Electronic Supplementary Information

Parametric Scheme for Rapid Nanopattern Replication via Electrohydrodynamic Instability

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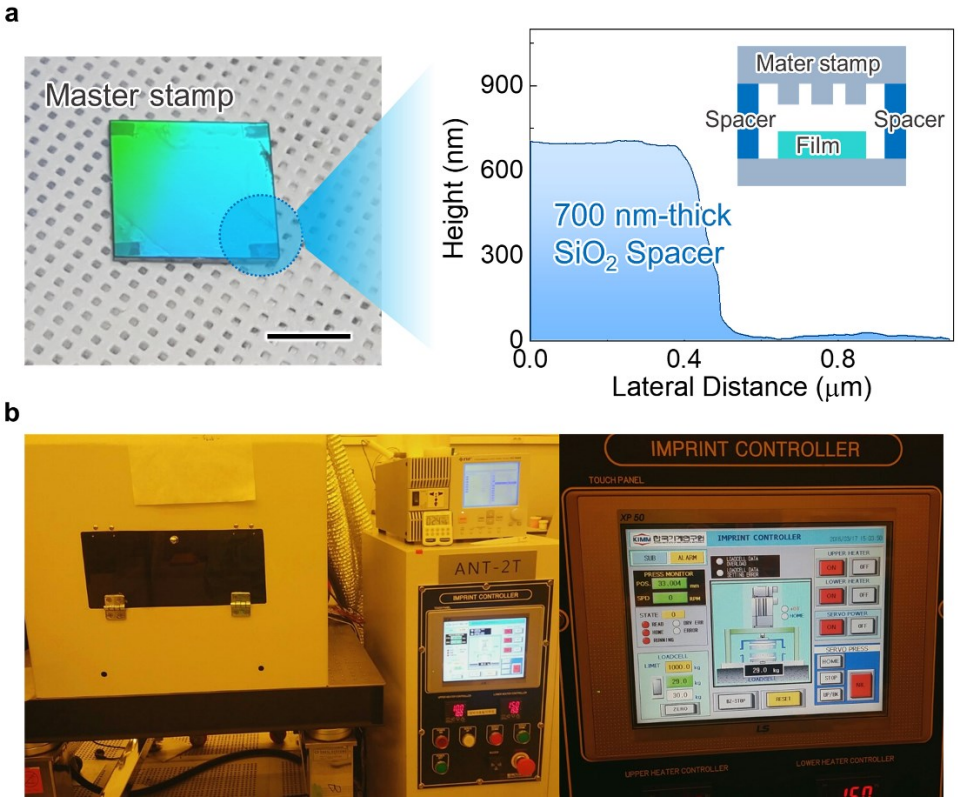

Fig. S1. (a) Dielectric spacers placed on each four corners of the master stamp are employed to support the wedge geometry in capacitor-like assembly. The electrode gap of 400 nm was maintained by employing 700 nm-thick spacer layer and the protrusion height of 300 nm (i.e., 700 – 300 = 400 nm). The thickness of spacer layer (i.e., electrode gap) was measured by AFM. Scale bar represents 1 cm. (b) To maintain gap uniformity during pattern replication, a commercially available nano-imprinter was employed with a mechanical pressure of 50 kPa.

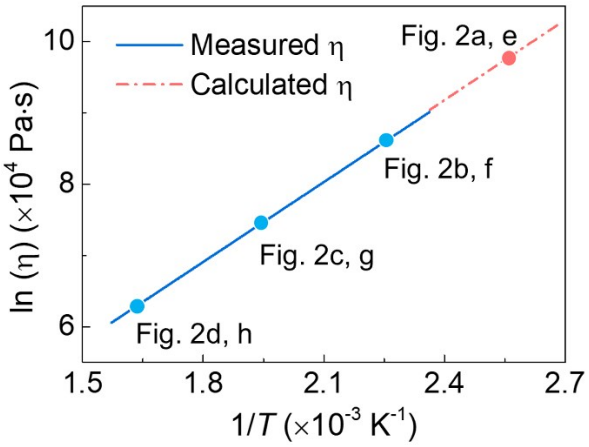

Fig. S2. The viscosity values of the liquefied PS film were measured by using the Rheometer system (ARES-G2; shear rates of 0.01 – 0.1 s^{-1} at 0.1 °C/s). The measured viscosity values (blue solid line) are in excellent agreement with our calculated ones (red dash-single dotted line). It should be also noted that, because of the limited fluidity of PS below 150 °C, the calculated value of η at 120 °C was used instead for the sake of completeness.

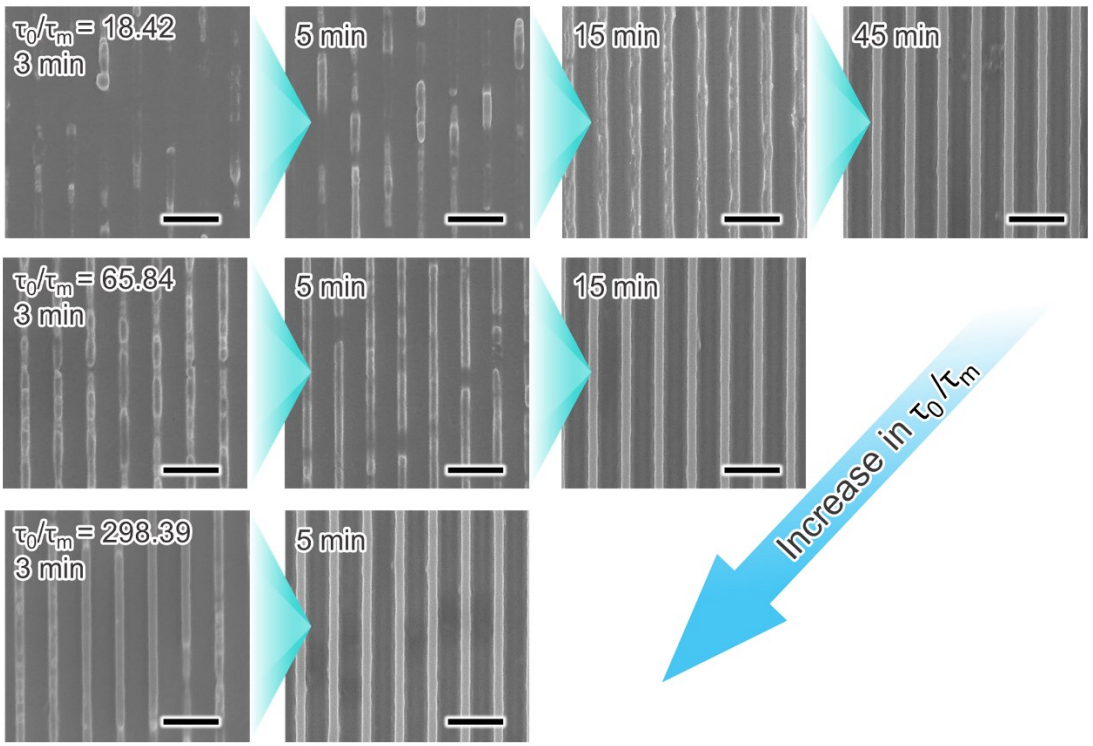

Fig. S3. The effect of τ_0/τ_m on pattern evolution: a nano-sized line array having 200 nm linewidth and 550 nm periodicity was successfully replicated in 45 min at τ_0/τ_m = 18.42. Further increase of τ_0/τ_m up to 298.39, the faithful replication of the line array was completed in 5 min. Scale bar, 1 μm.