

Development of A Mechanical Digital Microfluidic Immunoassay Platform with Glass Microspheres

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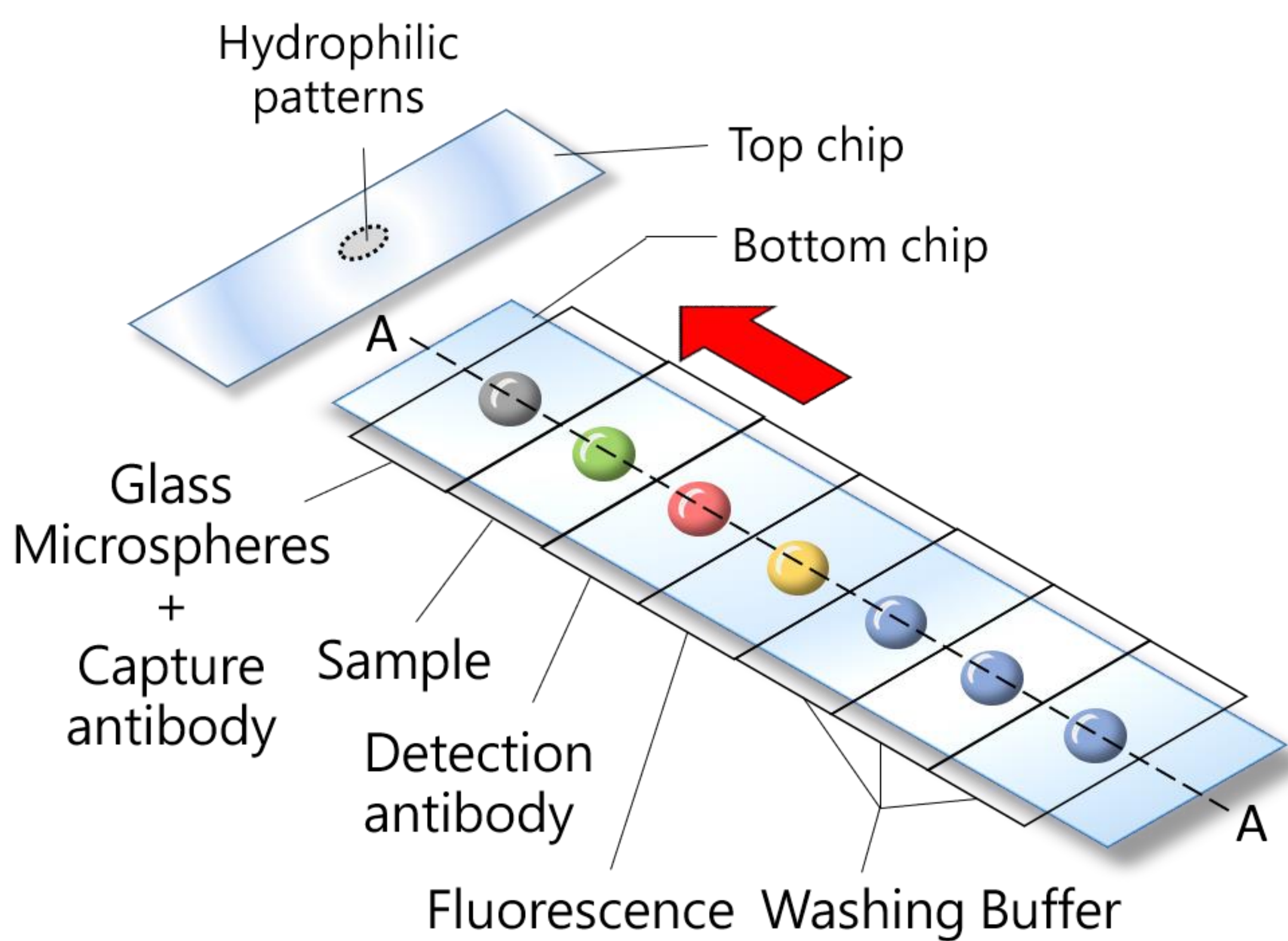
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Abstract

- A highly reliable digital microfluidics immunoassay platform by combining the technology of movable chips with the glass microspheres.
- The required sample volume for our chips was 2 μL , and the time for immunoassay process was 27 minutes. The minimum detection limit of immunoassay was 0.246 pg/mL ,

Method

- A digital microfluidics immunoassay platform consisting of two movable chips.



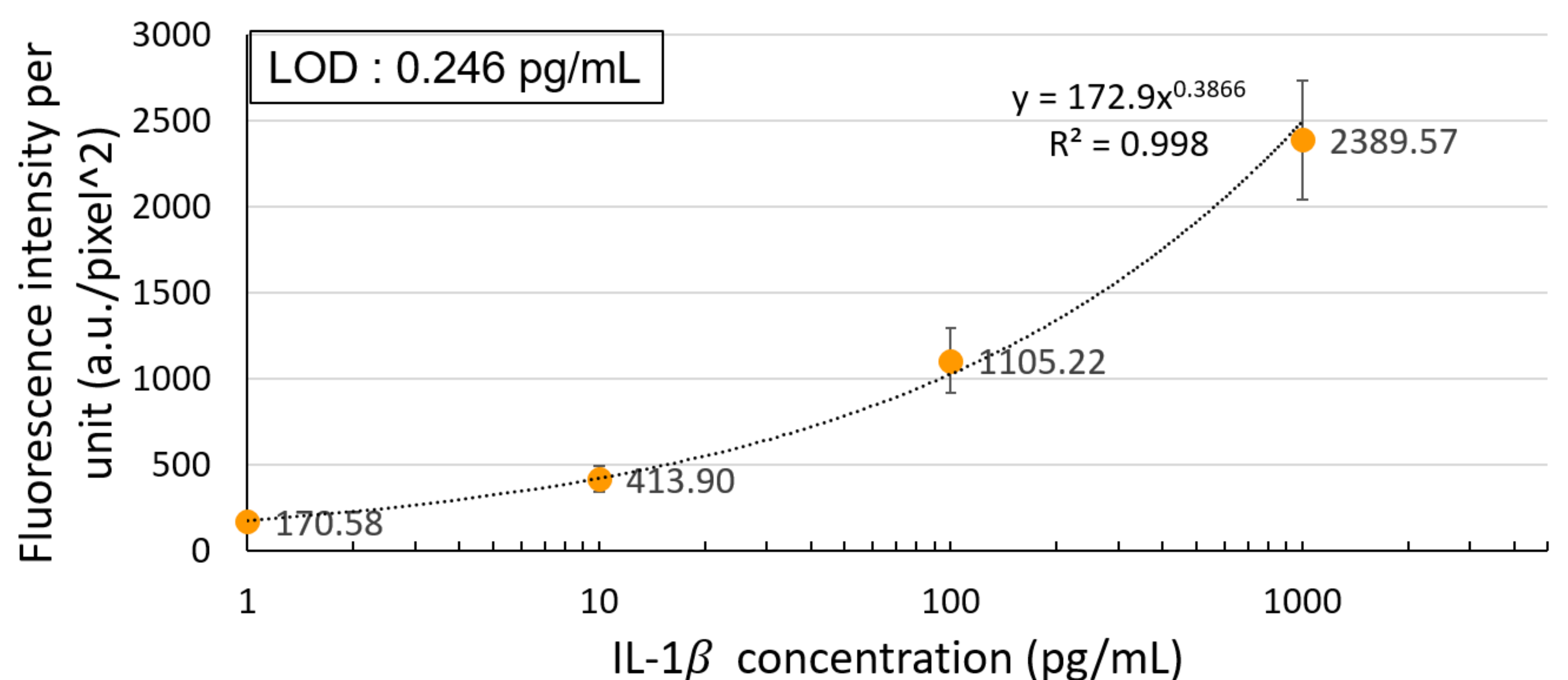
A – A Cross-section

- 1. microspheres captured**
Press down
Top
Bottom
Glass microspheres
 - 2. Droplets cutting**
Pull up
 - 3. Droplet moving**
Transporting
 - 4. Droplet mixing**
Press down
- Glass microsphere which can self-concentrate to the top of droplets was chosen as the carrier of capture antibody.
 - Droplet operations carried out by the relative motion of two chips and the hydrophilic patterns on the chips.

Result & Conclusion

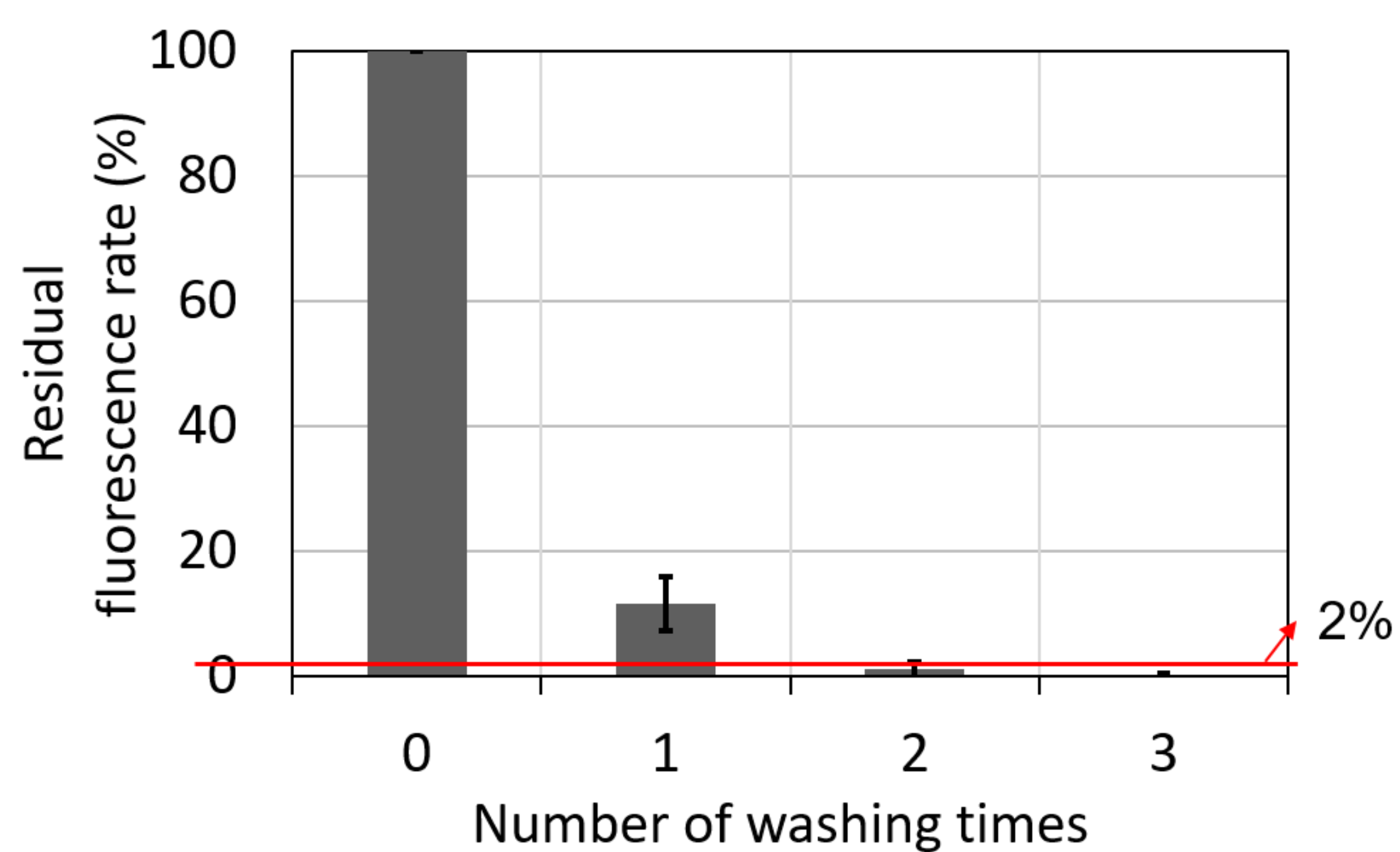
Number of microspheres before and after droplet cutting

Test No.	Number of microspheres before cutting	Number of microspheres after cutting
1	53	53
2	41	41
3	19	19



Calibration curve for Human IL-1b

- The immunoassay of Human IL-1b demonstrated on our platform took 27 minutes, and without any microsphere lost.
- The required sample volume for the immunoassay was 2 μL , and the minimum detection limit was 0.246 pg/mL .
- None of the chips were broken during the immunoassay process.



Residual fluorescence rate after washing step