

Electronic Supplementary Information for

**Graphene quantum dot incorporated perovskite films:
passivating grain boundaries and facilitating electron
extraction**

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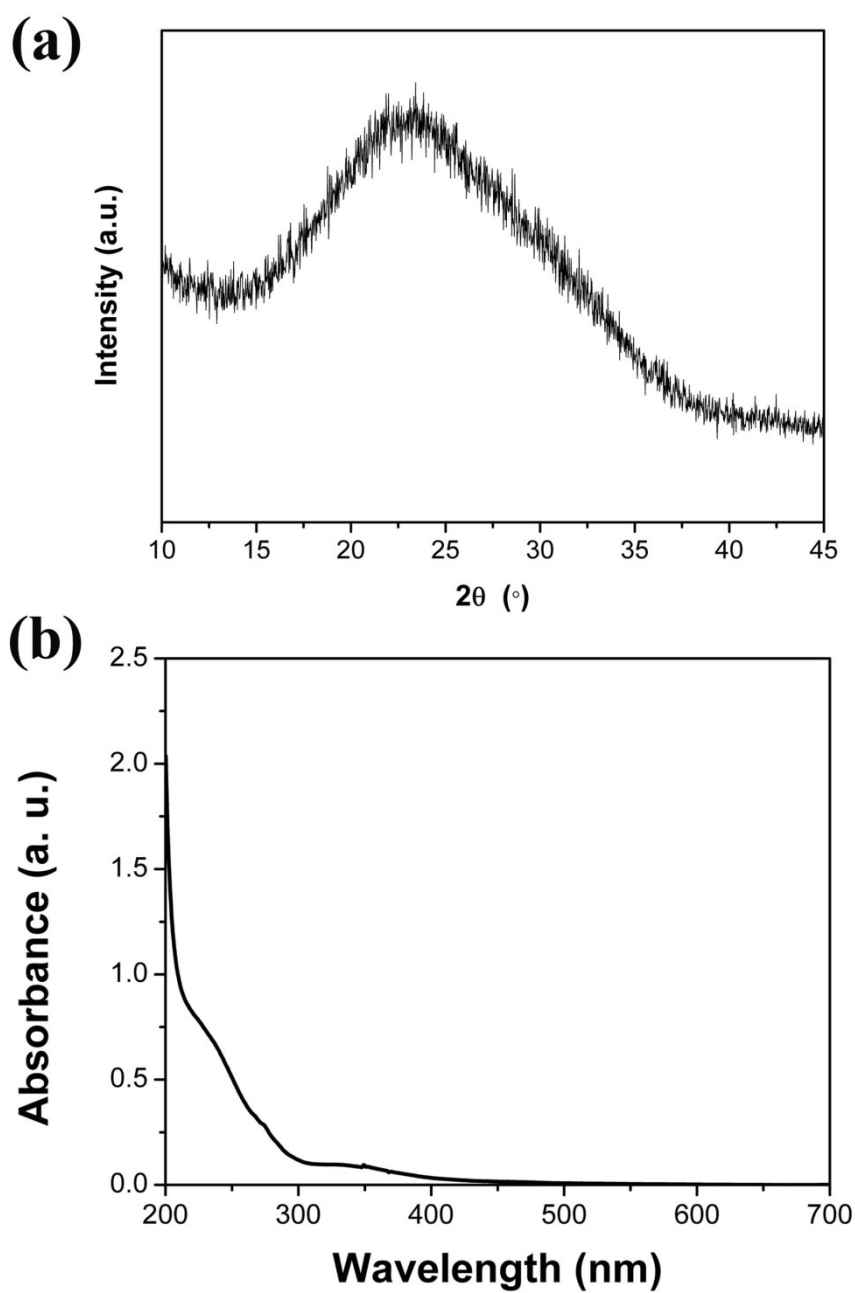


Fig. S1 (a) XRD and (b) UV-vis absorption spectrum of GQDs.

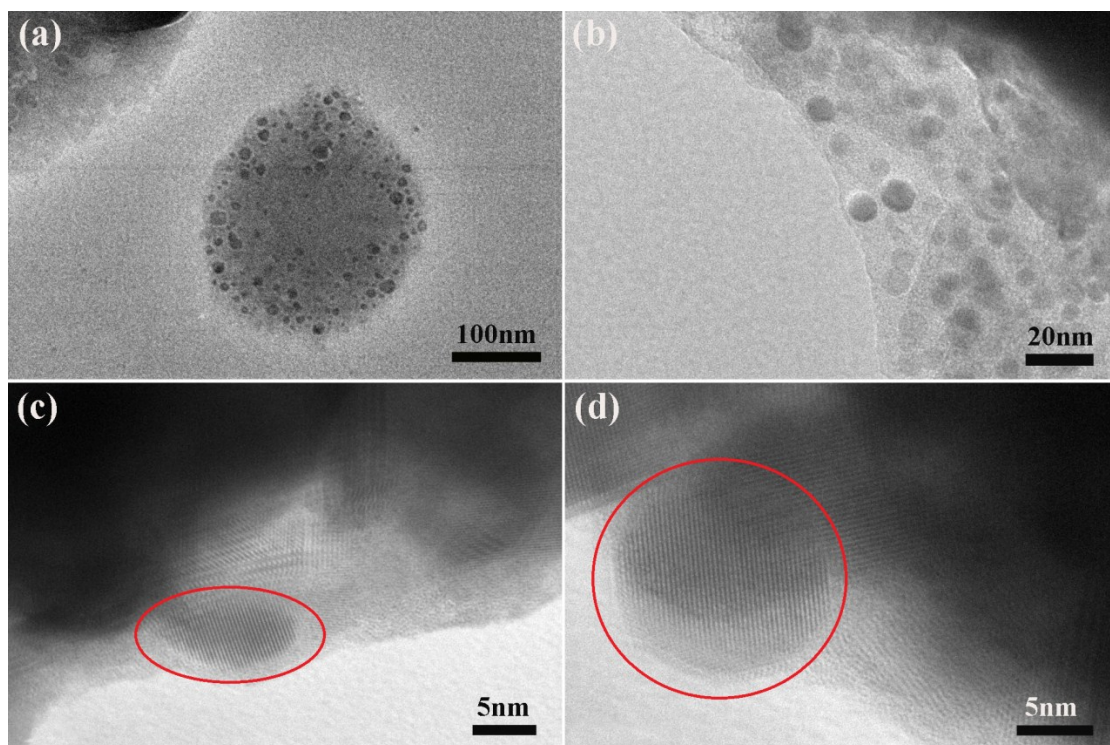


Fig. S2 TEM images of GQD-perovskite with different resolutions.

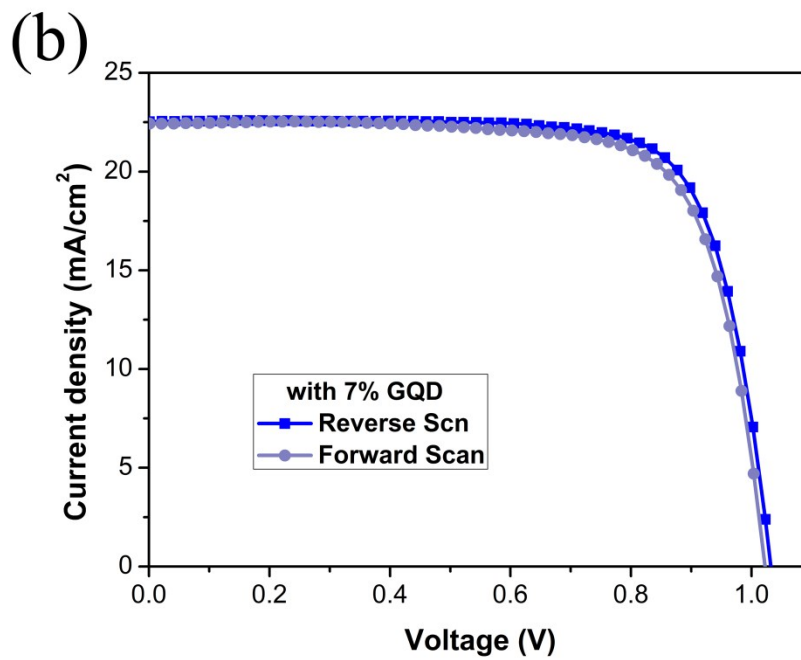
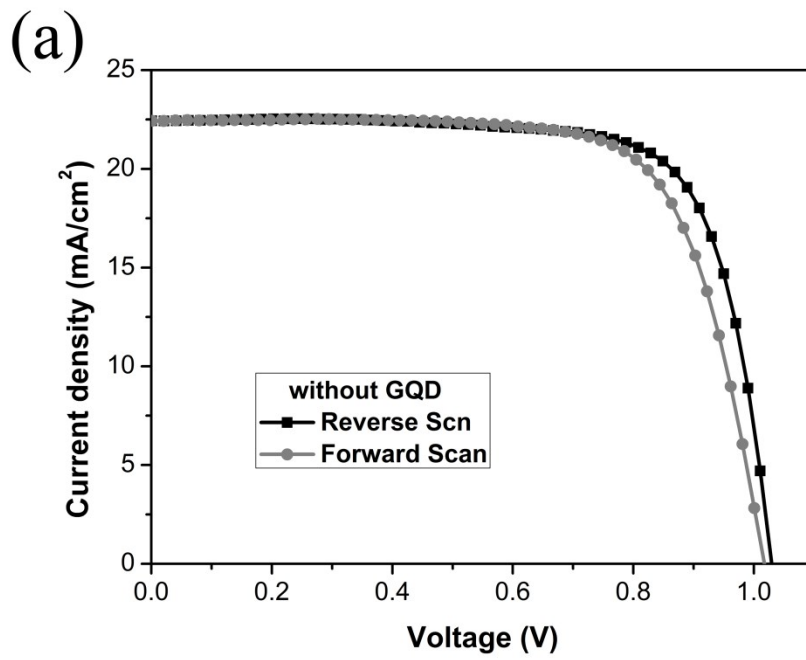


Fig.S3 J-V characteristics of perovskite solar cells (a) without GQD and (b) with 7% GQD including reverse and forward scan.

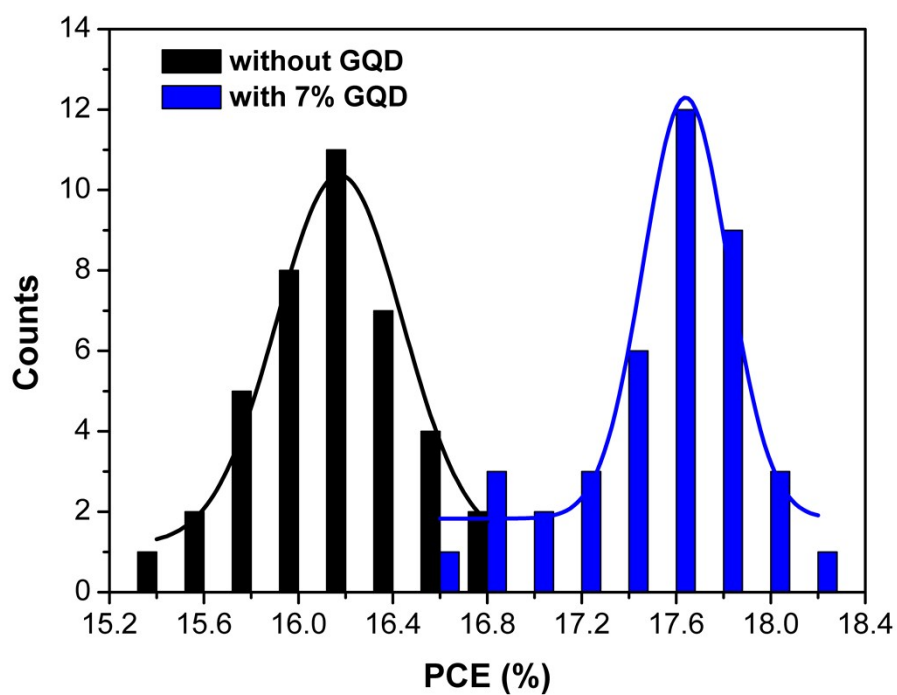


Fig.S4 The PCE distribution histogram of the perovskite solar cells without and with 7% GQD

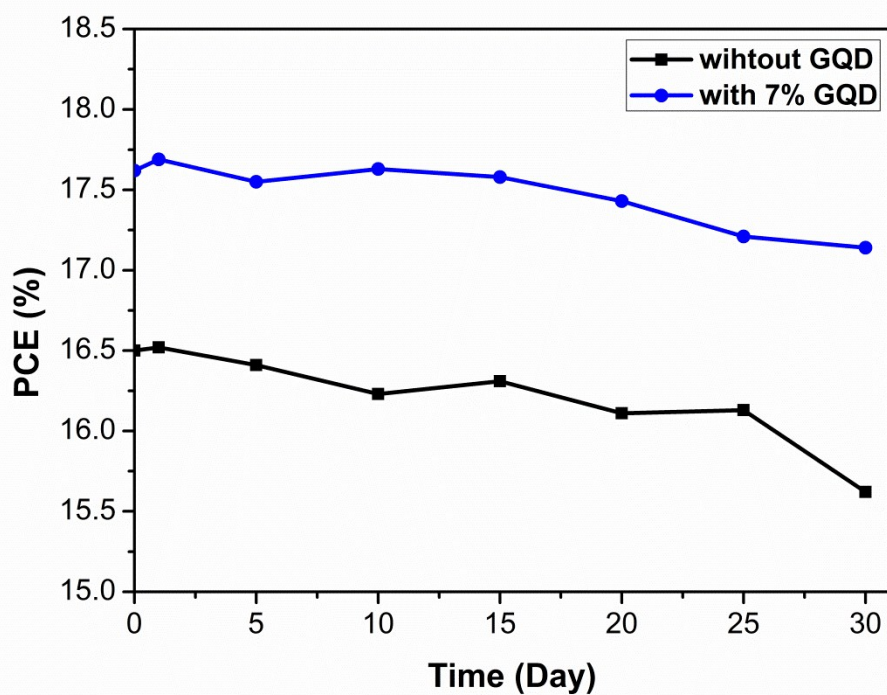


Fig.S5 The humidity stability of fabricated perovskite solar cells (with humidity of 36%)

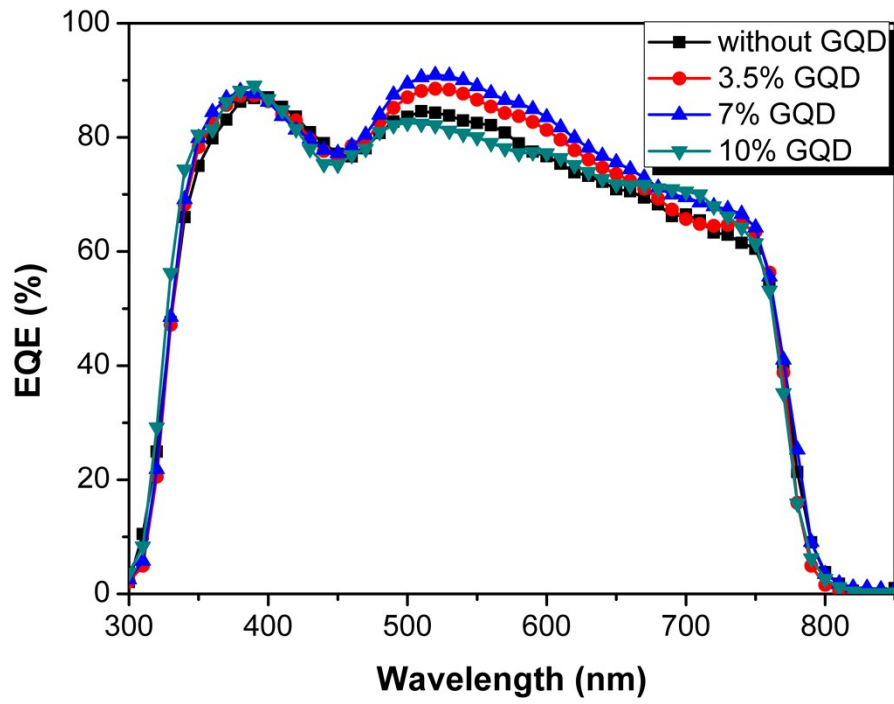


Fig. S6 The EQE spectra of fabricated perovskite solar cells with different amount of GQDs.

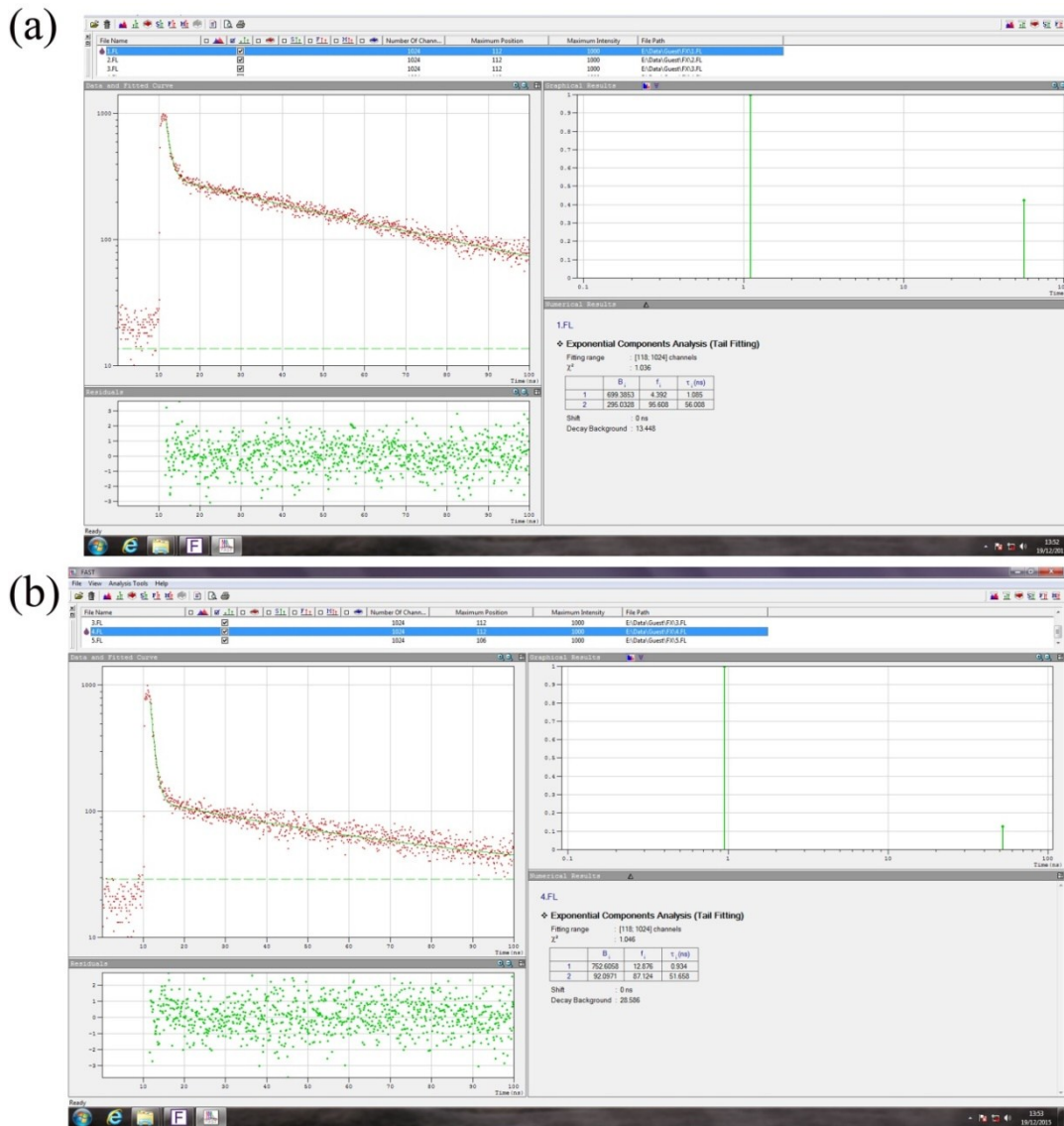


Fig.S7 Original fitting graphs of the TRPL decay measurement of perovskite solar cells (a) without GQD and (b) with 7% GQD