Supporting Information

Crystal engineering approach for fabrication of inverted perovskite solar cell in ambient conditions

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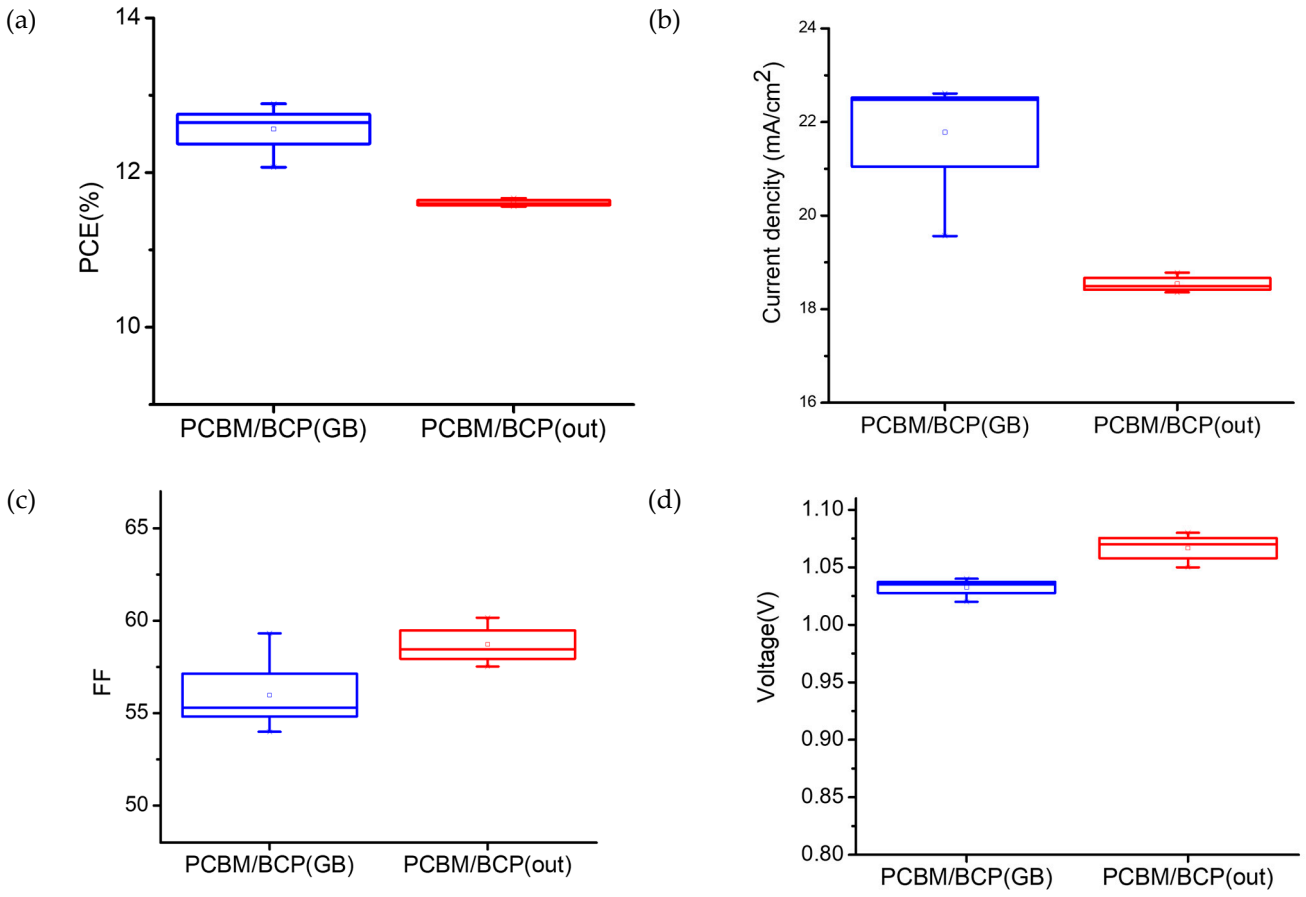


Figure S1. Statistical photovoltaic parameters of the of $MAPbI_3$ perovskite applying PCBM and BCP outside and inside glove-box(GB): a) – PCE, b) – JSC c) – Fill Factor, and d) – VOC

Table S1. The best parameters and average values of $MAPIbI_3$ perovskite applying PCBM and BCP outside and inside glove-box: a) – PCE, b) – JSC c) – Fill Factor, and d) – VOC

$MAPbI_3$ PSCs	**V_{OC} (V)**	**J_{SC} (mA/cm²)**	**FF (%)**	**PCE (%) max(average)**
PCBM/BCP inside glove-box	1.04 (1.03 ±0.01)	22.393 (21.78 ±1.48)	55.34 (55.97 ±2.31)	12.9 (12.56 ±0.38)
PCBM/BCP outside glove-box (air)	1.04 (1.07 ±0.02)	18.779 (18.54 ±0.22)	57.52 (58.71 ±1.34)	11.7 (11.61 ±0.05)

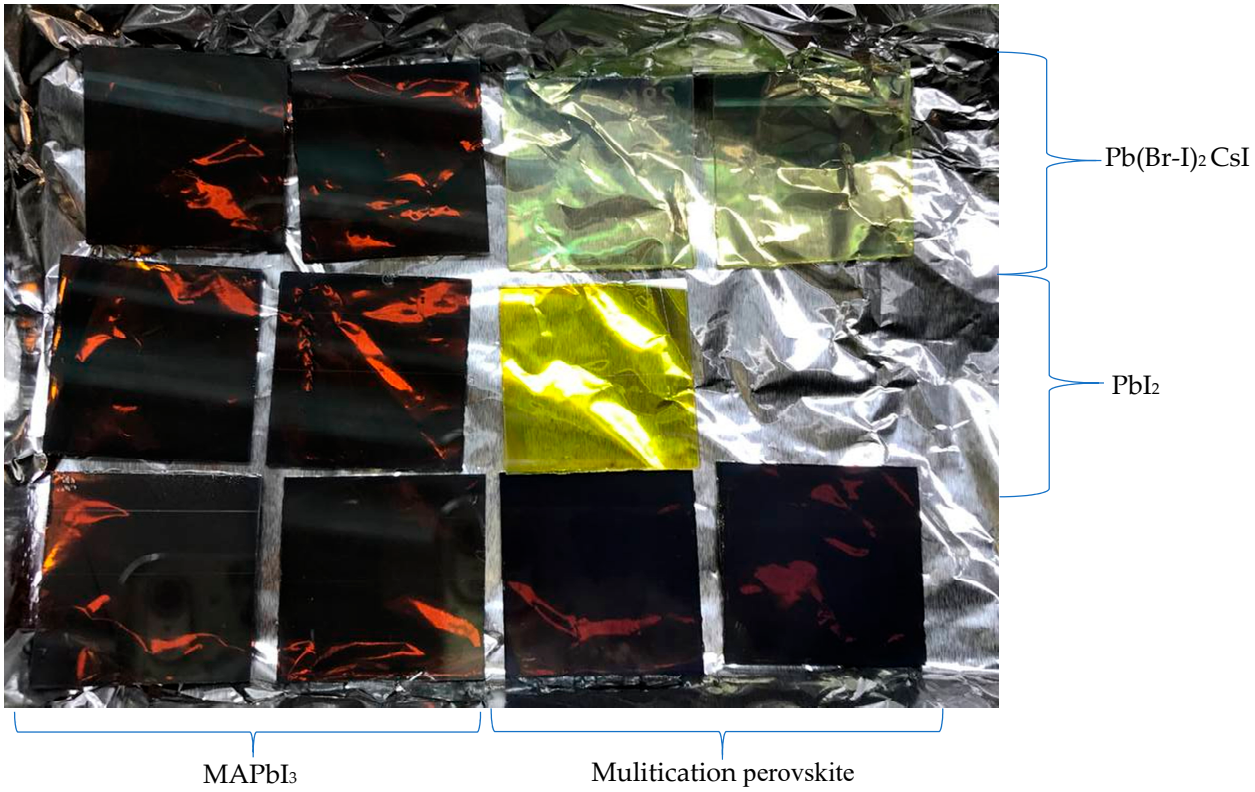
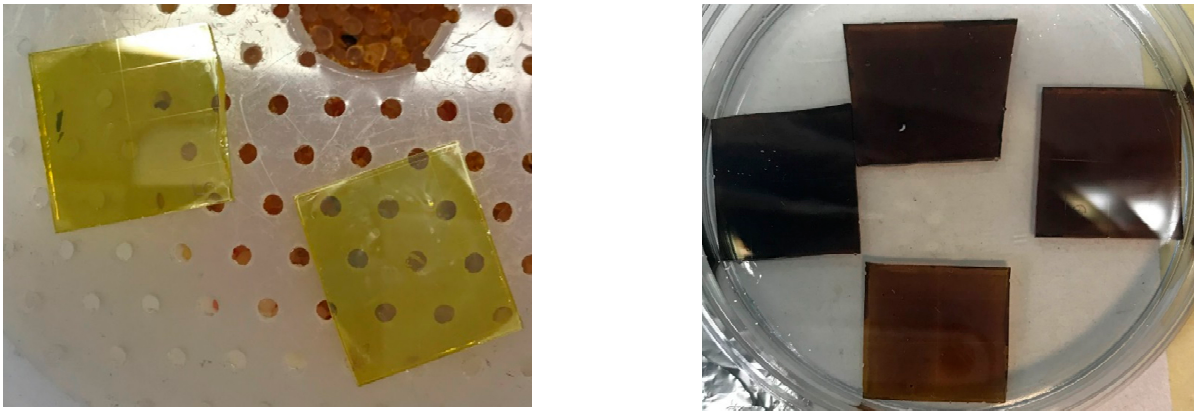


Figure S2. Pb and PbX_2 layer, perovskite layers



PbI_2 layers on TCO/NiO_X $MAPbI_3$ formation (under dipping process)

Figure S3. Pb layer, perovskite formation under dipping process

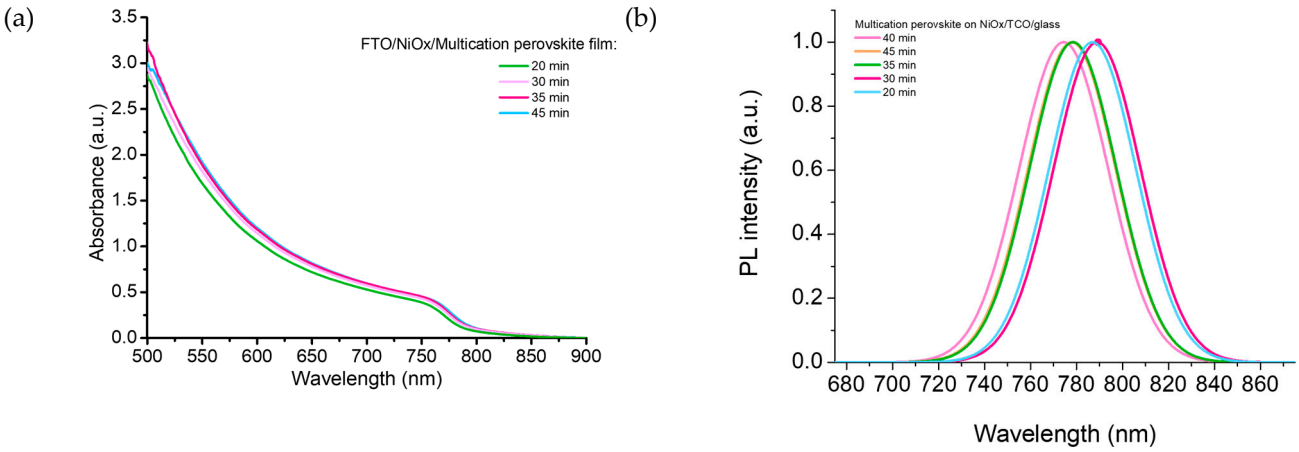
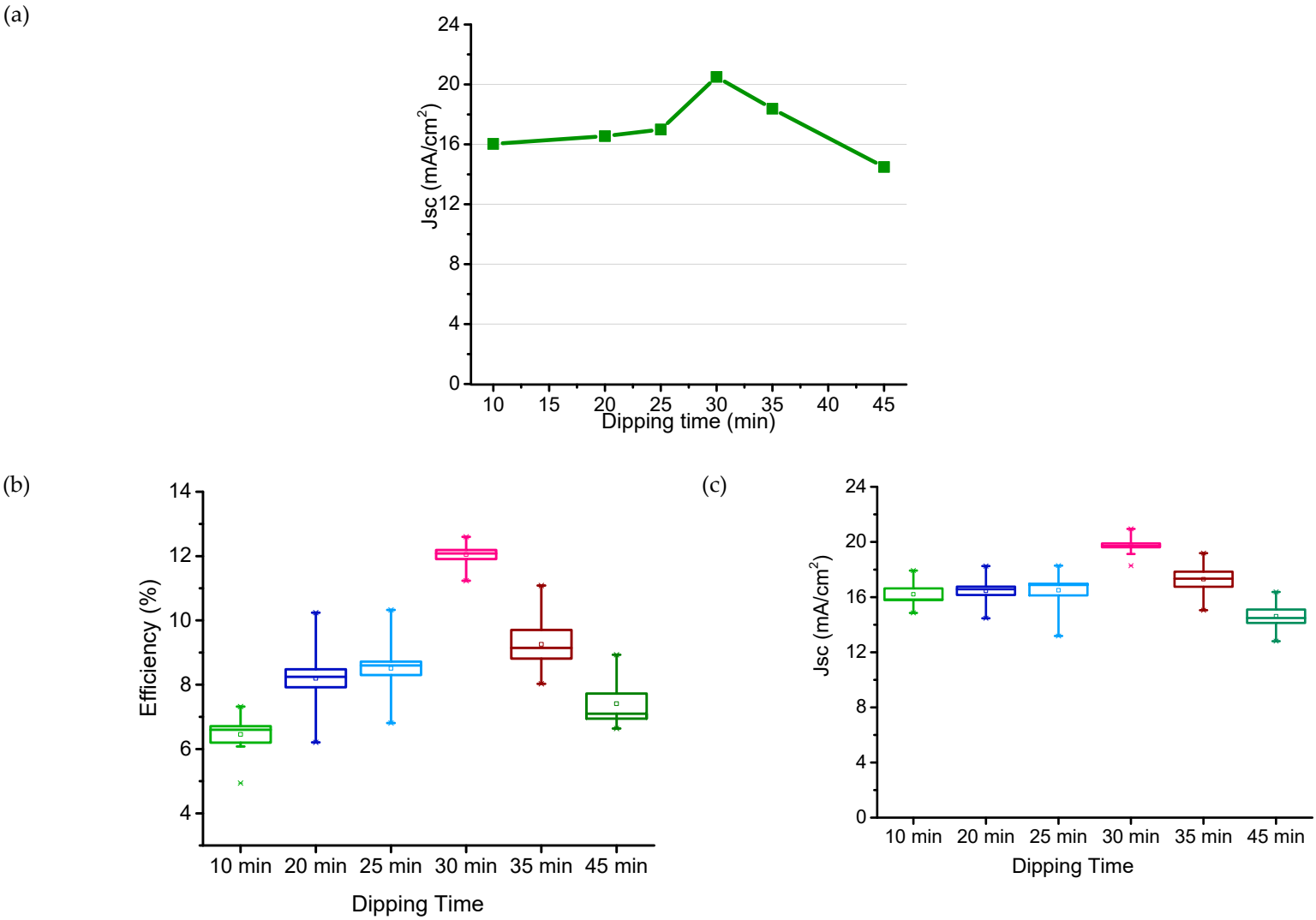


Figure S4 (a) – Absorbance of multication perovskite films (different dipping time), (b) – PL of multication films on NiOX/FTO (different dipping time)



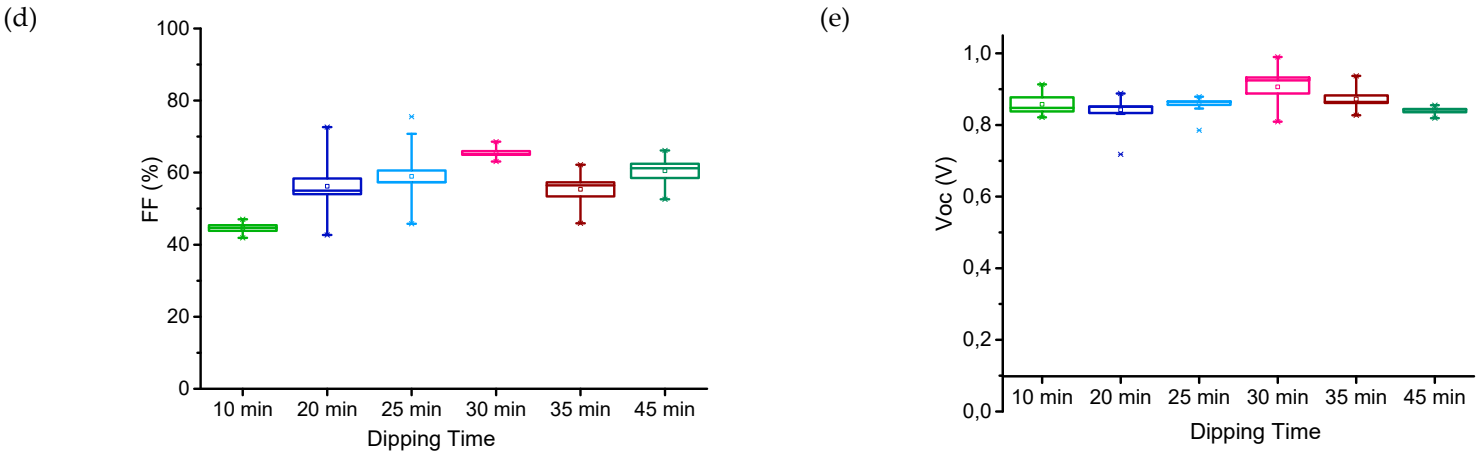


Figure S5. a) Multication perovskite: JSC dependence on dipping time in multication solution; b),c),d),e) – Electrical parameter statistics for the investigated multication perovskite-based device acquired at 1 Sun irradiation. The cell active area is 0.16 cm^2.

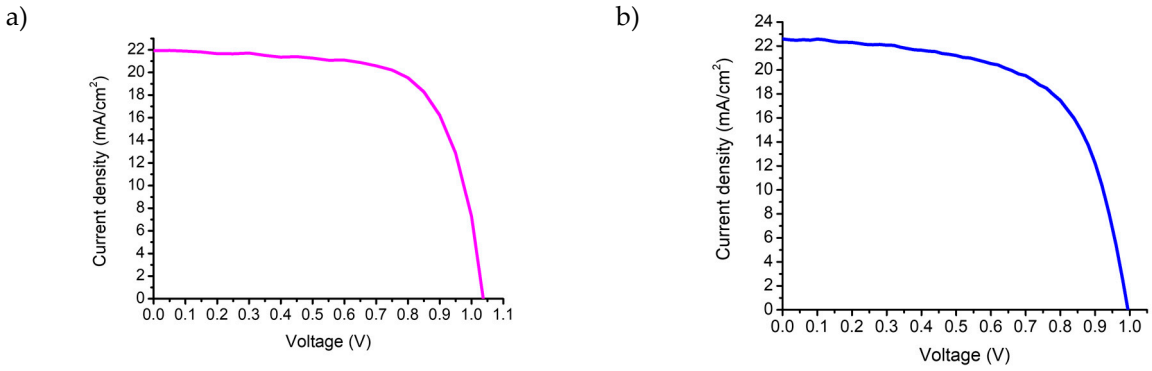


Figure S6. J-V-plots of two-step a) Multication and b) pure $MAPbI_3$ perovskite solar cells