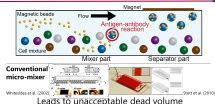


# A Pumpless Mixer for Efficient Capturing of Small Particles Utilizing Vibration-Induced Flow

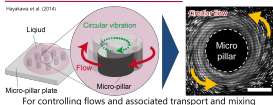
生産技術研究所 革新的シミュレーションセンター 長谷川研究室

<http://www.ysklab.iis.u-tokyo.ac.jp>

## Present need for immunoassay



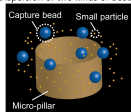
## Vibration-Induced Flow



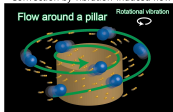
To demonstrate applicability of vibration-induced flow for pumpless mixer

## Concept of mixing experiment

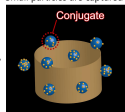
Dispersion of two kinds of beads



Convection by vibration-induced flow

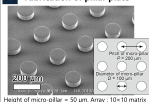


Small particles are captured

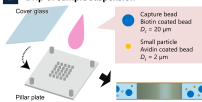


## Experimental procedure

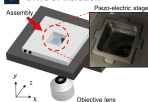
### 1 Fabrication of pillar plate



### 2 Drip of sample suspension



### 3 Drive of vibration

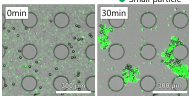


## Results

### Collection by Capture bead

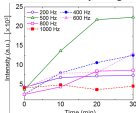
$f = 500 \text{ Hz}$ ,  $A = 1.8 \mu\text{m}$

● Small particle



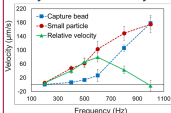
Small particles dispersed around micro-pillars were collected by Capture bead after mixing

### Time evolution of capturing rate



Optimal frequency exists for capturing small particles

### Velocity of beads converted by flow



Relative velocity has significant influence to capturing rate

## Summary

Succeeded in developing pumpless mixer utilizing vibration-induced flow  
 → Optimal vibrating-condition exists for capturing small particles