Fabrication of Perovskite PV devices using Ossila I201 Ink

Process summary

1. Substrate clean (in air)
   Sonicate ITO substrates for 5 minutes in hot (~70°C) 1% Hellmanex (Ossila C141)
   Dump-rinse substrates twice in boiling, deionised (DI) water
   Sonicate for 5 mins in IPA
   Dump-rinse twice in boiling DI water
   Dry the substrates with a nitrogen gun
   Bake the substrates on a hotplate at ~120°C

2. PEDOT:PSS anode preparation (in air)
   Filter Al 4083 PEDOT:PSS (Ossila M121) using a 0.45μm PVDF filter (Ossila C105)
   Dispense 35 μl of the filtered PEDOT:PSS solution onto the heated ITO substrate spinning at 6000 rpm for 30s
   Place substrate onto a hotplate at ~120°C
   After all ITO substrates have been coated, transfer all to a nitrogen-filled glovebox and place onto a hotplate at 120°C for ~20-30 mins
   Remove the substrates from the hotplate and allow to cool at room temperature

3. Perovskite deposition (in nitrogen glovebox)
   Heat I201 perovskite ink for 2 hours at ~70°C and then cool to room temperature
   Place the ITO coated substrate (at room temperature) onto the spin-coater and spin the substrate at 4000 rpm (for 30s)
   Dynamically dispense 30μl of I201 ink
   Place substrate back onto the hotplate (in the glovebox) at ~80°C.
   Once all substrates have been coated, anneal for ~90 mins
   After 90 mins, use a cleaning swab dipped in DMF solvent to wipe the cathode stripe clean
   After cleaning, anneal for an addition 20-30 mins at 80°C to remove any residual DMF solvent. After this time, remove substrates from the hotplate and cool to room temperature.

4. PC70BM deposition (in nitrogen glovebox)
   Prepare a solution of PC70BM (Ossila M113) at 50 mg / ml in chlorobenzene and stir for 3 to 5 hours
   Place perovskite coated substrate onto the spin-coater and spin at 1000 rpm.
   Dispense 20 μl of PC70BM solution onto the substrate (while spinning) and spin for a total time of 30s

5. Cathode deposition and encapsulation
   Thermally evaporate a calcium/aluminium cathode (5 and 100 nm respectively) through a shadow-mask (Ossila E341)
   Encapsulate devices using a glass coverslip (Ossila C181) and encapsulation epoxy (Ossila E131)
   Expose to UV radiation (350 nm) for 30 mins to cure the epoxy