Influence of $Pb(SCN)_2$ additive on Perovskite solar cells stability [POSTER]

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Discovered and popularized in 2009 [1], perovskites solar cells have gained a lot of attention within the last decades. Their high performances up to 25,5% of yield today, their low cost, simple manufacturing, and high potential to be included in tandem solar stacks make them a good candidate among the different solar cell's technologies.

Nevertheless, the stability of perovskite solar cell is yet to be addressed. Perovskite solar cells is an ionic organic-inorganic material. It is highly reactive to humidity and air and its ionic structure makes it sensitive to electric fields present when using the cells. Several passivation methods have been tried to counter this phenomenon. Extrinsic methods such as encapsulation can be performed to prevent moisture and oxygen to attack the material. On the other hand, intrinsic methods such as additive engineering can be a point of focus to tackle the possible ion migration of the perovskite [2].

$Pb(SCN)_2$ is an additive that has been pinpointed to reduce degradation of the perovskite solar cells. The additive impact the crystal morphology. The grains of perovskite are increasing with the amount of $Pb(SCN)_2$ added **(fig 1)**. This improvement of grain size can impact the long-term stability by reducing grain boundaries thus limiting traps for the electrons. A record of 1200 hours **(fig 2)** has been obtained by optimizing a process using 1% molar ratio of $Pb(SCN)_2$

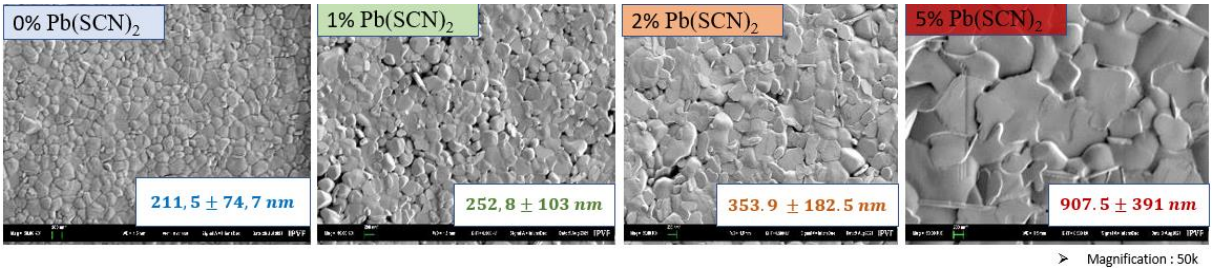

Figure 1: Scanning electron microscopy images of different ratios of $Pb(SCN)_2$ in triple cation perovskite

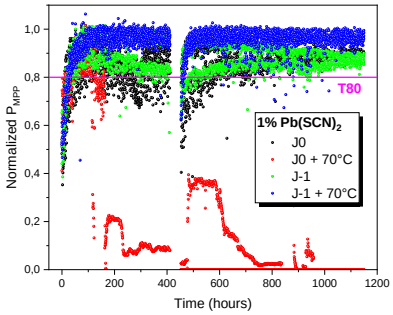

Figure 2: Maximum power point tracking of different formulation of 1% $Pb(SCN)_2$

[1] Akihiro Kojima et al., Organometal Halide Perovskites as Visible-Light Sensitizers for Photovoltaic Cells J. AM. CHEM. SOC, 131, 6050–6051 (2009)
[2] Apurba Mahapatra et al. A review of aspects of additive engineering in perovskite solar cells, journal of materials Chemistry, 8, 27-54 (2020)