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Supporting information for

Rapid vapour deposition and in situ melt crystallization for 1-min fabrication of 10-µm-thick crystalline silicon films with a lateral grain size of over 100 µm

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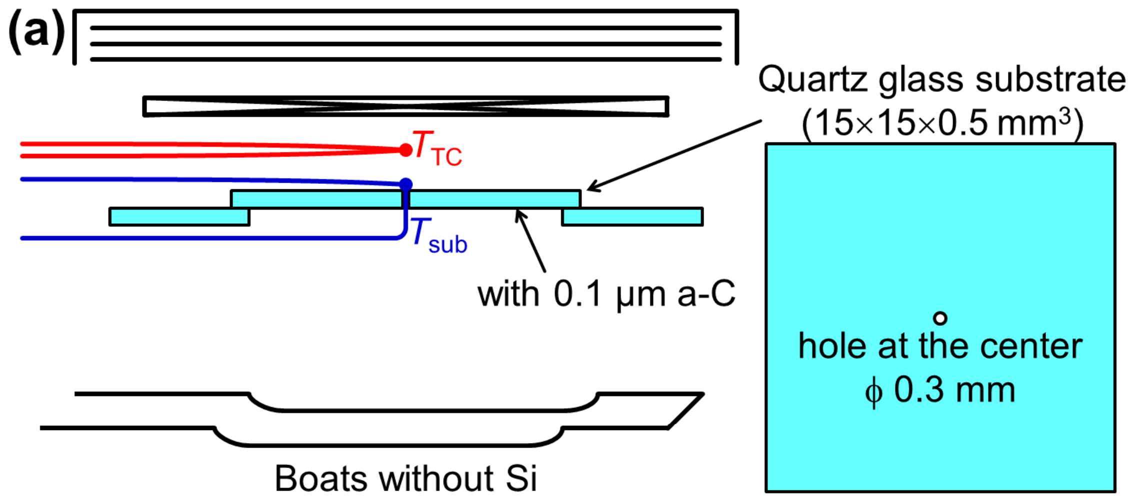

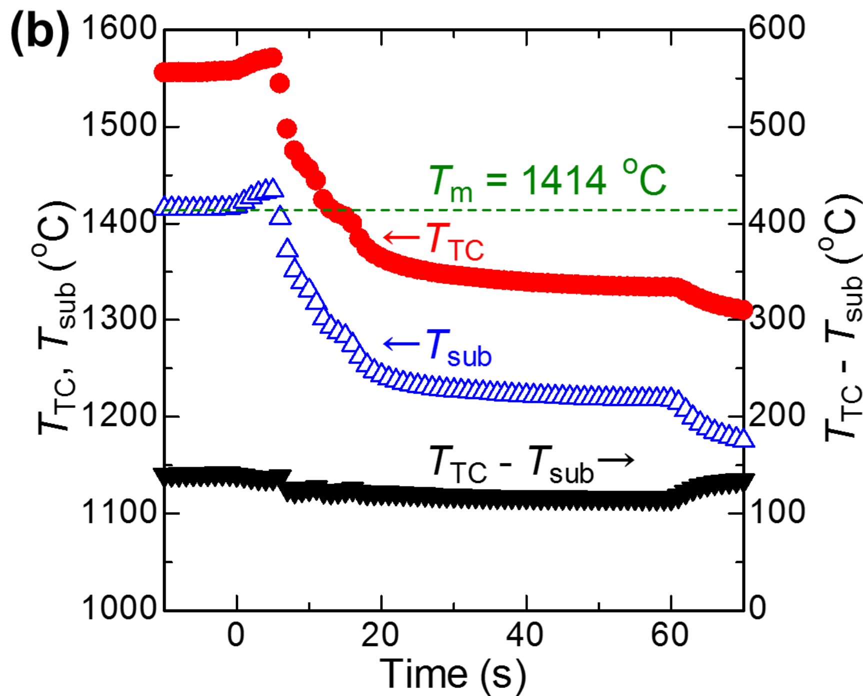

Fig. S1 Temperature measurement of the substrate during the RVD process. Measurement was done with the same time profile of input powers for the tungsten boats and the carbon heater as the standard Si deposition method (Fig. 3) but without putting the Si source material in the boats. Quartz glass substrate with 0.1 μm-thick a-C layer was used (the same substrate structure as Fig. 3), and a Pt-$Pt_{0.87}Rh_{0.13}$ thermocouple was attached to the substrate through a ϕ=0.3 mm hole made at the centre of the substrate. The substrate temperature (T_{sub}) proved to be 100–150 °C lower than the upper $W_{0.95}Re_{0.05}$-$W_{0.74}Re_{0.26}$ thermocouple temperature (T_{TC}), and slightly above the melting point of Si (T_m = 1414 °C) when starting the RVD process. And T_{sub} decreased below T_m by decreasing the heating power for the upper carbon heater at 5 s.

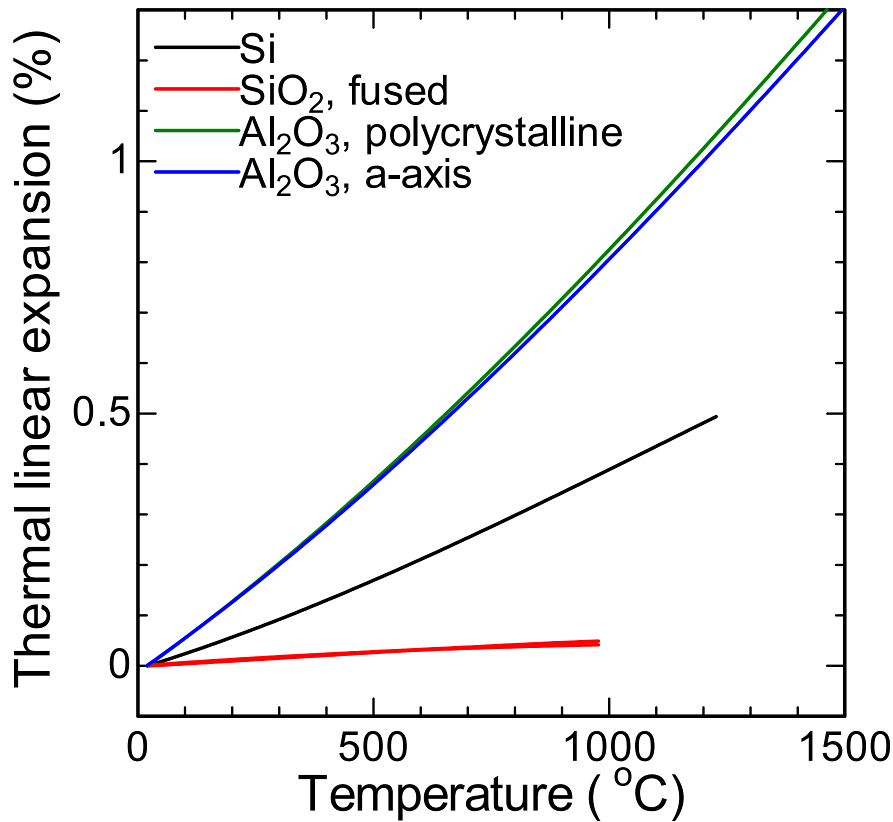

Fig. S2 Thermal linear expansion of Si, SiO_2, and Al_2O_3., calculated using the equations recommended by Touloukian, et al.[26] The expansions (%) are:

Si: $-0.071 + 1.887\times10^{-4}(T+273) + 1.934\times10^{-7}(T+273)^2 - 4.544\times10^{-11}(T+273)^3$

SiO_2, fused: $-0.014 + 4.028\times10^{-5}(T+273) + 2.733\times10^{-8}(T+273)^2 - 1.541\times10^{-11}(T+273)^3$

$-0.022 + 8.728\times10^{-5}(T+273) - 3.200\times10^{-8}(T+273)^2 + 2.347\times10^{-12}(T+273)^3$

$-0.015 + 3.968\times10^{-5}(T+273) + 4.666\times10^{-8}(T+273)^2 - 3.446\times10^{-11}(T+273)^3$

Al_2O_3, poly: $-0.180 + 5.494\times10^{-4}(T+273) + 2.252\times10^{-7}(T+273)^2 - 2.894\times10^{-11}(T+273)^3$

Al_2O_3, a-axis: $-0.176 + 5.431\times10^{-4}(T+273) + 2.150\times10^{-7}(T+273)^2 - 2.810\times10^{-11}(T+273)^3$

where T is temperature (°CI.

26. Y. S. Touloukian, R.K. Kirby, R.E. Taylor and T.Y.R. Lee, *Thermophysical Properties of Matter - The TPRC Data Series. Volume 13. Thermal Expansion - Nonmetallic Solids*, IFI Plenum, New York, 1977, p. 154, p. 176, and p. 358.