Property investigation of replaceable PDMS membrane for using as an actuator in microfluidic devices

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Figure List

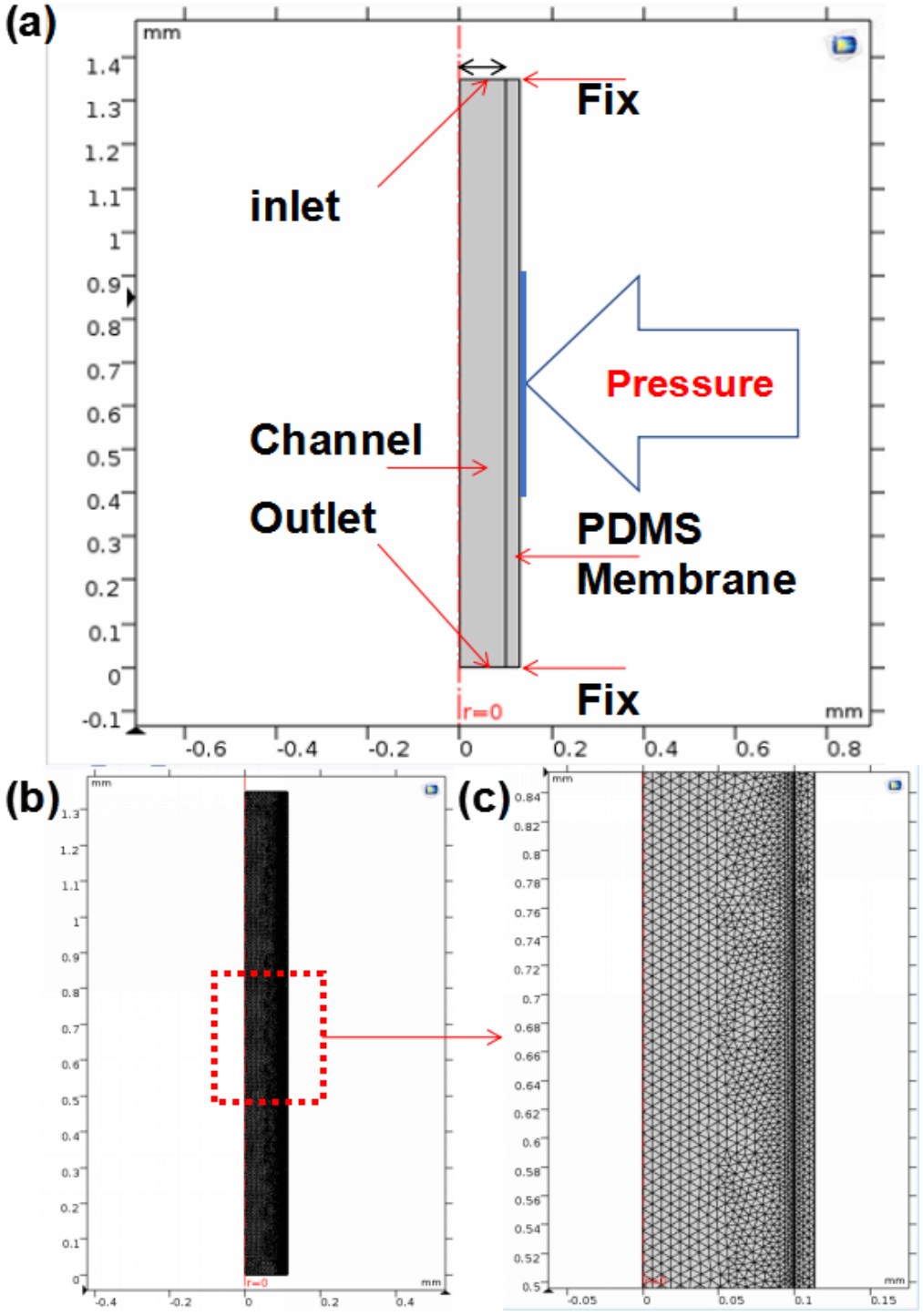

Figure. S1. Geometry for simulation and calculating domain. (a) Geometry and boundary conditions for simulation. The height of the channel is 100 μm. The area in diameter of 500 μm was set to apply pressure. (b) Simulation domain filled with calculating elements. (c) Enlarged image of the center area enclosed by red rectangle in (b).

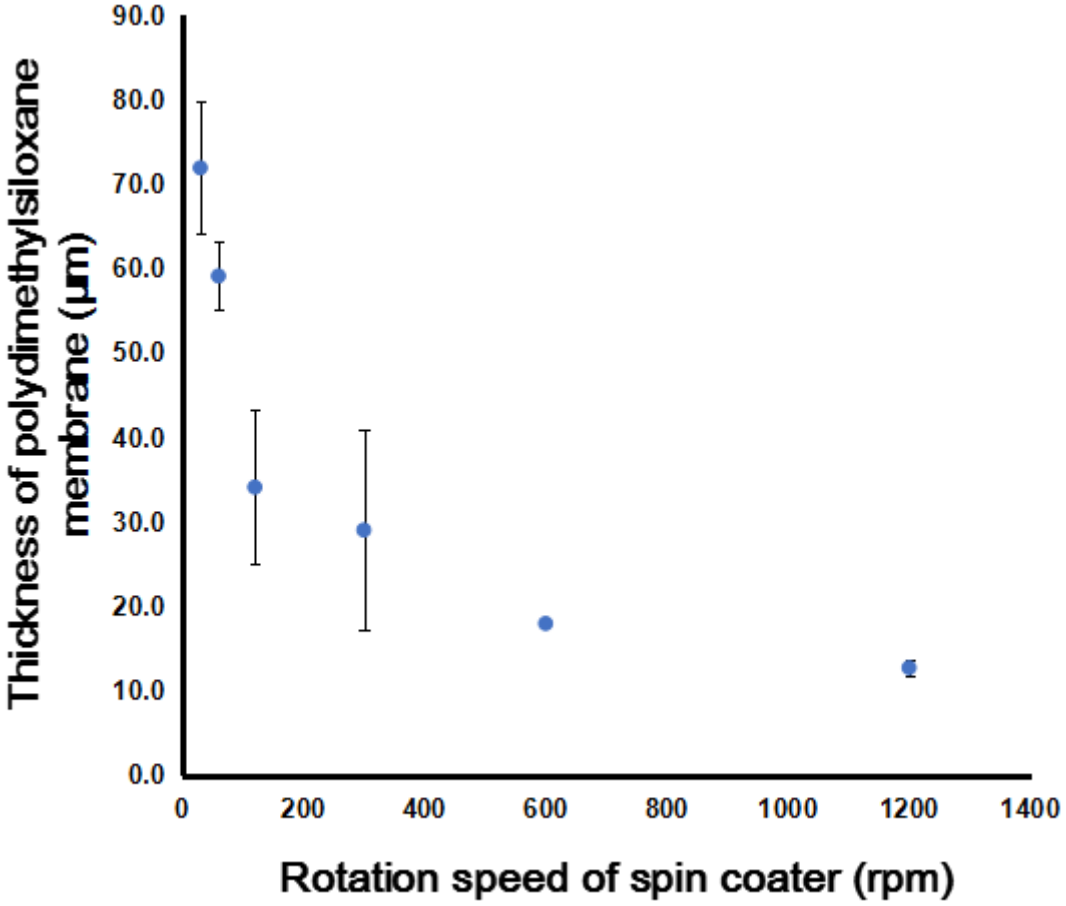

Figure. S2. Shows the thickness of the PDMS membrane and its corresponding rotational speed.

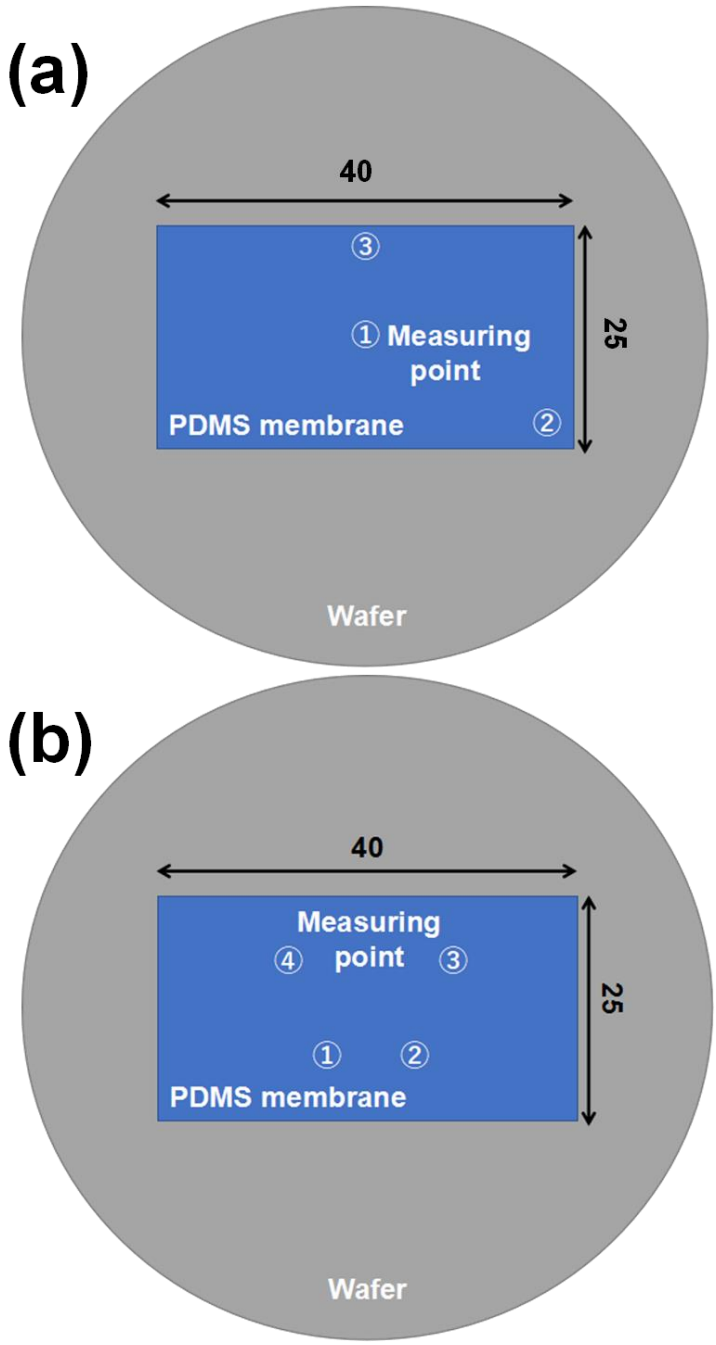

Figure. S3. Measuring points for average thickness of PDMS membrane. (a) Three measuring points (defined as position A) and (b) four measuring points based on the positions of valves (defined as position B).

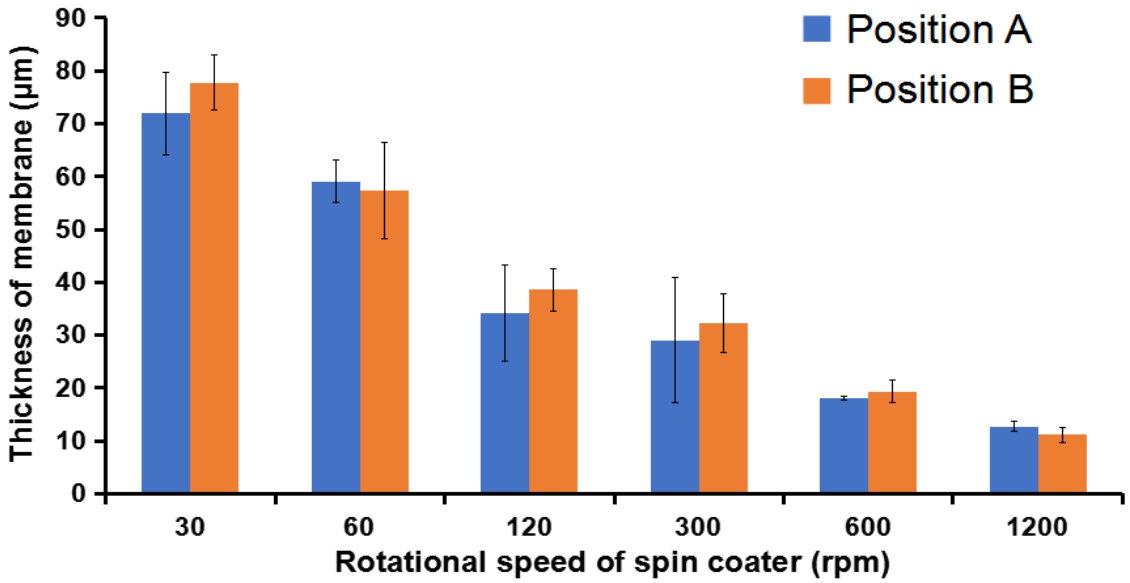

Figure. S4. Comparison of membrane thickness measured at position A and B. The maximum difference between thickness at position A and position B was less than 4 μm (rotational speed of 30 rpm), and the minimum difference was 1 μm (rotational speed of 1200 rpm). The difference was possibly induced by measuring error or other unavoidable environmental conditions such as temperature and humidity.

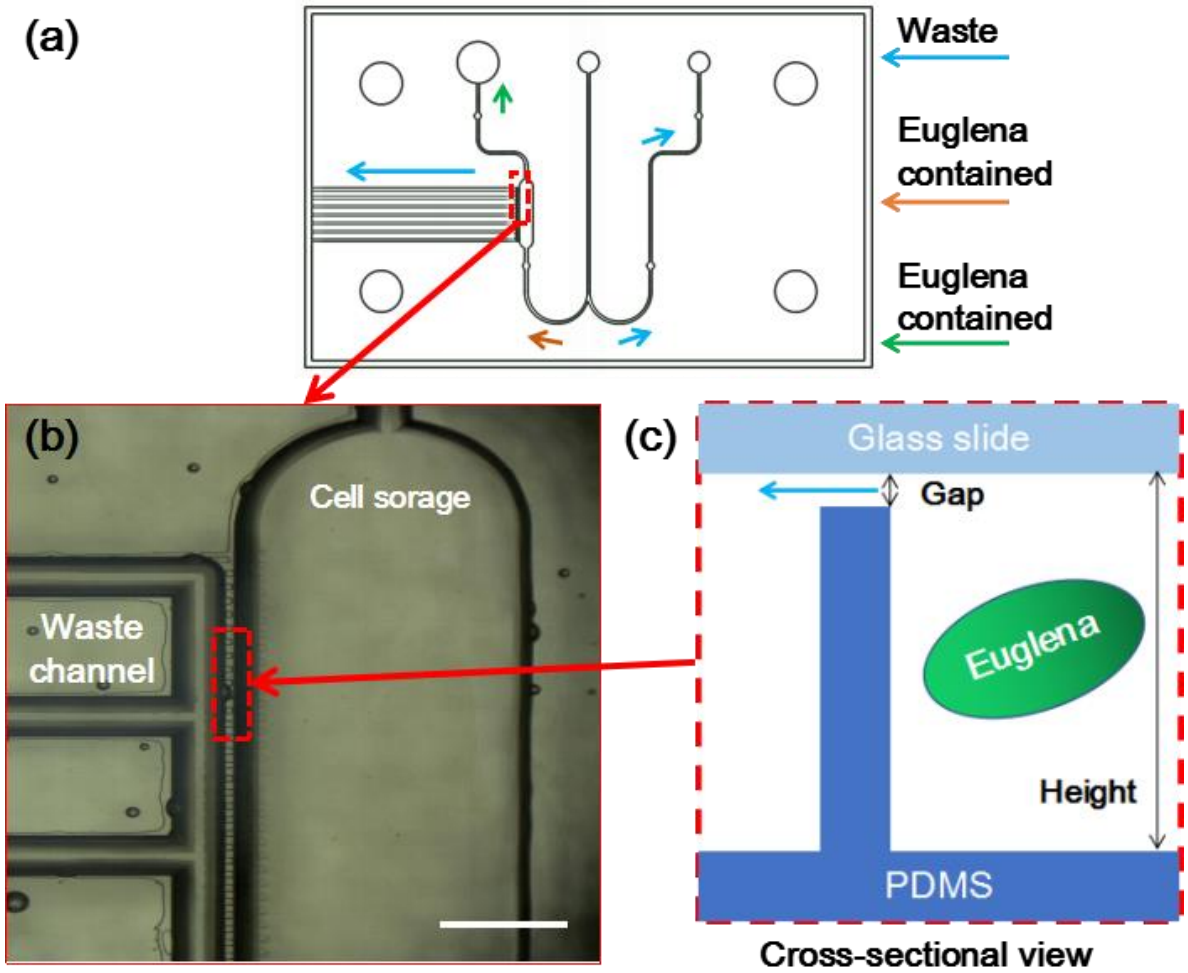

Figure. S5. Images of gap structure integrated cell storage unit. (a) The flow of the *Euglena* capturing device. These 4 valves control the solution containing *Euglena* flow to cell storage unit. Extra solution will be released from waste channel without losing *Euglena*. (b) Microscopic image of the cell storage unit from the prototype device. (c) Cross sectional view of the cell storage unit in (b). The gap was less than 10 μm, which prevented the *Euglena* from escaping from the storage but released the extra solution

Video. S1. Video of valve motion. The response time was faster than 30 ms.