $Br^-$, it is still unclear whether $MA^+/Br^-$ remains in $FAPbI_3$ thin films. The non-volatile nature of $Cs^+$ remains in $FAPbI_3$ thin films. This paper aims to clarify the effect of the amount of $Cs^+$ on film properties, PSC performance and stability and whether there is a threshold amount of $Cs^+$ for it to be effective.

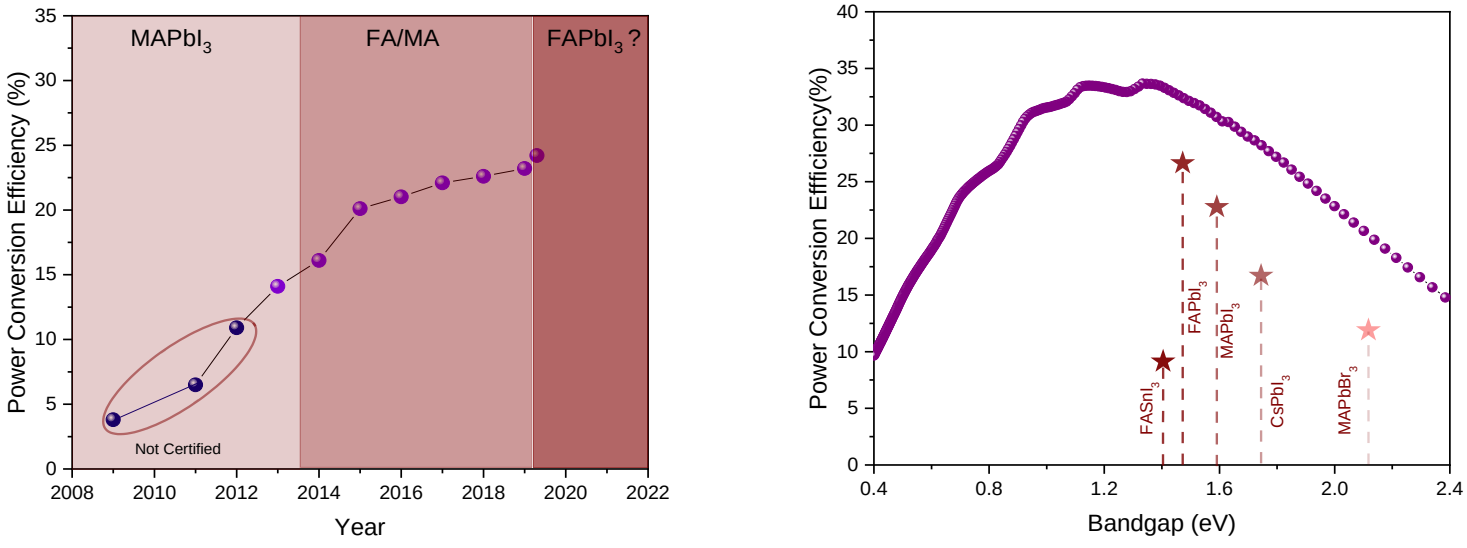


**Figure 1. (a) Evolution of perovskite cell performance. (b) Bandgap of different perovskite material and the efficiencies of the associated best devices demonstrated.**

**References**

Shi, T., Shujuan, H. and Anita, H, 2013, 'How much Caesium is enough for Perovskite Solar Cells?', *Trends in Chem*, in Preparation.