Electronic Supplementary Material (ESI) for Nanoscale.
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Supporting Information

Mixed-Scale Channel Networks Including Kingfisher-Beak-Shaped 3D Microfunnels for Efficient Single Particle Entrapment

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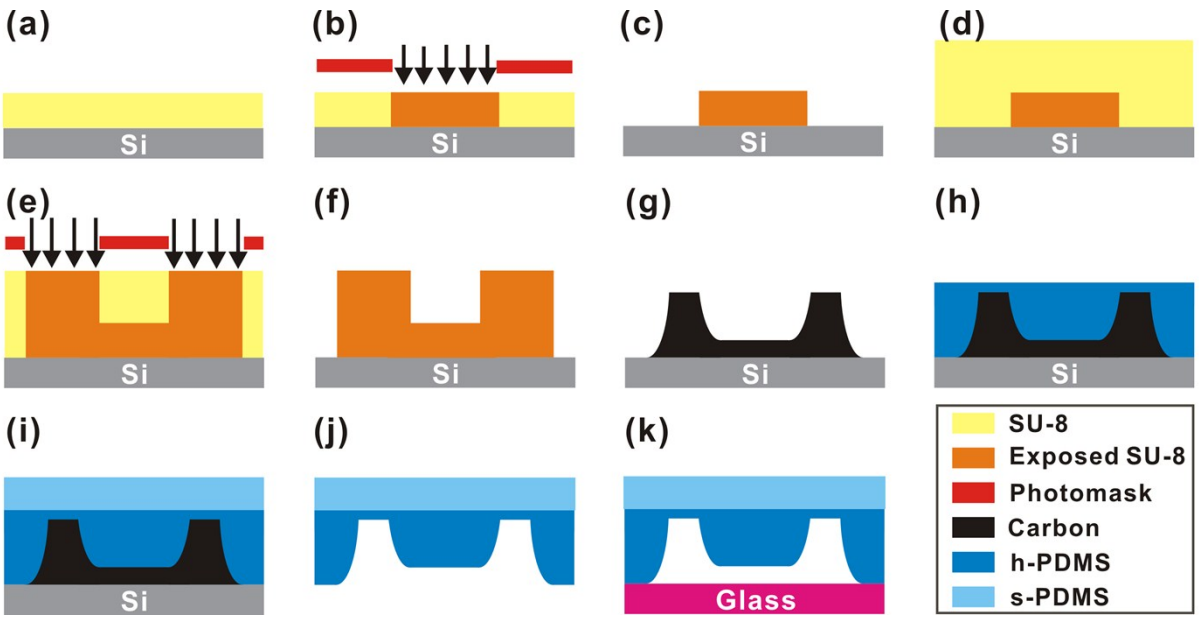

Fig. S1 Schematic of mixed-scale PDMS channel network fabrication: (a) thin SU-8 photoresist spin-coating for nanochannel molds, (b) 1st UV exposure, (c) development, (d) thick SU-8 photoresist spin-coating for microchannel molds, (e) 2nd UV exposure, (f) development, (g) pyrolysis, (h) h-PDMS casting, (i) s-PDMS casting, (j) demolding, and (k) Glass/PDMS bonding.

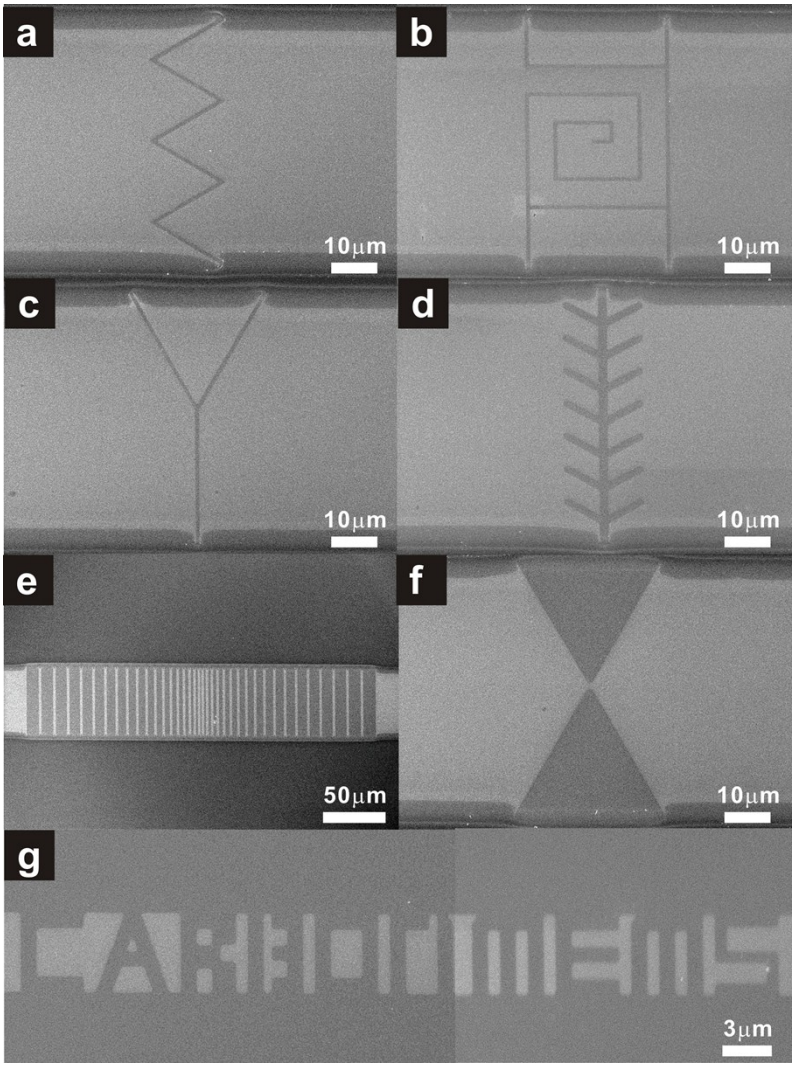

Fig. S2 Various carbon structures fabricated by two-step UV lithography and pyrolysis. (a) Zigzag shape, (b) maze shape, (c) 'Y' shape, (d) arrow shape, (e) bar code shape, (f) nanosized funnels, (g) "Carbon MEMS". Thickness of all structures is 32 nm.

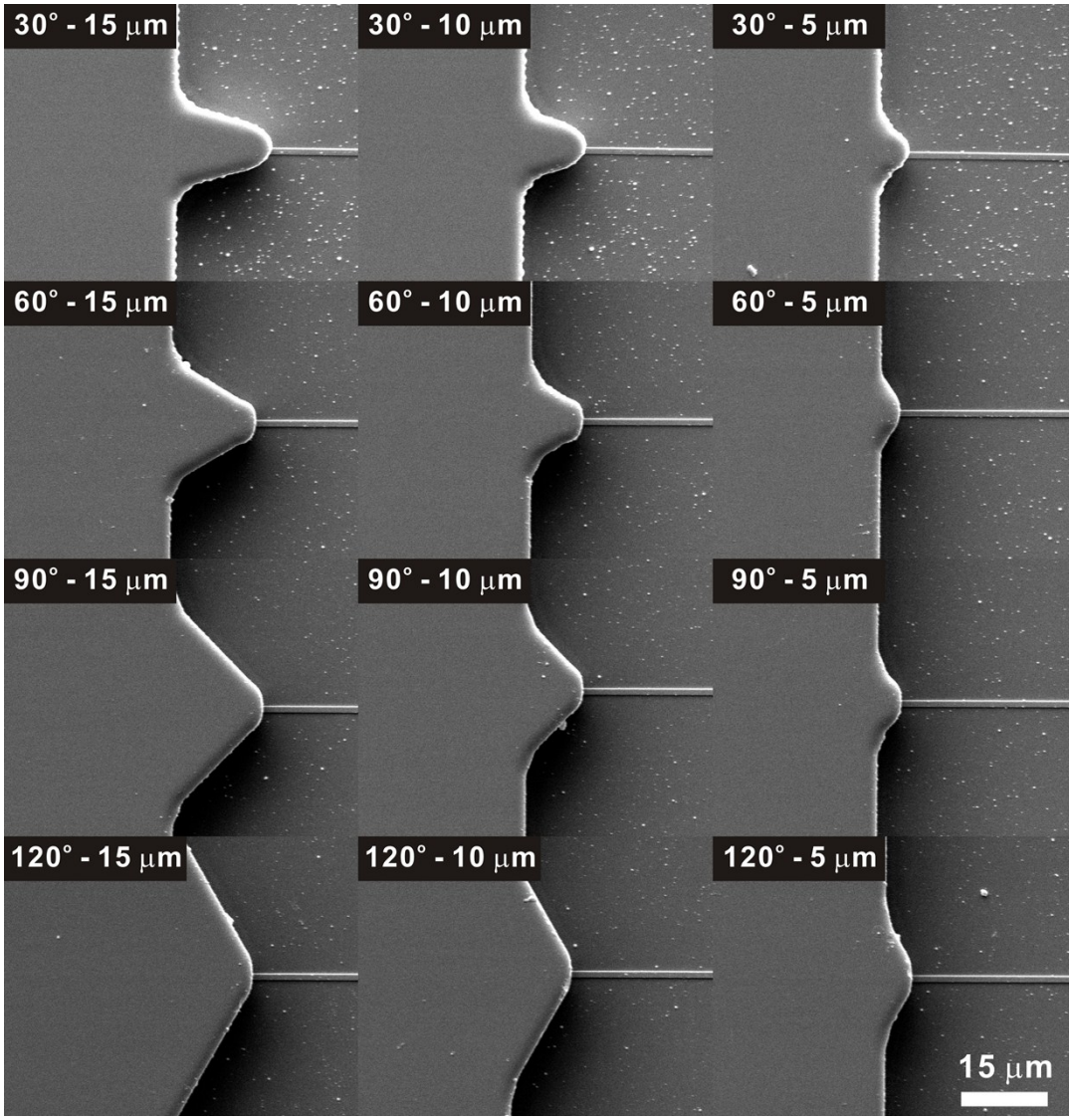

Fig. S3 Various designs of SU-8 microfunnel structures categorized according to inlet angle and nose length of the funnel structure.

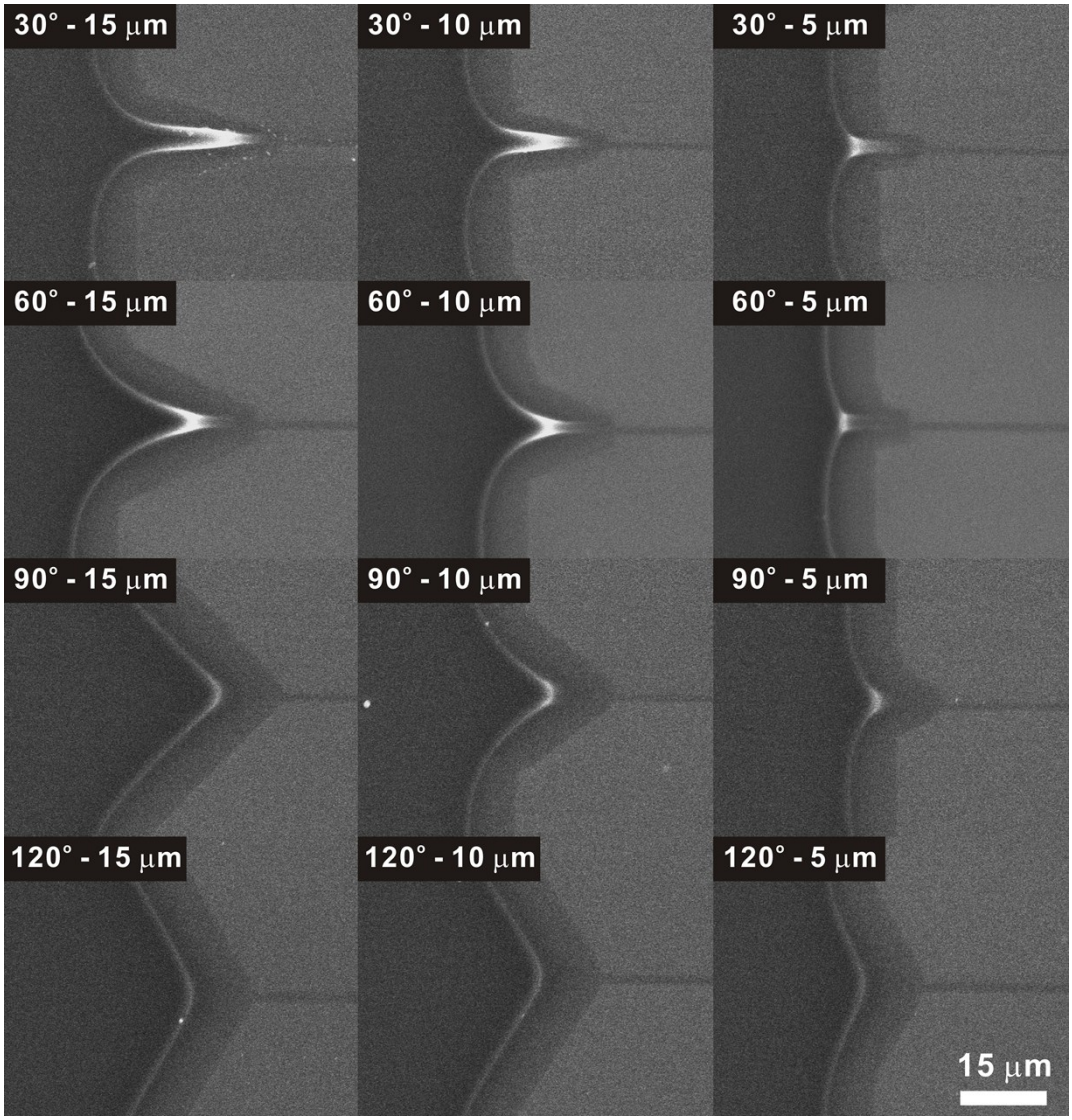

Fig. S4 Various designs of carbon microfunnel molds categorized according to inlet angle and nose length of the SU-8 funnel structure.

The video clips 'Video 1.avi' and 'Video 2.avi' recorded the single particle entrapment and multiple particle entrapment experiments with 6 frame/s. As shown in Video 1, single particles are trapped sequentially along the microfunnel array with a high aspect ratio and a long nose length (inlet angle = 30°, nose length = 15 μm), and no additional particles are not trapped. However, multiple particles are trapped in microfunnels with a large inlet angle (inlet angle = 60°, nose length = 15 μm) as shown in Video 2, because the cross-sectional areas of the funnels do not reduce in a uniform way.