

## SUPPORTING INFORMATION

# In Situ-Doped Silicon Thin Films for Passivating Contacts by Hot-Wire Chemical Vapor Deposition with a High Deposition Rate of 42 nm/min

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### I. Crystallinity of precursor a-Si:H layer.

### II. Crystallinity of crystallized poly-Si layer.

#### I. Crystallinity of precursor a-Si:H layer.

Raman spectroscopy was performed on the precursor a-Si:H thin films to measure the crystalline fraction of the thin film materials. Pure amorphous silicon thin films (crystalline fraction=0%) are determined for samples with varied  $\text{PH}_3$  concentrations. Figure S1 shows the Raman spectrum of precursor a-Si:H layer with 0.5%  $\text{PH}_3$  concentration. No obvious peak is shown in  $520\text{ cm}^{-1}$  which indicates crystalline silicon.

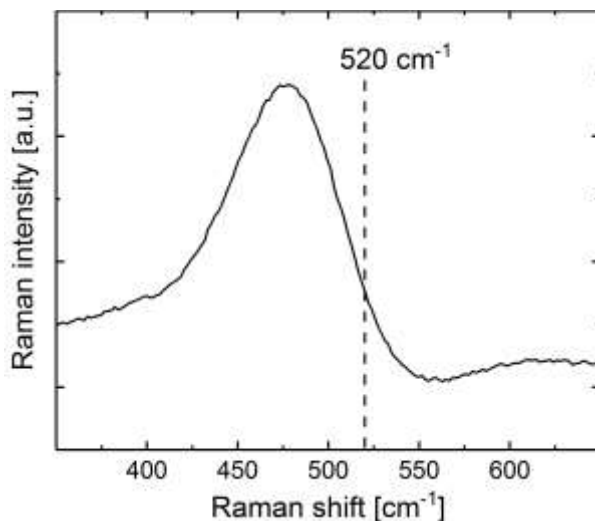


Figure S1. Raman spectrum of precursor a-Si:H layer deposited with 0.5%  $\text{PH}_3$  concentration.

#### II. Crystallinity of crystallized poly-Si layer.

After annealing at  $820^\circ\text{C}$  for 30 min, a full scan XRD measurement was performed on the crystallized poly-Si layers using a fast measurement setup (1s for each data point). Figure S2 shows the full scan spectrum of crystallized poly-Si layer deposited with 0.5%  $\text{PH}_3$  concentration. Using this fast measurement setup the signal-to-noise ratio is not good enough to

extract the domain size from the spectrum. Nevertheless, in the scanning spectrum only sharp crystalline peaks are shown and there is hardly any wave-shape signal which could be related to amorphous materials. This result shows that the amorphous fraction of the silicon layer, if there is any, is only a minor part of the poly-Si thin films.

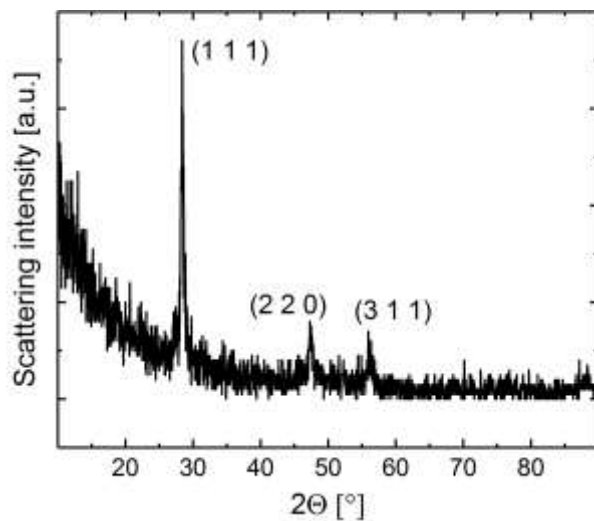


Figure S2. Full scan XRD spectrum of crystallized poly-Si layer deposited with 0.5%  $\text{PH}_3$  concentration.