**Supporting information**

**Optical analysis**

1. **Optical Microscopy**

|  |  |
| --- | --- |
|  | D:\CuI-MBT\CuI MBT OM\10x0002.tif  (b)  (b) |

**Surface morphology, as observed under optical microscope, of (a) CuI- thin film (b) CuI-MBT thin film**

The surface morphology of drop casted films were analysed under optical microscope. The images shows that the coating were uniform and well adhere to the substrate and did not fall off for long time. This may be helpful for fabrication of smooth surfaced junction of energy harvesting device.

**Supporting Information S2:**

Table:1

|  |  |  |
| --- | --- | --- |
| Parameters | CuI | CuI-MBT |
| C1 | -232.907 | -17.22 |
| C2 | 7.8355E-8 | -17.22 |
| R1 | -1309052.13 | 61.1721 |
| R2 | 91.9101 | 61.1725 |
| R3 | 67.0835 | 67.4740 |
| R4 | 39.2765 | 54.6201 |
| Qy1 | -0.001307 | -0.000149 |
| Qa1 | 0.21847 | 0.36666 |

Table:2 R1=Rct

|  |  |  |
| --- | --- | --- |
|  | Electrical conductivity (S/cm) | ∆G# |
| CuI (σ0) | 3.6377\*10-7 | -25kJ/mol |
| CuI-MBT (σ) | 0.01022 |

Table:3 R2=RIC

|  |  |  |
| --- | --- | --- |
|  | Ionic conductivity (S/cm) | ∆G# |
| CuI (σ0) | 5.1810\*10-3 | 20kJ/mol |
| CuI-MBT (σ) | 0.010217 |

Table:4 ∆G# (From EIS)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | CuI | CuI-MBT | ∆G# | | |
| CuI | CuI-MBT | |
| C1 | -232.907 | -17.22 |  | |  |
| C2 | 7.8355E-8 | -17.22 |  | |  |
| R1 | -1309052.13 | 61.1721 | 145.39 kJ | | 120.68 kJ |
| R2 | 91.9101 | 61.1725 | 121.69 kJ | | 120.68 kJ |
| R3 | 67.0835 | 67.4740 | 120.91 kJ | | 120.93 kJ |
| R4 | 39.2765 | 54.6201 | 119.58 kJ | | 120.40 kJ |
| Qy1 | -0.001307 | -0.000149 |  | |  |
| Qa1 | 0.21847 | 0.36666 |  | |  |

Table 5: ∆G# (From Cyclic voltammetry)

|  |  |  |  |
| --- | --- | --- | --- |
| ip of CuI (µA) | ∆G# | ip of CuI-MBT (µA) | ∆G# |
| 0.0256 | 68 kJ/mol | 2.7062 | 133 kJ/mol |
| 0.0272 | 122 kJ/mol | 2.9482 | 133 kJ/mol |
| 0.4360 | 126 kJ/mol | 0.1083 | 130 kJ/mol |
| 0.0587 | 120 kJ/mol |