Nearly Perfect Polycrystalline, Large-Grained Silicon Arrays Formed at Low-Temperature Ambient by Local Pyrolysis (Supporting Information)

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In Fig. S1 (a), the I_{heater}-V_{heater} curve (for the dense heater unit in the manuscript Fig. 1 (c)) is redrawn with the numbers representing each state, and corresponding I_{heater} vs. time and V_{heater} vs. time curves are shown in Fig. S1 (b). Total process time was ~7 min 30 sec, and p-Si growth time (Step $(5(S) \rightarrow 6(E))$) is ~ 2min.

Step $(0 \rightarrow 1)$: 1st heating

Step $(1 \rightarrow 2)$: thermal annealing

Step $(2 \rightarrow 3)$: 2nd heating before N₂ purge and stabilization

Step $(3\rightarrow 4)$: N₂ purge and stabilization under the same pressure as that of pyrolysis

Step $(4 \rightarrow 5)$: 3rd heating before pyrolysis

Step (5 (S) \rightarrow 6 (E)): pyrolysis or growth of p-Si (introduction of SiH₄/B₂H₆)

Step (6 \rightarrow 7): vacuum pumping & purging with N₂ under the same pressure as that of pyrolysis



Fig. S1. (a)I_{heater} vs. V_{heater} curve, and (b) I_{heater} or V_{heater} vs. time curves

Current and new heater structures with reduced temperature variation in the heater unit is shown in Fig. S2. In the region supported by the insulating column, the temperature will be lower than other suspended region due to heat transfer to the substrate and small amount of Joule heating ($=I_{heater}^2R$, R is the electrical resistance). In the current heater structure (2nd column of Fig. S2), disk diameter is wider than the bridge width, which make the amount of heating per unit volume larger in the bridge than in the disk. Amount of heat transfer is also larger in the disk than in the bridge. Therefore, decreasing the disk dimension or replacing with a narrower bridge and the smaller insulating column of Fig. S2). But, structural stability of the new heater structure needs to be optimized, taking into account of relative dimension and process complexity.



Fig. S2. Current heater structure (2nd column) and new heater structure with reduced temperature variation (3rd column).