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**Technical specification of Roll-to-Roll Set-up for Perovskite Solar Cell Fabrication**

**Item description**

Roll-to-Roll set-up for Perovskite Solar Cell fabrication on Flexible Substrates. The system should be suitable to be kept inside the glove-box with remote operation.

**Processing methods**

Slot-die coating with Flexographic printing for metal contacts

1. Slot-die head with maximum 50mm width and strip coating. Options for printing up to 100 meters maximum.
  - Capable of handling water and organic solvent for thin coating layer. Slot-die head should be compatible of handling acidic solutions and organic solvents.
  - Arrangements for transporting the coating material to the die with a respective pump system.
2. Flexographic printing unit for contact printing. Printing resolution below 200 microns. Standard recipe for Silver printing should be shared and demonstrated.
3. Anti-solvent treatment facility should be provided. This is like dripping Chlorobenzene on the as deposited films with controlled rate and volume. Vendor can discuss to finalize the drawing in later stage.
4. Air-knife should be provided with additional flow control and heated gas delivery system.

**Roller specification**

Width of the roller: approximately 150 mm, heated (temperature range ambient to 150 degree C). Options for Un-winder and re-winder should be provided for future capacity enhancement.

Processing speed of up to 5 meters/min. The roller should be heated (desirable max. 200 degree C).

**Ink-delivery system**

Holds syringes from 1 ml and up to 50 ml. Pump rate from 0.01 ml - 5 ml per minute. Able to handle different viscosity liquids.

**Control System**

In-built screen, PLC based system, computer controlled and remote monitoring. All control software should be provided. The control software should be upgradable and compatible with available

Microsoft Windows OS.

The said system should be standard Glove-Box compatible or can be built inside the purge-box

### **Laminator**

Laminator can be either integrated in the same system or separate with either of the two possible options

- (a) Pressure sensitive adhesives and
- (b) UV curing.

For the option (b) UV-curing oven (controllable from 0-200 watt) for post processing, The width and the speed should be as per the R2R coater specifications.

25 meters of ITO/PET patterned substrates and lamination sheet need to be provided at the time of delivery along with lamination foil for PSA lamination (100mm wide) of length 10 meter and lamination foil for UV lamination (100mm wide) of length 10 meter need to be provided as complimentary for trial.

The system can possibly be inspected at the factory/workshop before shipping. Supplier should be able to provide needed support during the course of inspection. Two-person training in the system for two days should be provided at the supplier's end.

During this inspection the plant should be able to run and demonstrate all its mechanical functions.

- (a) Check of completeness according to the order confirmation,
- (b) Visual inspection with regard to appropriate assembling,
- (c) Check of the mechanical functionality and safety regulations,
- (d) Functional demonstration of the installation according to the technical parameters and

Upon satisfactory, the supplier should be responsible for transportation, installation, demonstration and provide adequate training at the receive

