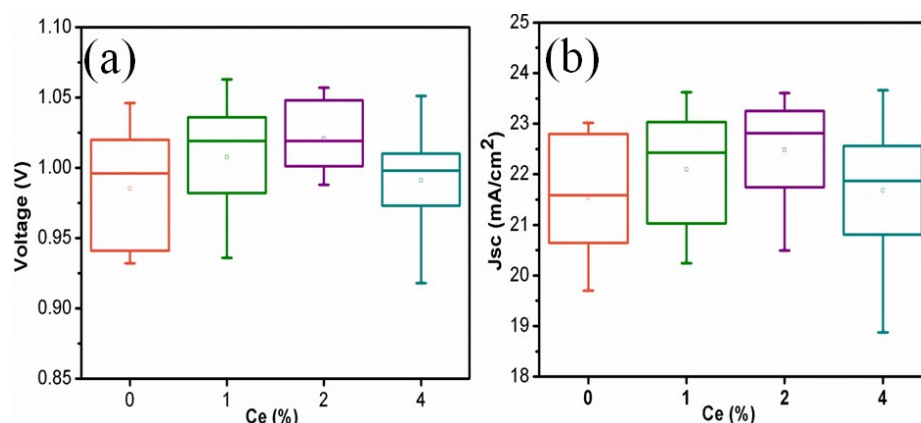


## Support information



**Figure. S1** (a and b) error bar of  $V_{oc}$ ,  $J_{sc}$ .

**Table S1** Photovoltaic performance of PSCs based on  $TiO_2$  and Ce- $TiO_2$  ETLs.

| ETLs                 | $V_{oc}$ (V)  | $J_{sc}$ (mA/cm <sup>2</sup> ) | FF (%)        | PCE (%)       |
|----------------------|---------------|--------------------------------|---------------|---------------|
| <b>Max (Average)</b> |               |                                |               |               |
| $TiO_2$              | 1.020 (0.998) | 22.80 (21.41)                  | 68.50 (65.01) | 15.92 (13.86) |
| 1% Ce- $TiO_2$       | 1.042 (1.007) | 23.62 (22.09)                  | 67.60 (66.30) | 16.63 (14.76) |
| 2% Ce- $TiO_2$       | 1.048 (1.026) | 23.61 (22.41)                  | 71.70 (69.31) | 17.75 (16.05) |
| 4% Ce- $TiO_2$       | 1.005 (0.990) | 22.56 (21.56)                  | 69.50 (65.40) | 15.74 (14.03) |