



Fabrication and characterization of evaporated hybrid perovskite based solar cells

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Poster

Fabrication and characterization of evaporated hybrid perovskite based solar cells

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Over the last years, interest for hybrid perovskite materials as light absorber in photovoltaic devices has increased continuously, from only 14 publications in 2012 to over 2200 in 2016^[1]. Hybrid perovskite deposition techniques can be sort out in two families: wet processing and vacuum deposition. If the first is the most widely used, the second appears more suitable for future commercialization of perovskite solar cells. Indeed, wet processing is highly user dependant and hardly allows homogeneous large surface deposition when vacuum based deposition permits high reproducibility between batches and homogeneity over large area.

In this context we report here experimental details to fabricate evaporated hybrid perovskite films including material densities, heating temperatures and deposition rates. The obtained layers will be characterized by absorption spectra, XRD (X-Ray Diffraction) or SEM (Scanning Electron Microscopy). Evaporated hybrid perovskite layers will also be incorporated in photovoltaic devices (structure being ITO/PEDOT:PSS/Perovskite/PCBM/Ag) and characterized by J-V and EQE (External Quantum Efficiency) measurements.



Figure a. Evaporator equipment in N₂-filled glove box

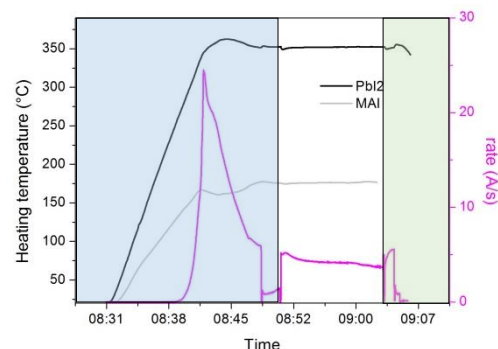


Figure b. Evolution of heating temperatures and deposition rate during process: settings (blue part), during coevaporation (white part) and checking rates after coevaporation (green part)

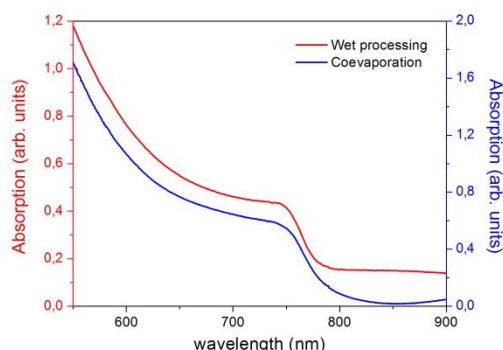


Figure c. Absorption spectra of MAPbI₃ by wet processing and coevaporation

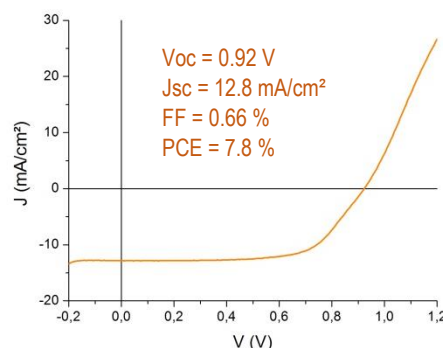


Figure d. J/V curve of a solar cell incorporating evaporated hybrid perovskite active layer (active area of 0.28 cm²)

^[1] From data analysis on Web of Science for "perovskite solar cells" research (on 09.03.17)