Atomic layer deposition processing for perovskite solar cells: research status, opportunities and challenges

Supplementary information

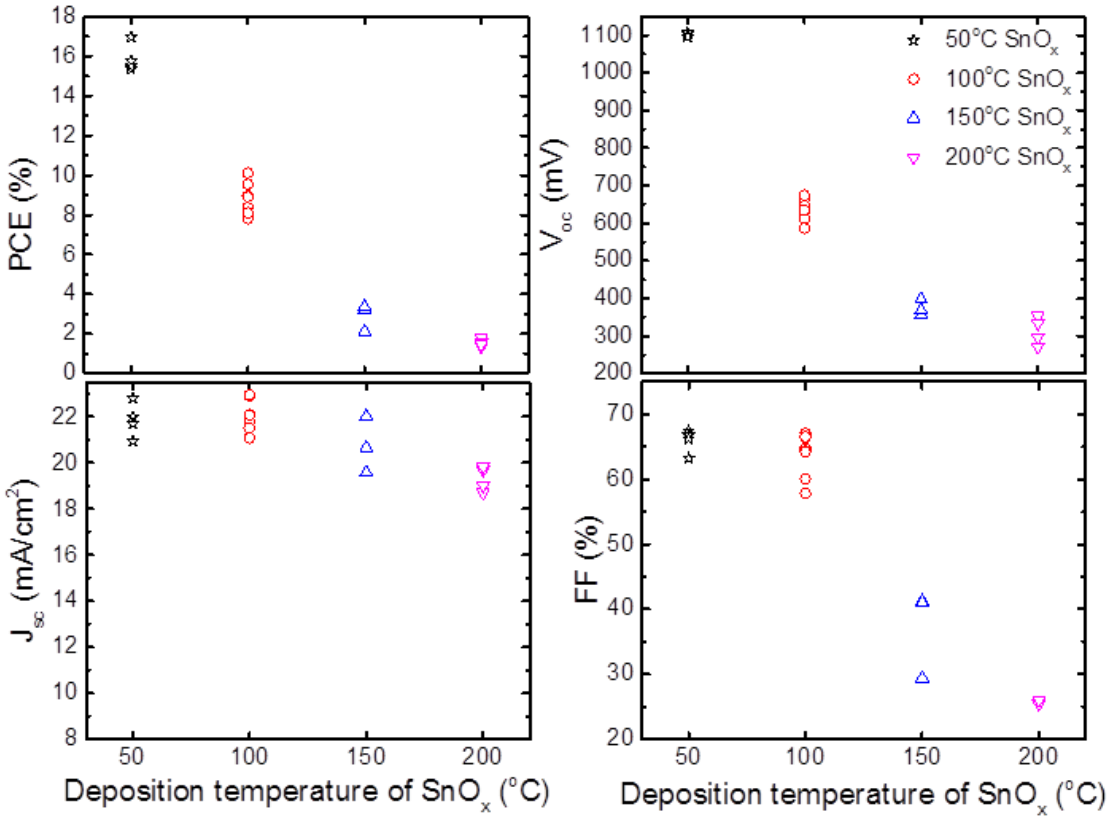

Figure 1: J-V parameters of n-i-p (triple cation $Cs_x(MA_yFA_{1-y})_{1-x}Pb(I_z,Br_{1-z})_3$ perovskite solar cells with SnO_x (15 nm) serving as electron transport layer and deposited by means of plasma-assisted ALD in a substrate temperature range of 50-200°C. The tin ALD precursor is tetrakis(dimethylamino)tin, while the oxidant is an O_2-fed inductively coupled plasma. The layers are deposited at a growth rate per cycle (GPC) of 0.12-0.15 nm/cycles. The mass density of the layers ranges from 4.10 g/cm^3 at 50°C to 6.1 g/cm^3 at 200°C, with an hydrogen content varying between 20% and 4% and low and high substrate temperature, respectively.