POSTER -Development of semitransparent perovskite solar cells: application in simple junction and tandem architecture

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The application of perovskite materials in photovoltaic field has already led to a fast rise in conversion efficiency, currently above 23%. These materials are also good candidates for tandem cells if used as the high bandgap subcell. This is the long term goal of this work.

The first part of this study consisted in the development of solar cells with optimized mono-cation perovskite $CH_3NH_3PbI_{3-x}Cl_x$ (chlorine doped MAPbI) in both n-i-p and p-i-n structures, using the same individual components for n-type and p-type layers: tin oxide (SnO_2) and poly-triarylamine (PTAA). The semi-transparent structures have been investigated with a large series of characterization tools: UV-visible absorption, photoluminescence, X-ray diffraction and scanning electron microscopy. Electrical measurements including photovoltaic efficiency parameters and external quantum efficiency were also determined and interrelated to the other characterizations.

The integration of transparent electrode consisting in ITO deposited by sputtering has also been scouted, as a proof of concept for a semi-transparent perovskite solar cells. The optoelectronic characterizations permitted to fully compare n-i-p and p-i-n structures semi-transparent solar cells.