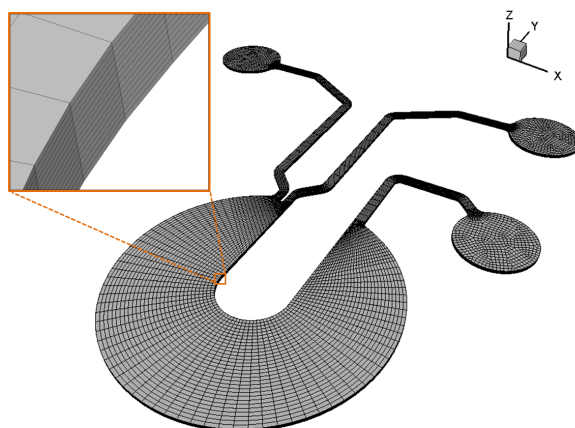


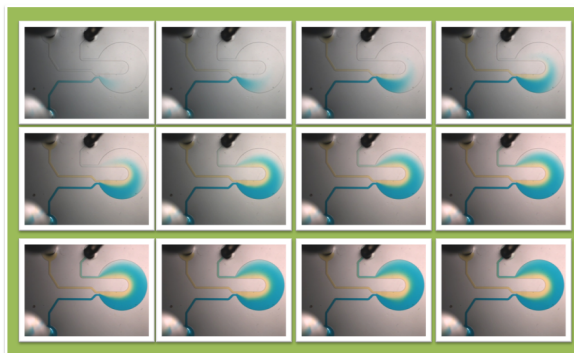
## Supplementary Information

**Movie clip.** (File name: 25hr\_25sec.wmv, size: 2.7 Mb) The transient of gradient generation in the system was recorded. This file is a 25sec-movie clip that was recorded for 25 h. The flow was generated by using 0.1M PEG solution for osmosis.

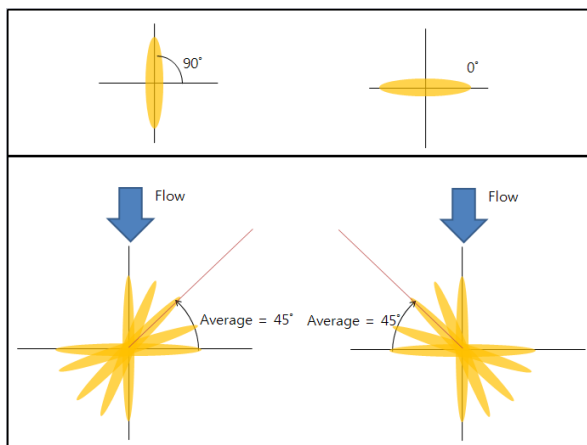
**Fig. S1.** Mesh generation for computer simulation. The total grid number was approximately 100,000. Inset illustrates the vertical mesh.



**Fig. S2.** Development and stabilization of chemical gradient. In the food dye experiment, the stable gradient profile was achieved in less than 30 min. Pictures were taken at 1 min intervals in this figure.



**Fig. S3.** As shown in the top figure, two extreme cases can be made, and the average angle of these cases is obviously  $45^\circ$ . Expanding this idea, two symmetric alignments should be considered as shown in the bottom figure. However, in the view point of the flow, the both cases are identical and we measured the angle from the line perpendicular to the flow direction, ranging from  $0^\circ$  to  $90^\circ$ .



**Fig. S4.** Cell distribution in the main channel (phase contrast image). Initially, cell distribution in the vicinity of the outer rim of the channel was low relative to other regions, where cells were uniformly distributed.

