Rapidly and Controllable Fabrication of Large-Scale and High-orderly Micro-Honeycomb Arrays Induced by Nonsolvent Phase Separation

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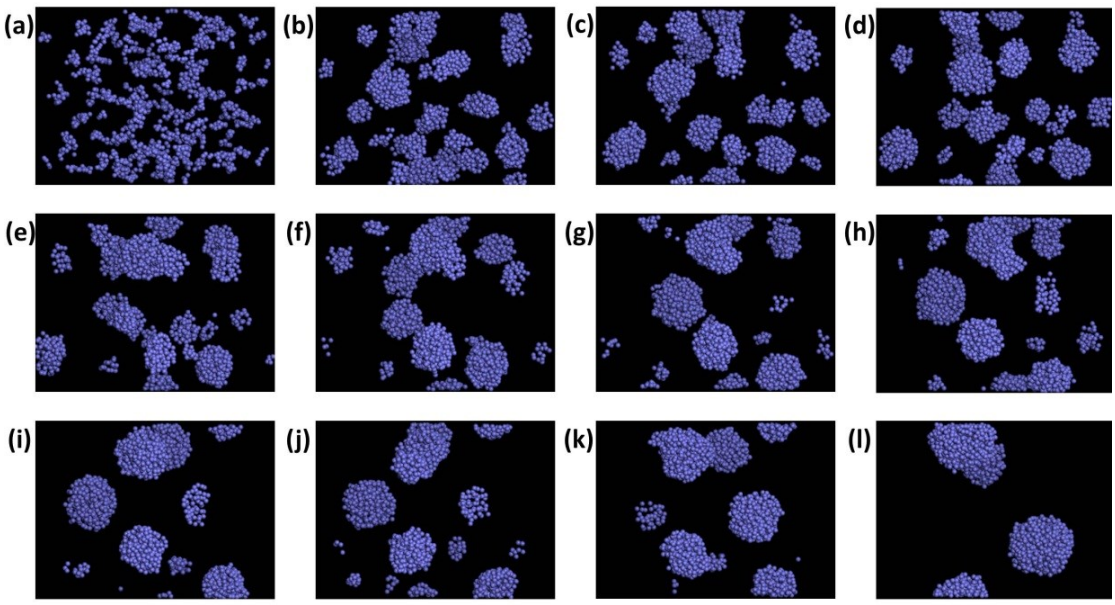

Figure S1. The DPD stimulation. (a-l) The phase separation of chloroform, methanol and PMMA ternary system simulated by dissipative particle dynamics along with time by erasing the chloroform and PMMA beads

Table S1. Parameters of each bead used in this simulation[1].

Bead	ρ / g·cm^{-3}	Unit molar volume / cm^3·mol^{-1}	Unit volume / Å^3	Number of repeat units or molecules for per bead	Solubility parameter / MPa$^{0.5}$
$CHCl_3$	1.48	80.74	134.12	1	18.9
CH_3OH	0.79	40.50	67.27	2	29.7
PMMA	1.18	84.74	140.76	1	19.5

Table S2. Flory-Huggins interaction parameters between beads.

	$CHCl_3$	CH_3OH	PMMA
$CHCl_3$	0		
CH_3OH	3.870		
PMMA	0.011	3.450	0

Table S3. DPD interaction parameters between beads.

	$CHCl_3$	CH_3OH	PMMA
$CHCl_3$	25.00		
CH_3OH	38.53	25.00	
PMMA	25.04	37.06	25.00

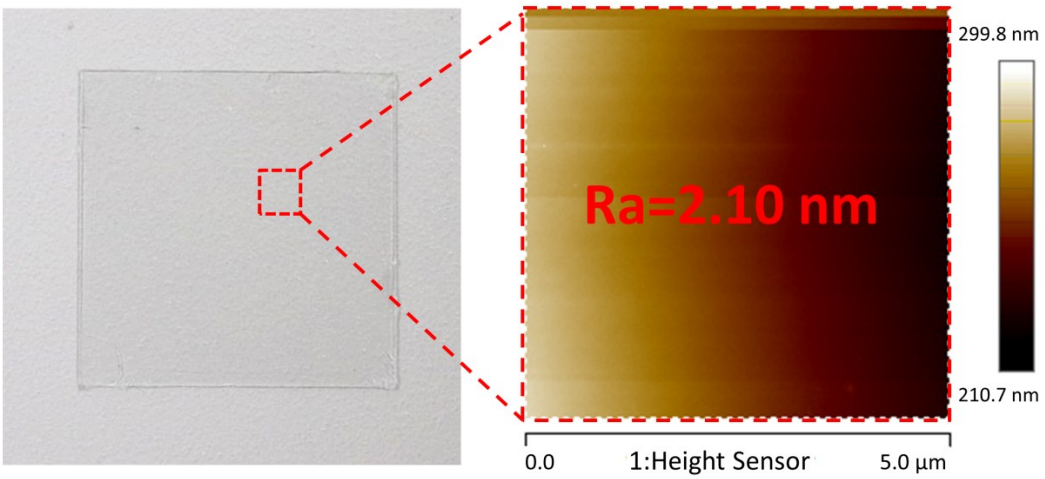

Figure S2. The photo of the spin-coating PMMA film and the AFM image of surface roughness.

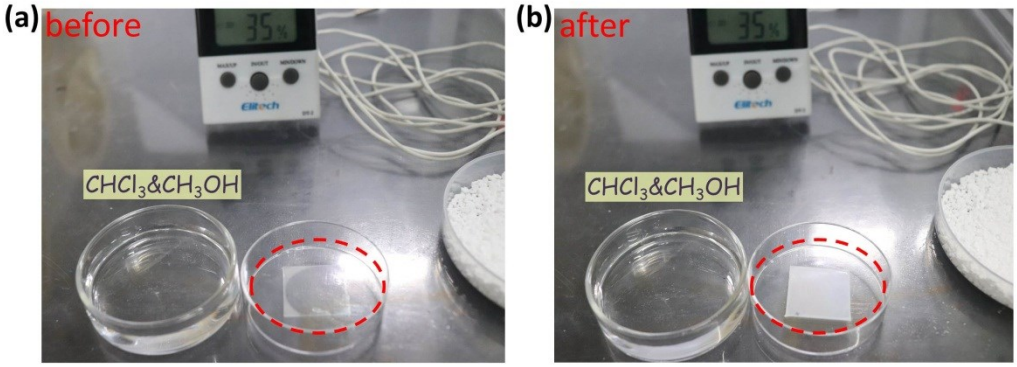

Figure S3. Optical pictures of the experimental equipment. The initial state (a) and the final state (b) of the PMMA coating glass after soaking in the $CHCl_3$/CH_3OH solution, respectively.

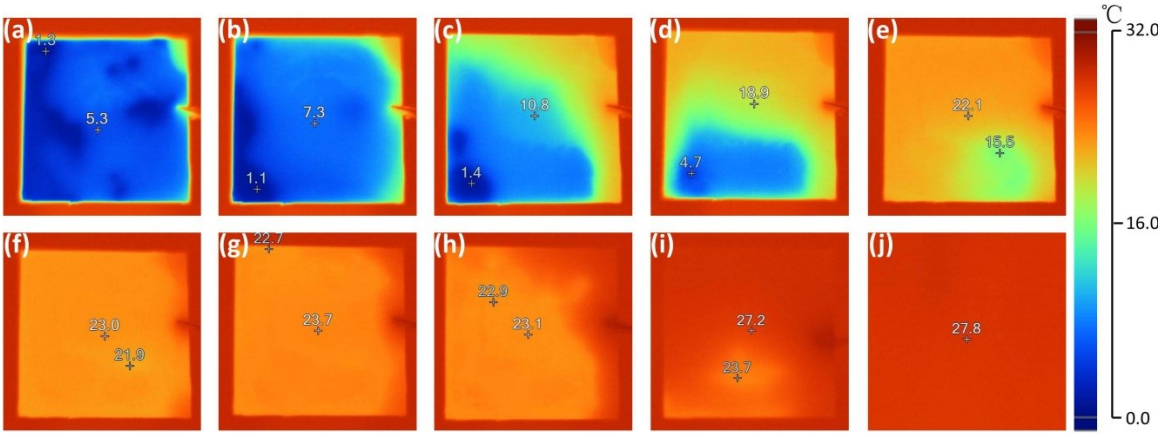

Figure S4. The surface temperature of PMMA film during the solvent volatilization. (a-j) IR images after the PMMA film draining out the $CHCl_3$/CH_3OH solution from the beginning to the end (recorded by every 15 s).

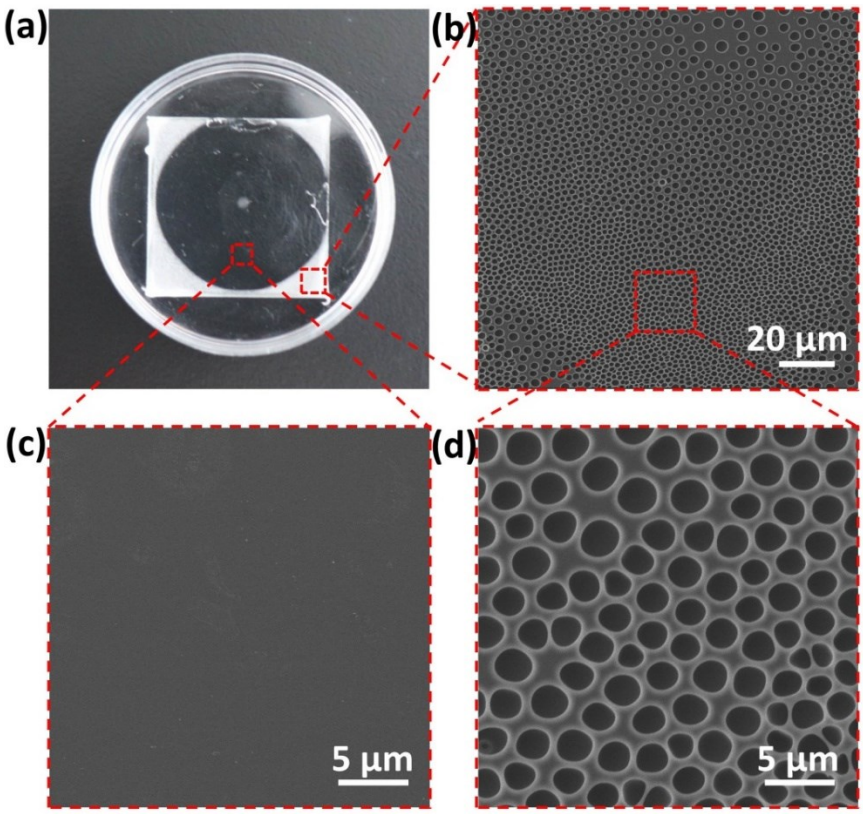

Figure S5. The one-step spin-coating film of the ternary system composed by chloroform, methanol and PMMA. (a) The optical photograph of PMMA film. The SEM images (b) and its magnification (d) of the edge of the polymer film. (c)The SEM image of the transparent part in the center of the polymer film.

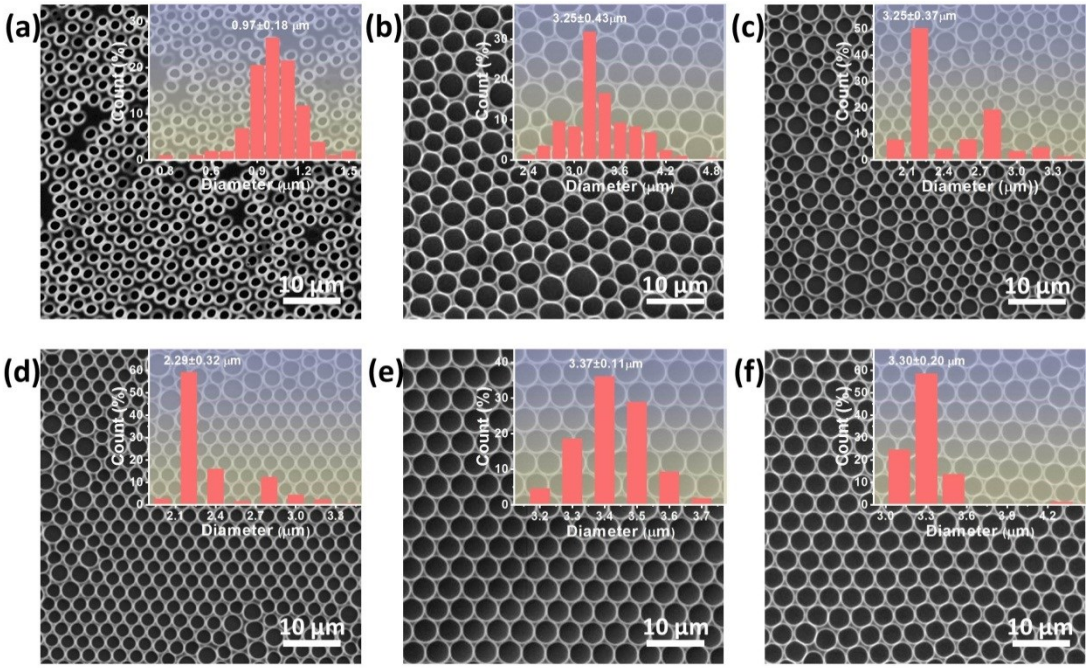

Figure S6. SEM images of micro-honeycomb structures at different mixing times of methanol and chloroform. (a-f) The mixing time of 0 h, 2 h, 4 h, 6 h, 8 h and 10 h,

respectively.

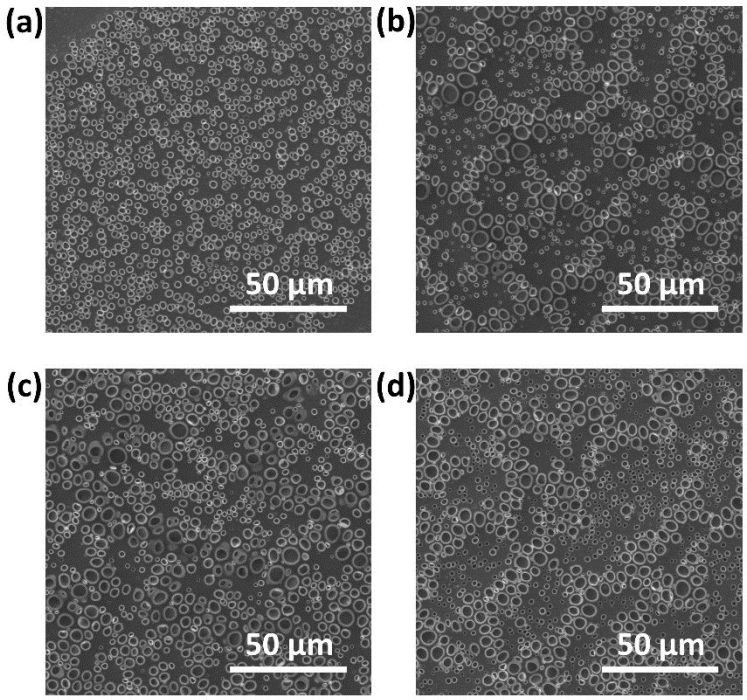

Figure S7. SEM images of micro-honeycomb structures only soaking in the chloroform solvent without methanol at different humidity. (a-d) 20%RH, 30%RH, 40%RH and 60%RH, respectively.

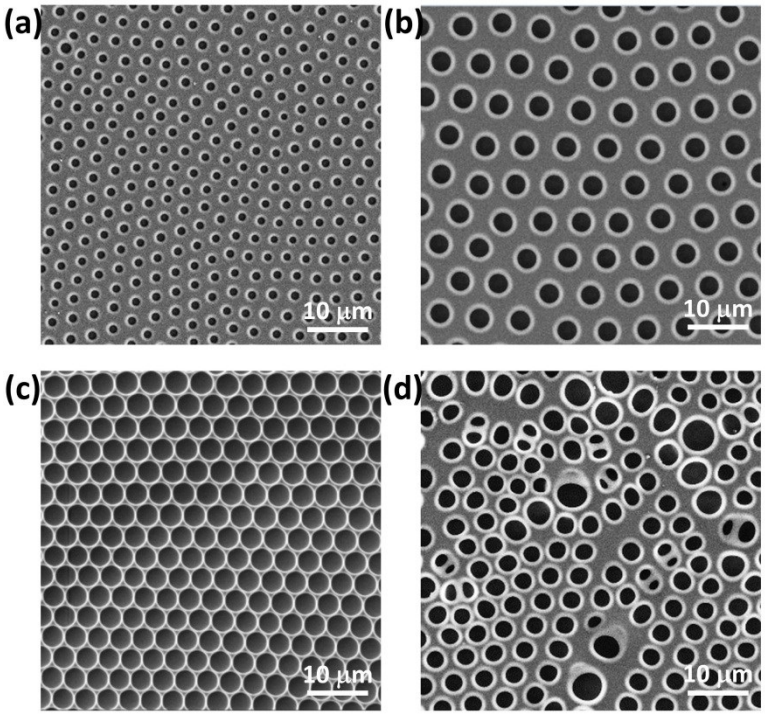

Figure S8. SEM images of micro-honeycomb structures with different humidity. (a-d) 20% RH, 30% RH, 40% RH and 60% RH, respectively.

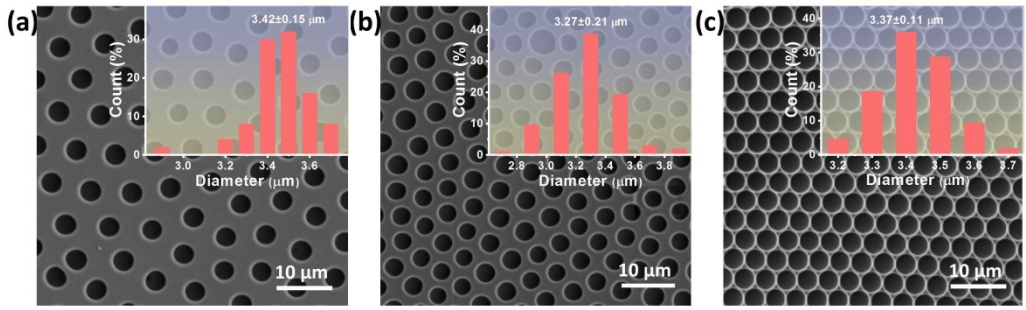

Figure S9. SEM images of micro-honeycomb structures on different substrates at the same preparing condition. (a-c) The copper sheet, silicon wafer and glass slice, respectively.

Reference：

1． C. M. Hansen, Hansen solubility parameters: a user's handbook. -- 2nd ed.: CRC Press of Taylor & Francis Group, 2007.