Supporting information for

Fabrication of Two-dimensional Arrays of Diameter-tunable PS-b-P2VP Nanowires at the Air/Water Interface

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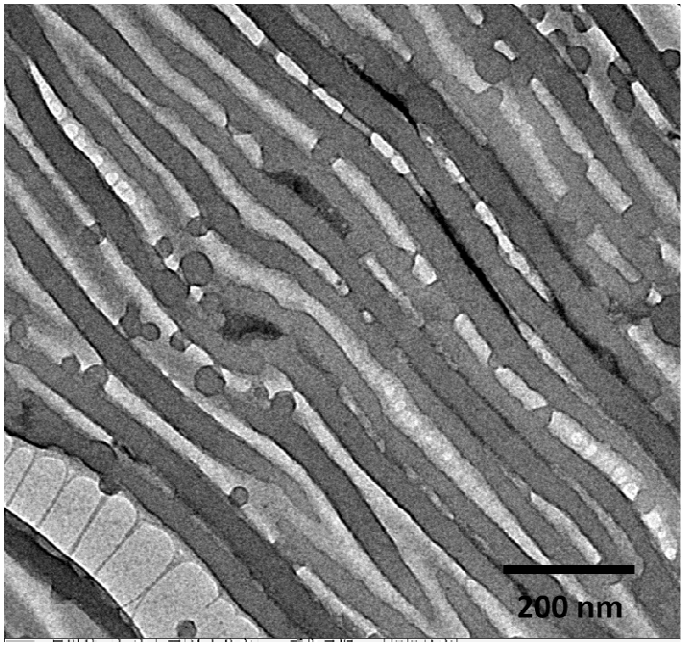

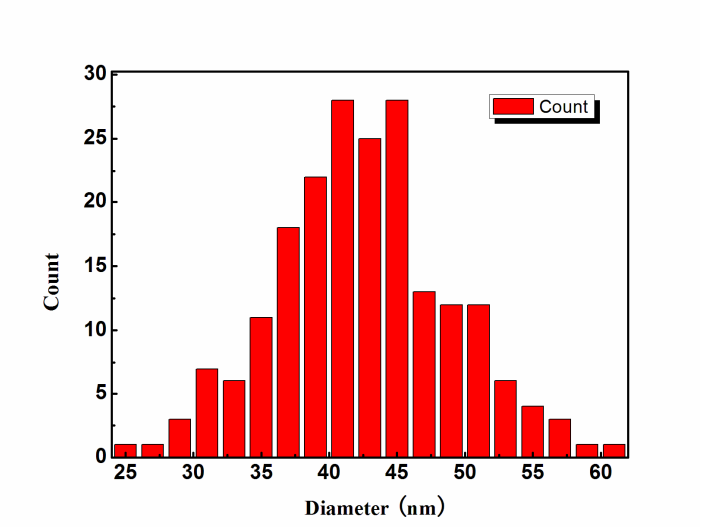

Figure S1. TEM image of the nanowires of pure PS-b-P2VP formed at the air/liquid interface and the diamater distribution histogram of the nanowires.

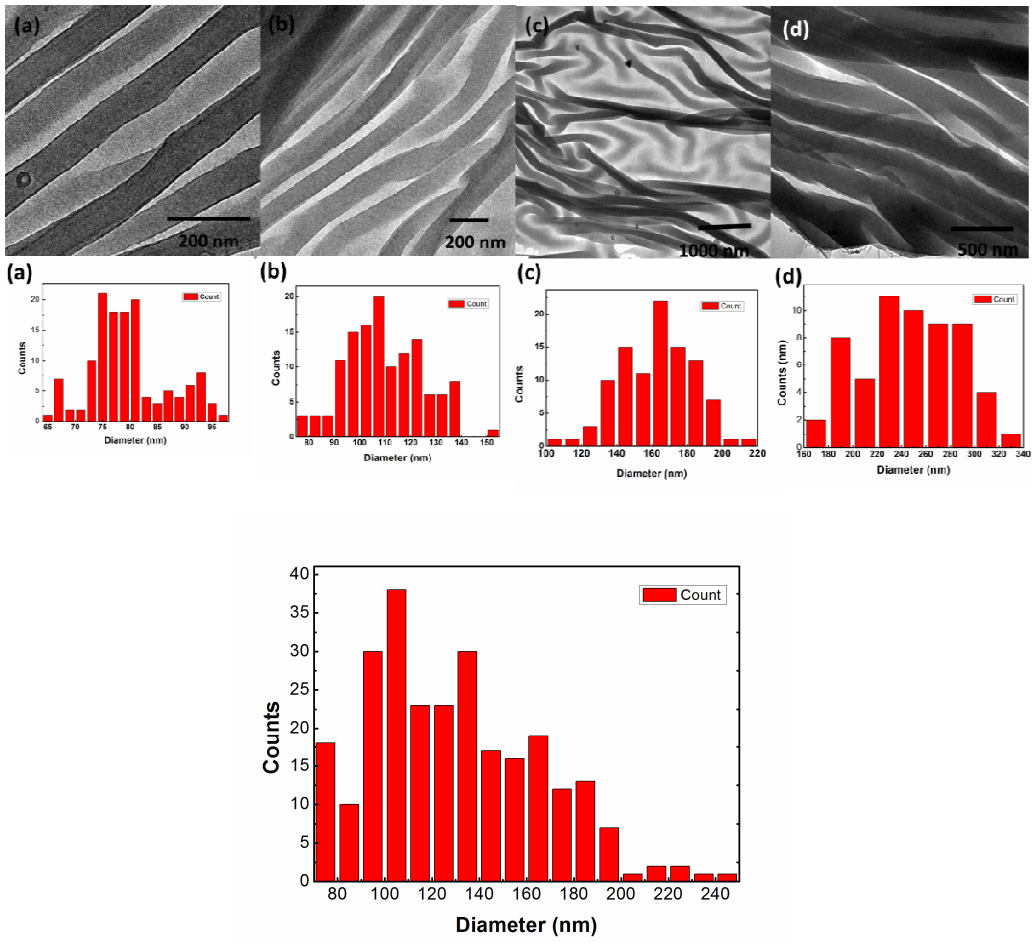

Figure S2. TEM images of the mixed h-PS1/PS-b-P2VP (mass ratio: 20) nanowires appeared at different areas, the corresponding diameter distribution histograms of the nanowires and the diamater distribution histogram of all the nanowires

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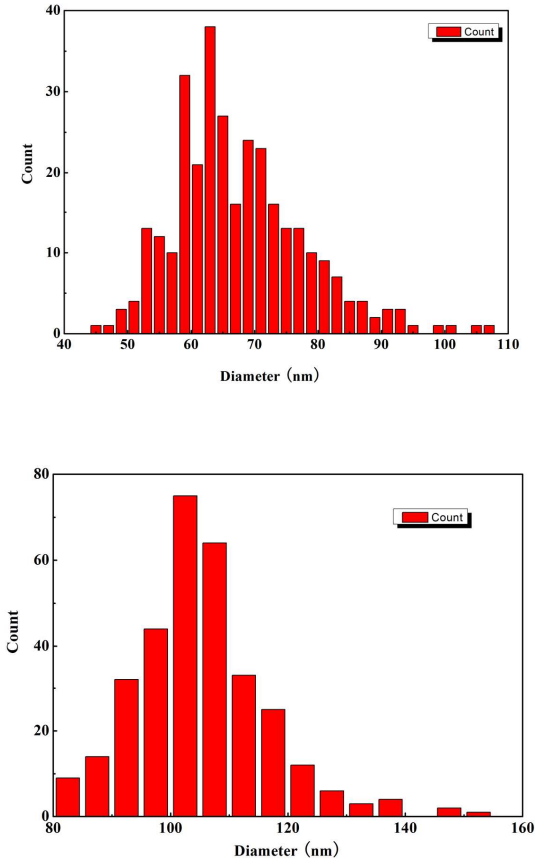

Figure S3. Diameter distribution histograms of the nanowires formed at the air/water interface. Top: h-PS1/PS-b-P2VP = 4; Bottom: h-PS1/PS-b-P2VP = 12.

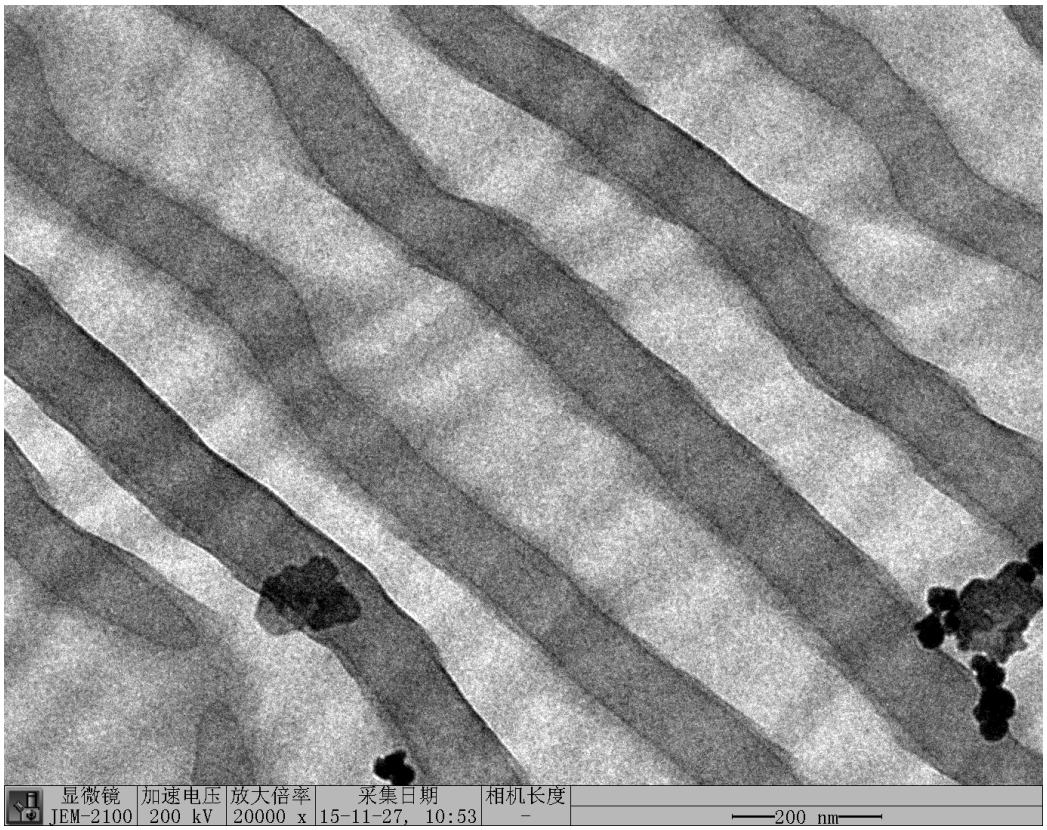

Figure S4. TEM image of the mixed h-PS2/PS-b-P2VP (mass ratio: 20) nanowires formed at the air/liquid interface.

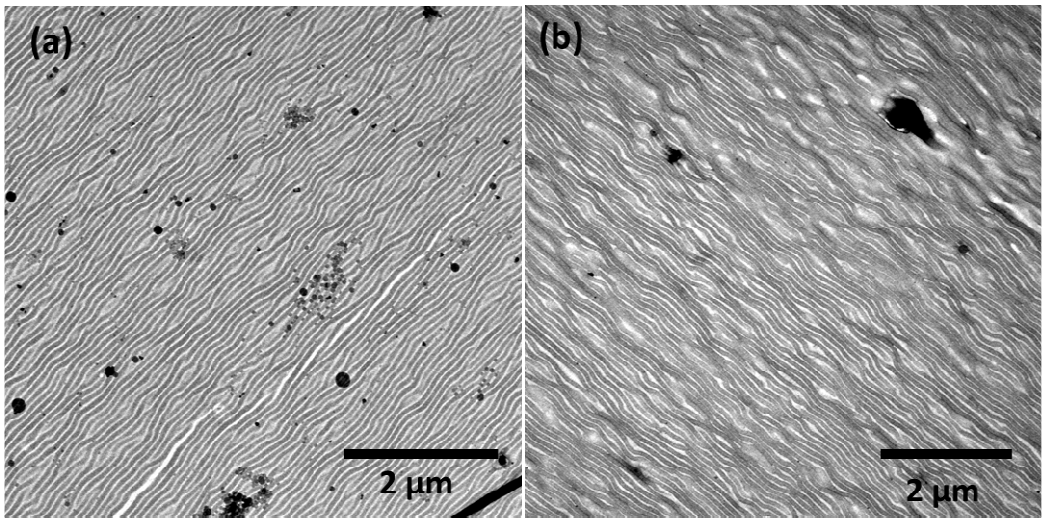

Figure S5. TEM imeges of the nanowires formed at the air/liquid interface. (a), Pure PS-b-P2VP; (b), h-PS1/PS-b-P2VP with the mass ratio of 4.

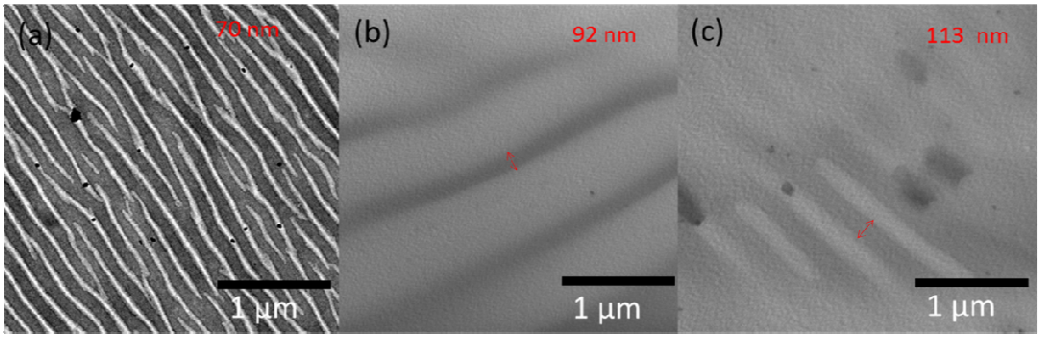

Figure S6. TEM micrographs of thin films of PS-b-P2VP [M_n(PS) = 440000 g mol^{-1}; M_n(P2VP) = 12500 g mol^{-1}; M_w/M_n = 1.2] formed at the air/water interface via encapsulation of h-PS1 with different mass ratios of h-PS1/PS-b-P2VP: 0 (a), 2 (b), and 4 (c).

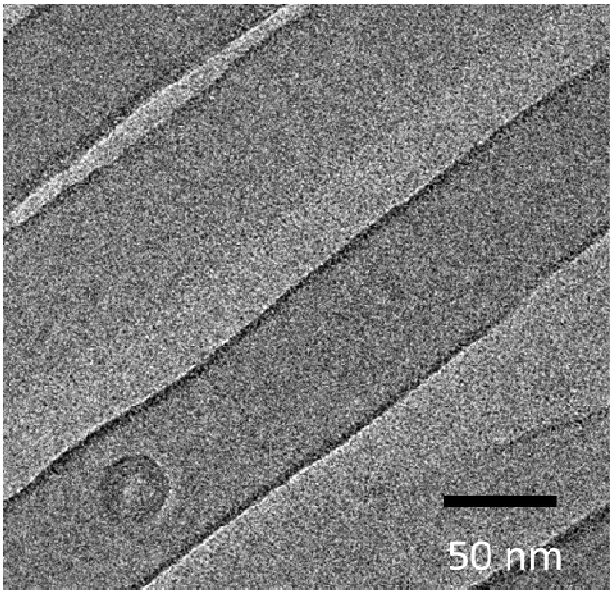

Figure S7. A high magnification TEM micrograph of the thin film formed at the air/water interface via encapsulation of h-PS1 with the mass ratio of 6.

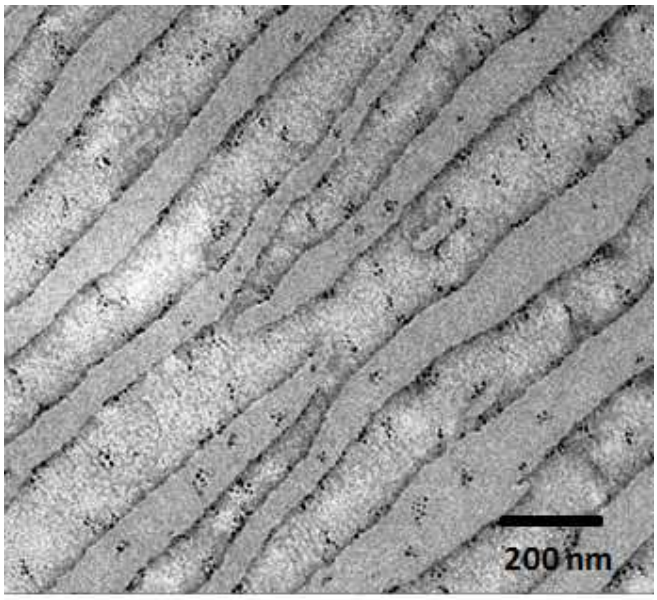

Figure S8. TEM image of the PS-b-P2VP/Pb^{2+} nanowires formed at the air/liquid interface. The concentration of the block copolymer is 0.2 mg mL^{-1}, the volume ratio of the DMF/chloroform is 6:4, the concentration of the lead acetate is 2×10^{-3} mol L^{-1}, and volumes of the mixed organic solution of the polymer and the aqueous solution of Pb^{2+} are 5 mL, respectively.

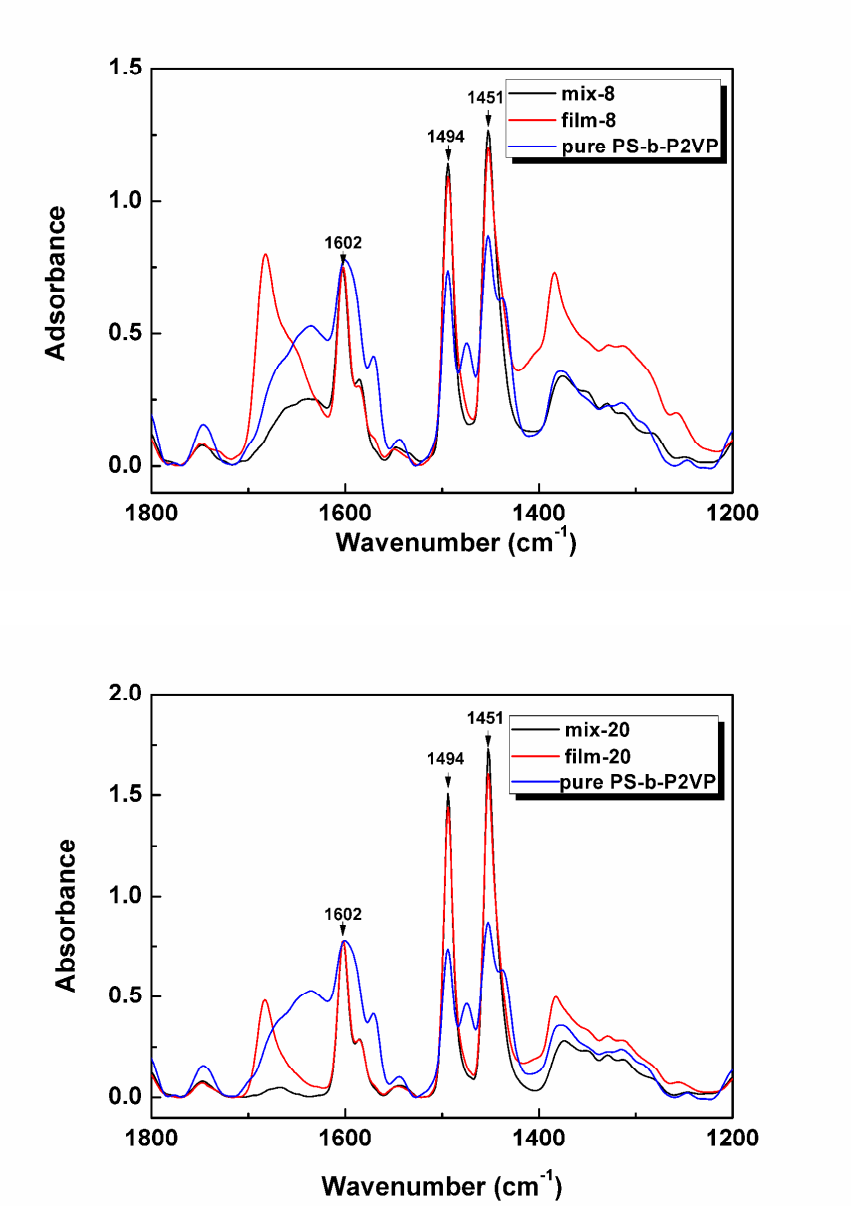

Figure S9. FTIR spectra of the pure block copolymer, the composite films of h-PS1/PS-b-P2VP formed at the air/water interface with different mass ratios (8 and 20) and the corresponding physical mixtures of h-PS1/PS-b-P2VP.

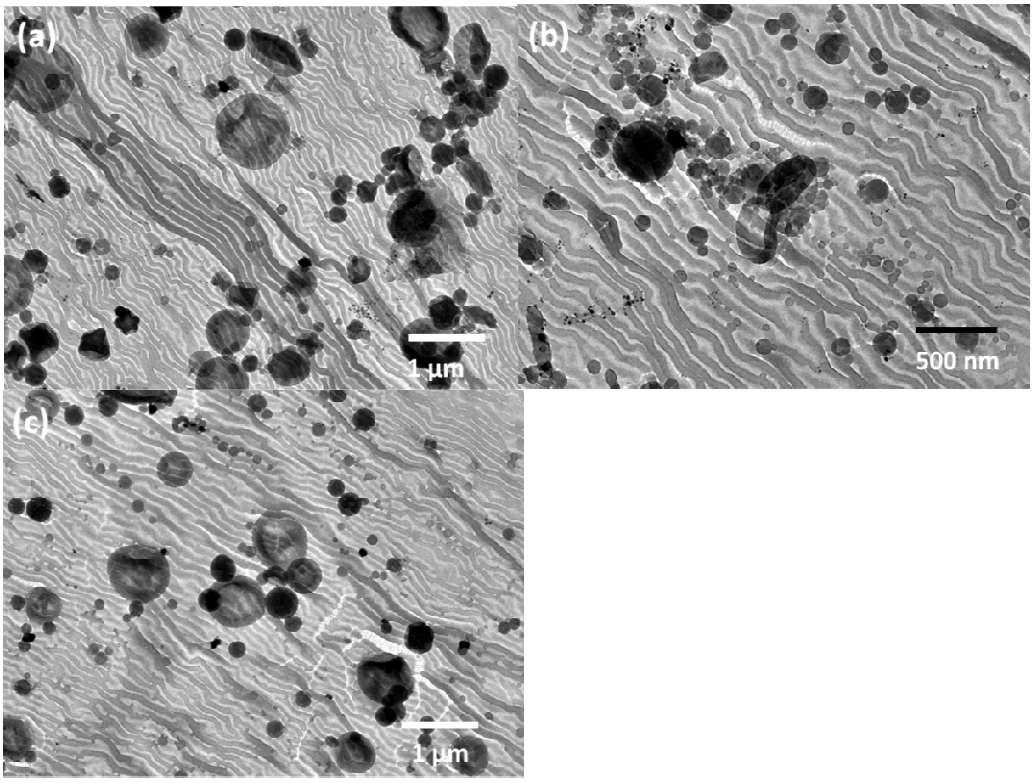

Figure S10. TEM micrographs of the mixed films of h-PS3/PS-b-P2VP with the mass ratios of 1 (a,b) and 2 (c). It can be see that a large amount of solid spheres appeared in the images.

Table S1. Mean diameters and the diameter distributions of the nanowires of PS-b-P2VP and the mixed h-PS1/PS-b-P2VP systems with different mass ratios.

Mass Ratio (h-PS1/PS-b-P2VP)	Diameter (nm)	σ (nm)
0	42	5
1	53	4
2	63	5
4	70	5
6	88	7
8	97	9
12	107	24
20	147	77

Table S2. Mean diameters and the diameter distributions of the nanowires of PS-b-P2VP and the mixed h-PS2/PS-b-P2VP systems with different mass ratios.

Mass Ratio (h-PS1/PS-b-P2VP)	Diameter (nm)	σ (nm)
0	42	5
0.2	44	4
1	46	4
2	54	4
3	58	5
4	68	6
5	103	10
6	105	12
8	106	10
20	104	13

Table S3. Mean diameters and the diameter distributions of the nanowires of PS-b-P2VP and the mixed h-PS3/PS-b-P2VP systems with different mass ratios.

Mass Ratio (h-PS1/PS-b-P2VP)	Diameter (nm)	σ (nm)
0	42	5
1	70	7
2	65	5
4	68	8
20	71	8

Measurement and calculation of the thin film amount: The mass of the film formed at the air/liquid interface was measured using a balance (Sartorius, BS 124S). Firstly, 20 mg of PS-b-P2VP and 160 mg of h-PS1 were dissolved in 40 mL chloroform in a 100 mL volumetric flask. Then DMF was added to the mark. This mixed organic solution was used as organic phase to form the liquid/liquid interface. Sixteen glass bottles with the inner diameter of 3.5 cm were used to prepare the thin film. 5 mL of the mixed organic solution was added to a bottle, and then 5 mL aqueous solution of $AgNO_3$ with a concentration of 0.01 mol L^{-1} was added carefully to cover the organic phase. A planar liquid/liquid interface was constructed. A thin film appeared at the air/aqueous solution interface quickly. This film was a free-standing one and deposited on a glass slide after 8 hours. All the films formed at the air/liquid interface by using the 16 glass bottle were selected and dried in a desiccator with P_2O_5 as drying agent. The sample was measured using a balance after 2 days. The mass of the film was found to be 12.2 mg.

The total area of the air/liquid interface can be calculated. $A = 3.14 \times 3.5^2 \times 16 = 615.44$ cm^2. Then the mass of the film per cm^2 should be 0.0198 mg, i.e. 19.8 μg.

In order to get these films, $(20 + 160) \times 80/100 = 145$ mg. So the yield can be calculated to be: $12.2/145 = 0.084 = 8.4\%$. Please note that the actual yield should be less than this value slightly due to the existence of the silver species in the films.

If the formed film is a monolayer composed of parallel aligned close-packed nanowires, the mass can be calculated. For the composite nanowires of the h-PS1/PS-b-P2VP with the mass ratio of 8, the mean diameter of the nanowires was measured to be 107 nm. Then the volume of the film can be calculated as follows:

$V = 615.44 \times 107 \times 10^{-7} \times (3.14/4) = 5.17 \times 10^{-3}$ cm^3.

If just consider the PS (PS block and h-PS1), the density of the PS is 1.05 g cm^{-3}. Then the mass can be calculated as: $M = 1.05 \times 5.17 \times 10^{-3} = 5.43 \times 10^{-3}$ g = 5.43 mg

So the mass per cm^2 is 5.43/615.44 = 0.0088 mg, i.e. 8.8 μg.

It can be seen that the calculated 8.8 μg cm^{-2} is less than the measured value, 19.8 μg cm^{-2}. The difference should be attributed to the combined Ag^+ ions and the formed Ag nanoparticles. It can be also seen that the formed thin film can be considered as a monolayer. The yield should be dependent on the area of the air/liquid interface.