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Surface passivation via acid vapor etching enables efficient and stable solution-processed CdTe nanocrystals solar cells

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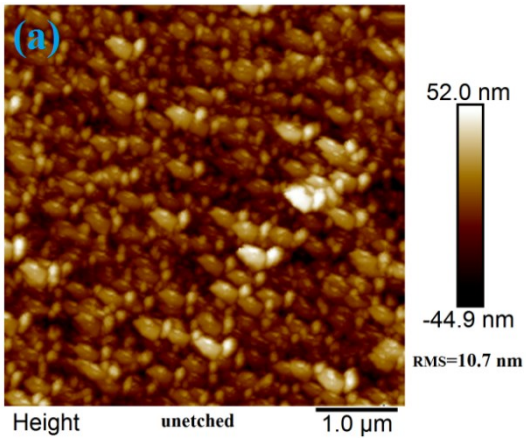

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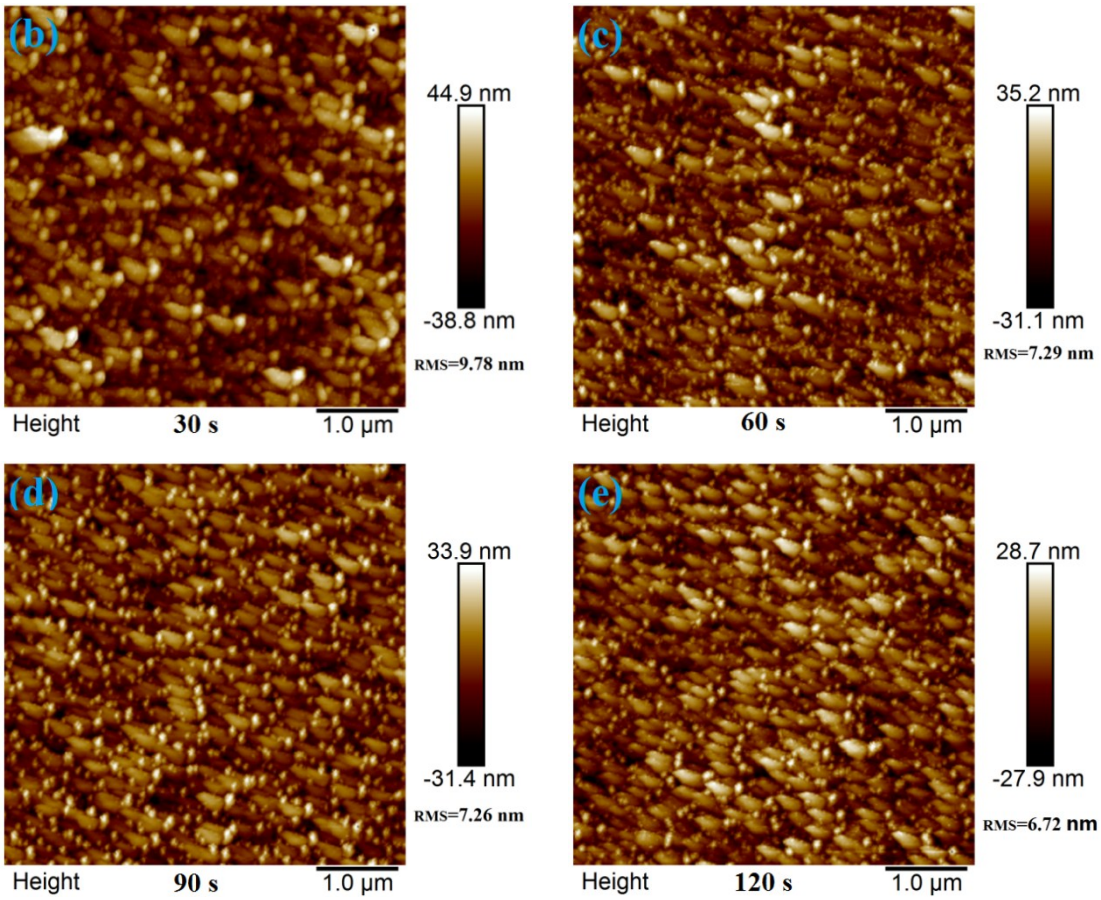
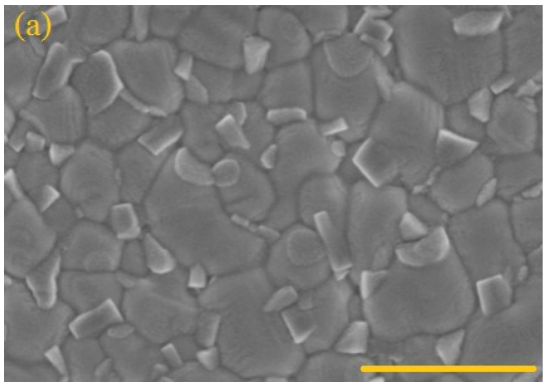


Figure S1. AFM images of CdTe NCs thin films with BM AVE time for (a) 0 s, (b) 30 s (c) 60 s, (d) 90 s, (e)120 s.



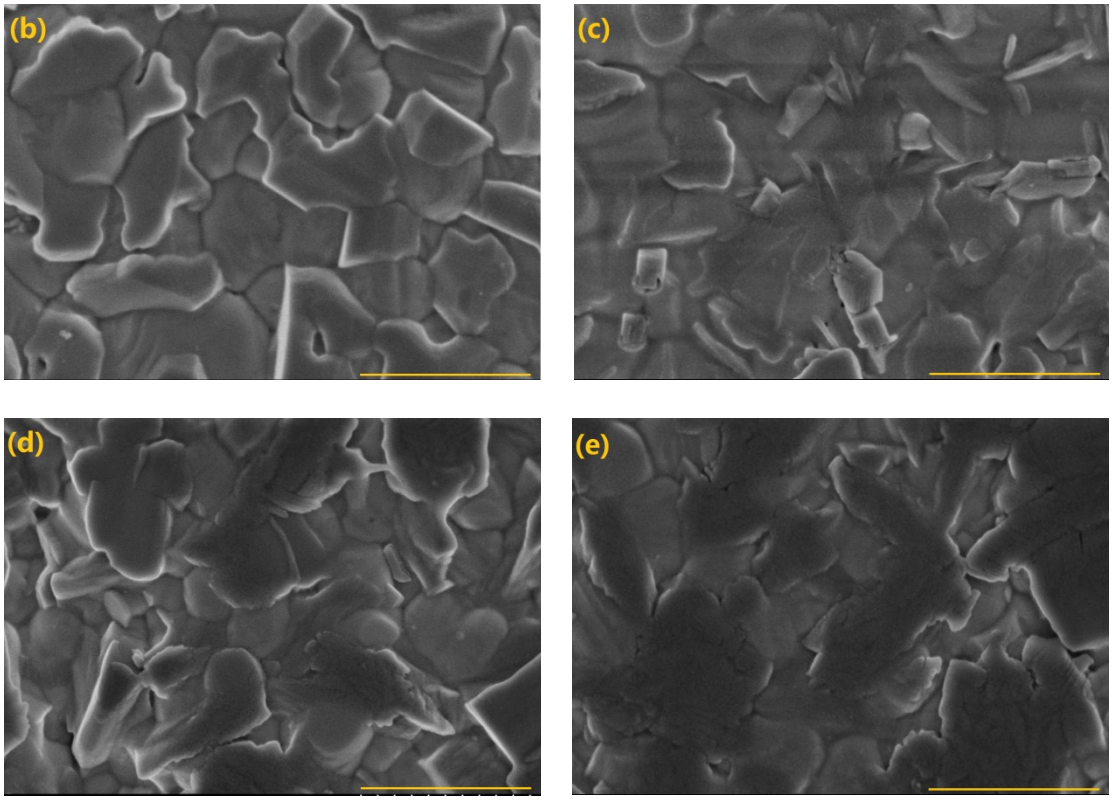


Figure S2. SEM images of CdTe NCs thin films via NA AVE with different time (a) 0 s, (b) 30 s, (b) 60 s, (c) 90 s, (d) 120 s (scale bar=500 nm).

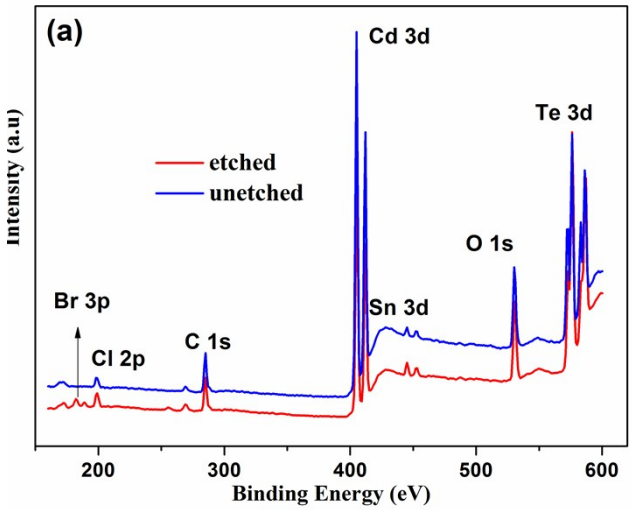


Figure S3. (a) XPS full-scan spectra of CdTe NCs thin film w/o BM vapor etching.

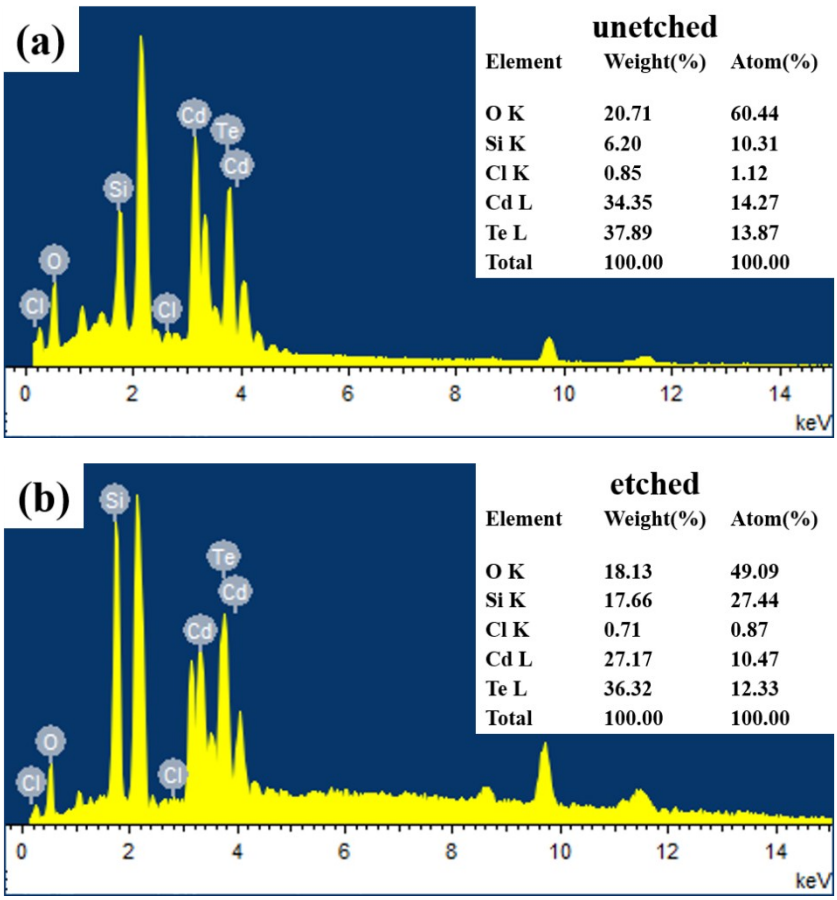


Figure S4. Energy dispersive spectrometer (EDS) measurements of the as-prepared CdTe samples (a) without AVE and (b) with AVE.

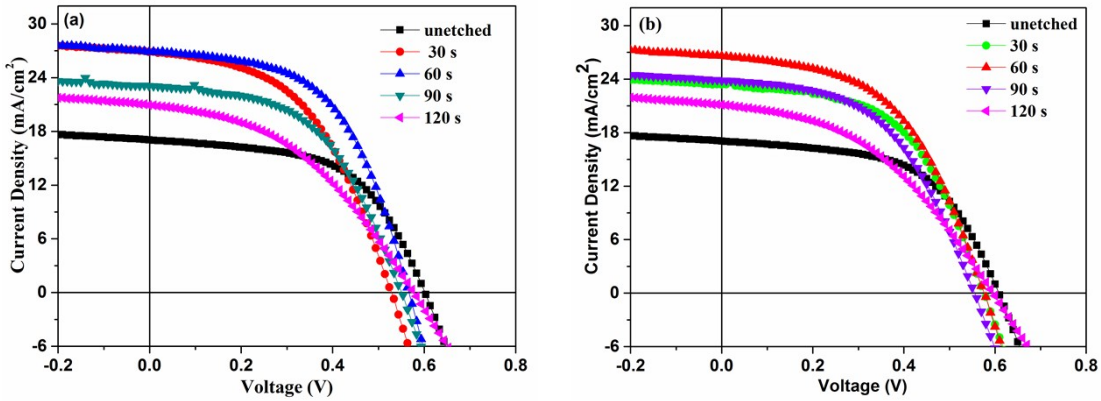


Figure S5. *J-V* characteristics of CdTe/CdSe NCs solar cells (a) with different BM vapor etching time and (b) with different NA etching time.

Table S1. Summarized device performance with different BM/NA AVE time

Condition	PCE (%)	J_{sc} (mA/cm^2)	FF (%)	V_{oc} (V)
unetched	5.83	17.06	56	0.61
BM AVE (30 s)	7	26.85	49.7	0.52
BM AVE (60 s)	8.38	27.66	51.1	0.59
BM AVE (90 s)	6.68	23.08	51.7	0.56
BM AVE (120 s)	5.25	21.02	43.1	0.58
NA AVE (30 s)	7.22	23.38	53.3	0.58
NA AVE (60 s)	8.67	27.33	54.7	0.58
NA AVE (90 s)	6.72	23.83	50.3	0.56
NA AVE (120 s)	5.37	21.12	42.4	0.6

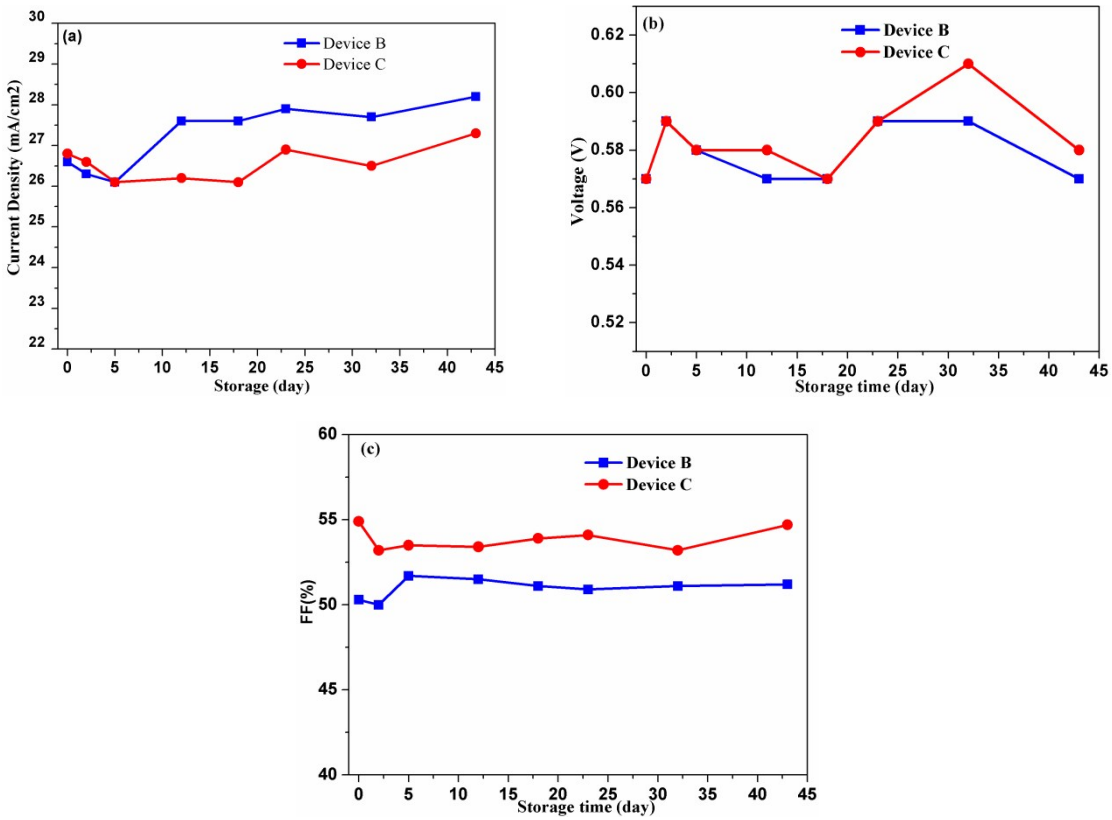


Figure S6. Stability of (a) J_{sc}, (b) V_{oc} and (c) FF of CdTe NCs devices with BM and NA AVE for different time periods under ambient air.

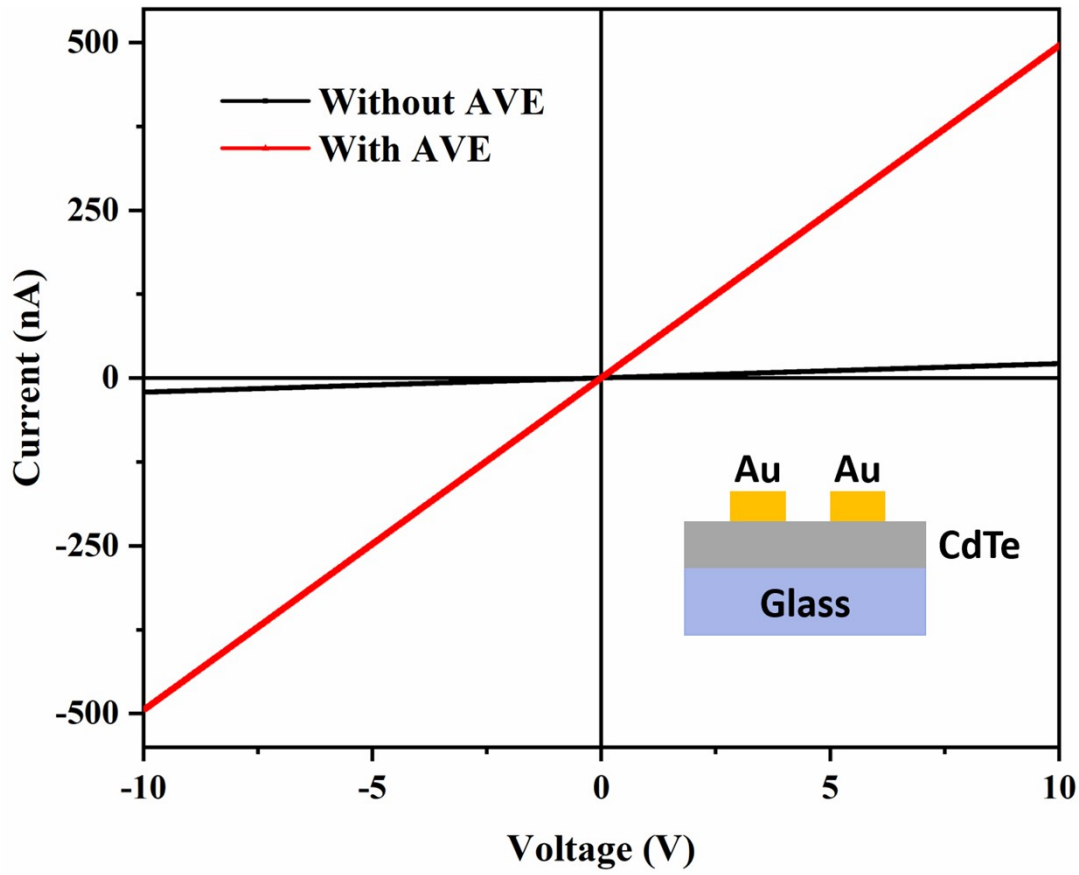


Figure S7. Dark current of CdTe films w/o AVE treatment.