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# Particle focusing and separation in xanthan gum solutions

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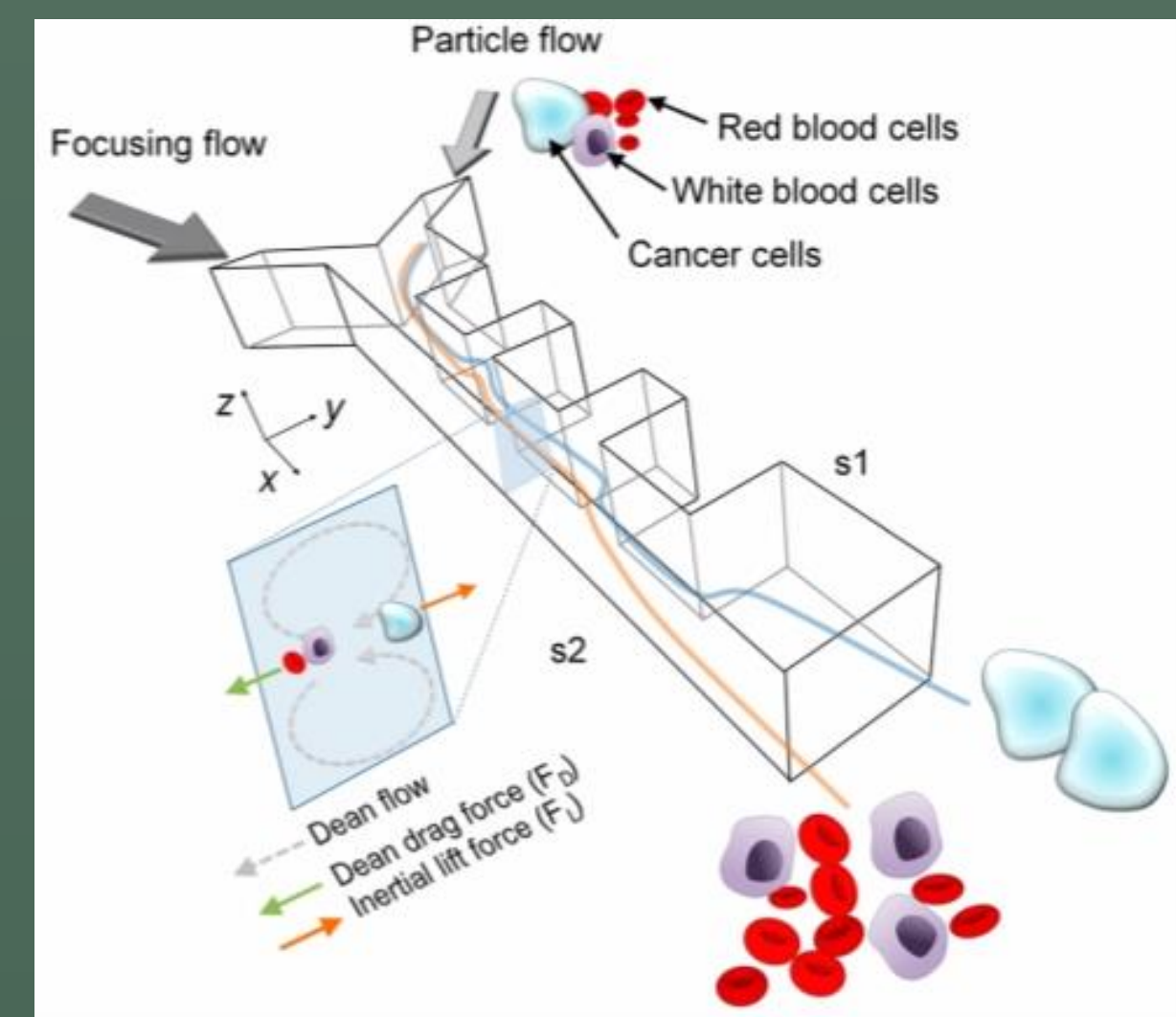
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## 1. Motivation

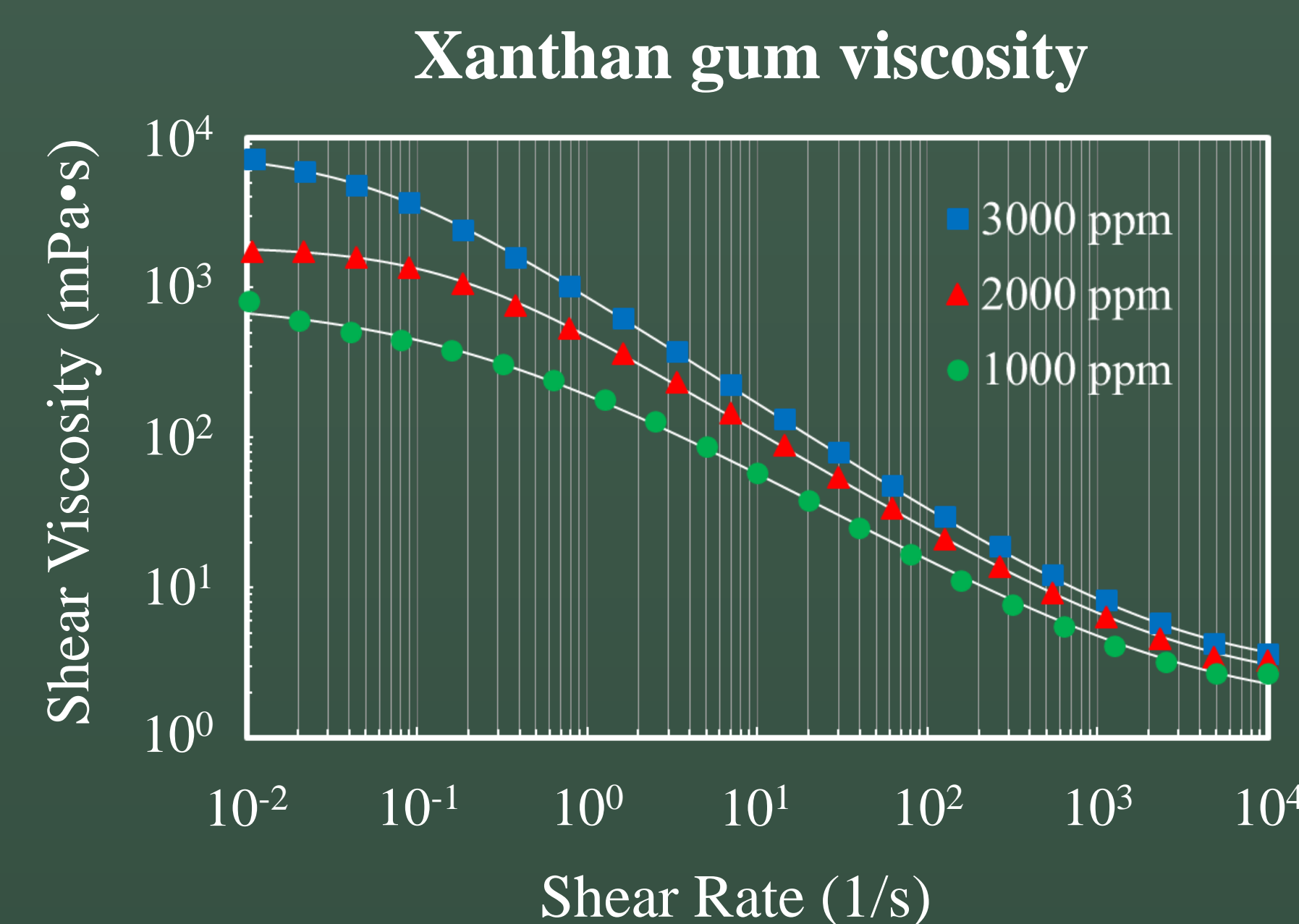
➤ Size-based particle (biological or synthetic) separation has various applications in biological, biomedical, chemical research area.



Lee et al. *Analytical Chemistry*, 2013

➤ Previous studies mainly use fluid with constant viscosity to separate particle as particle showing defocusing in the shear thinning fluid.

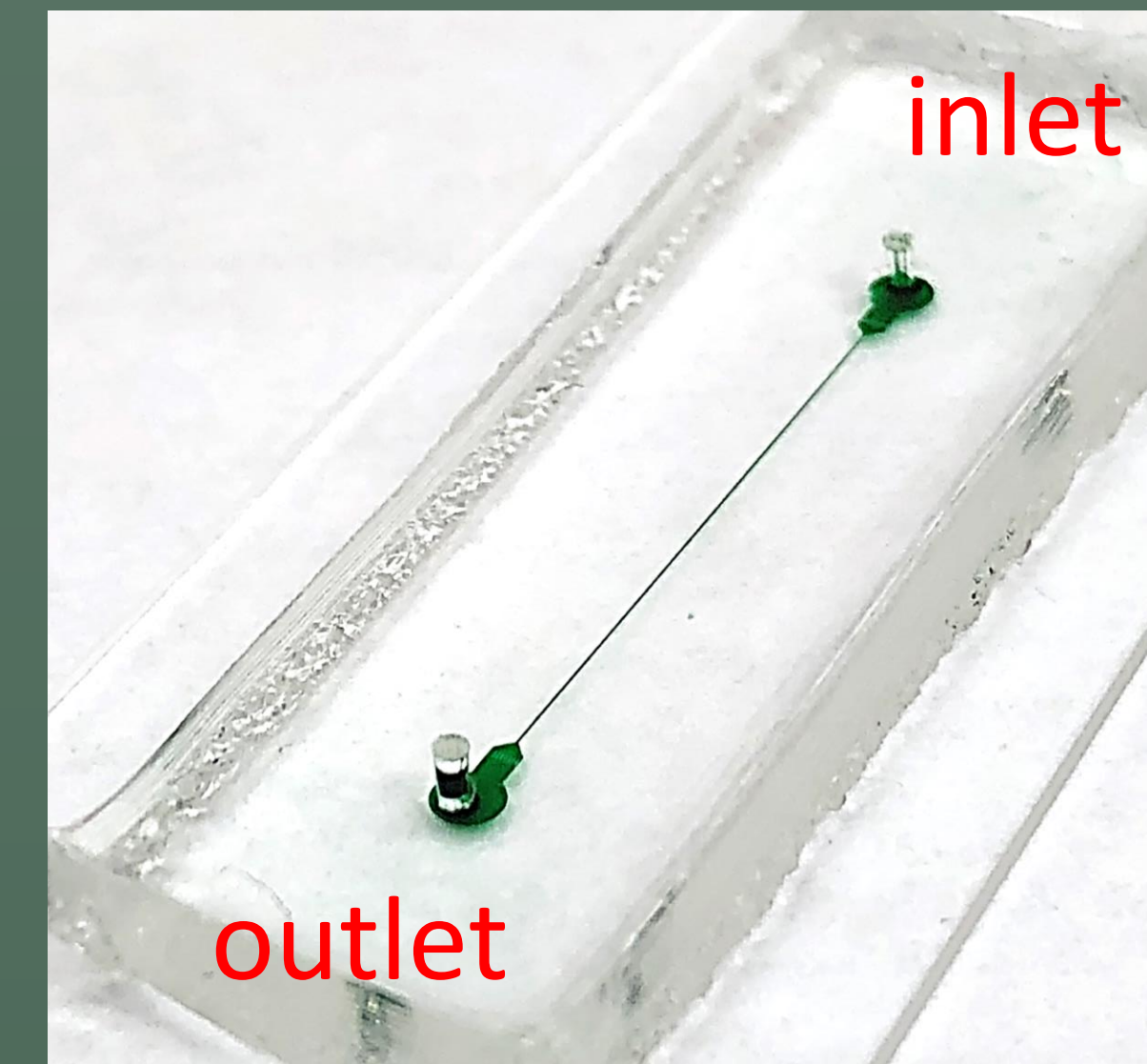
➤ Xanthan, as a commonly used stabilizer and thickener in food and pharmaceutical industry with well studied toxicological property, should be an ideal polymer to manipulate bio-particles.



## 2. Experimental Design

### ➤ Channel dimension

Length: 2 cm  
Channel width: 65 μm  
Channel depth: 30 μm  
Expansion region: 900 μm wide



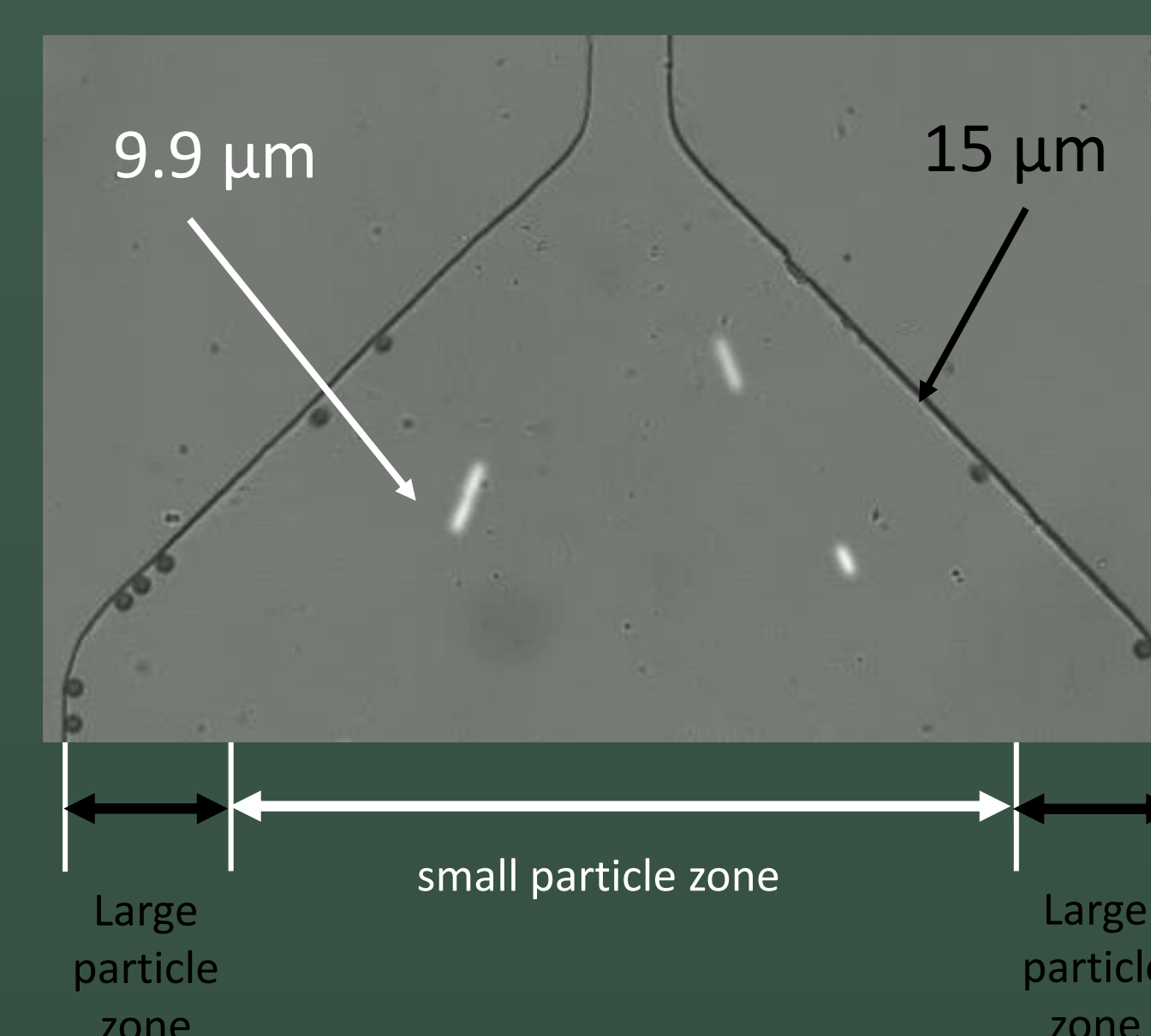
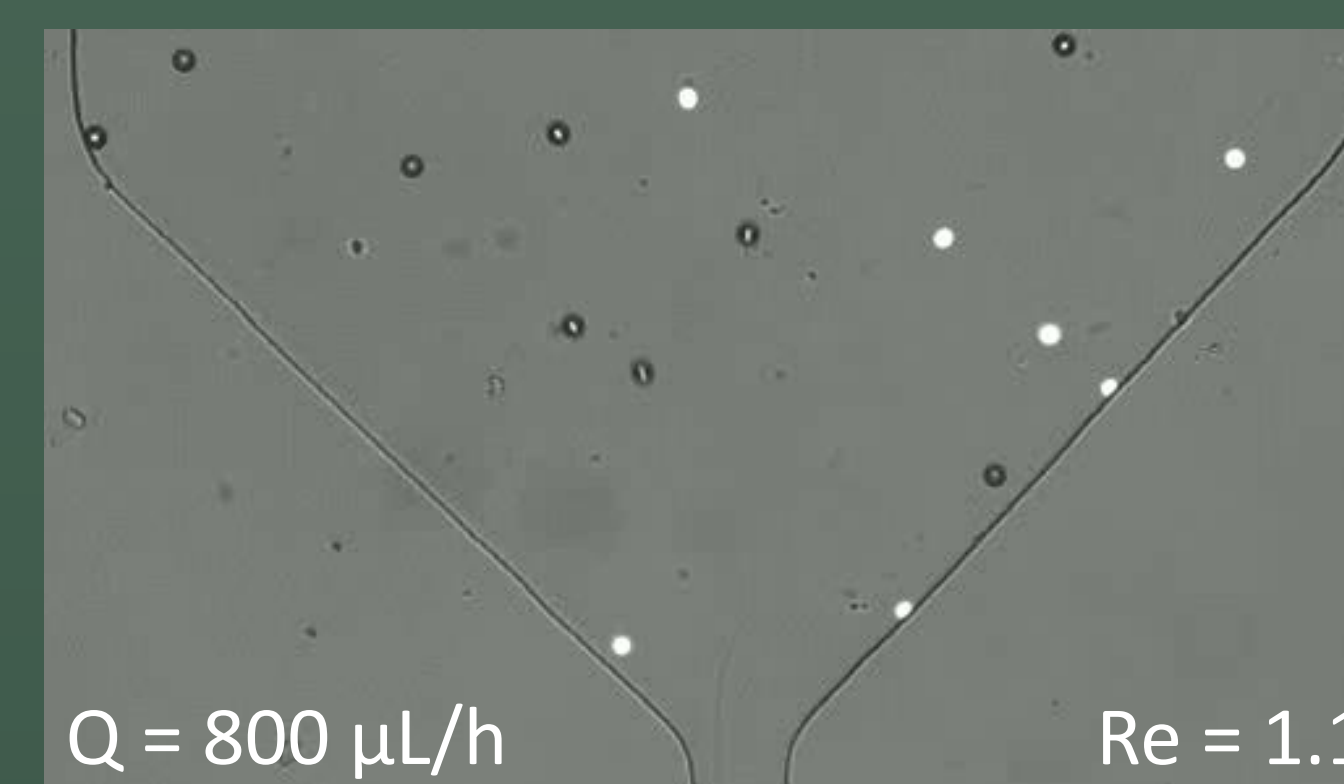
### ➤ Particle mixture

Binary: 9.9 μm and 15 μm spherical particle  
Xanthan solution: 1000 ppm, 2000 ppm and 3000 ppm

## 3. Results

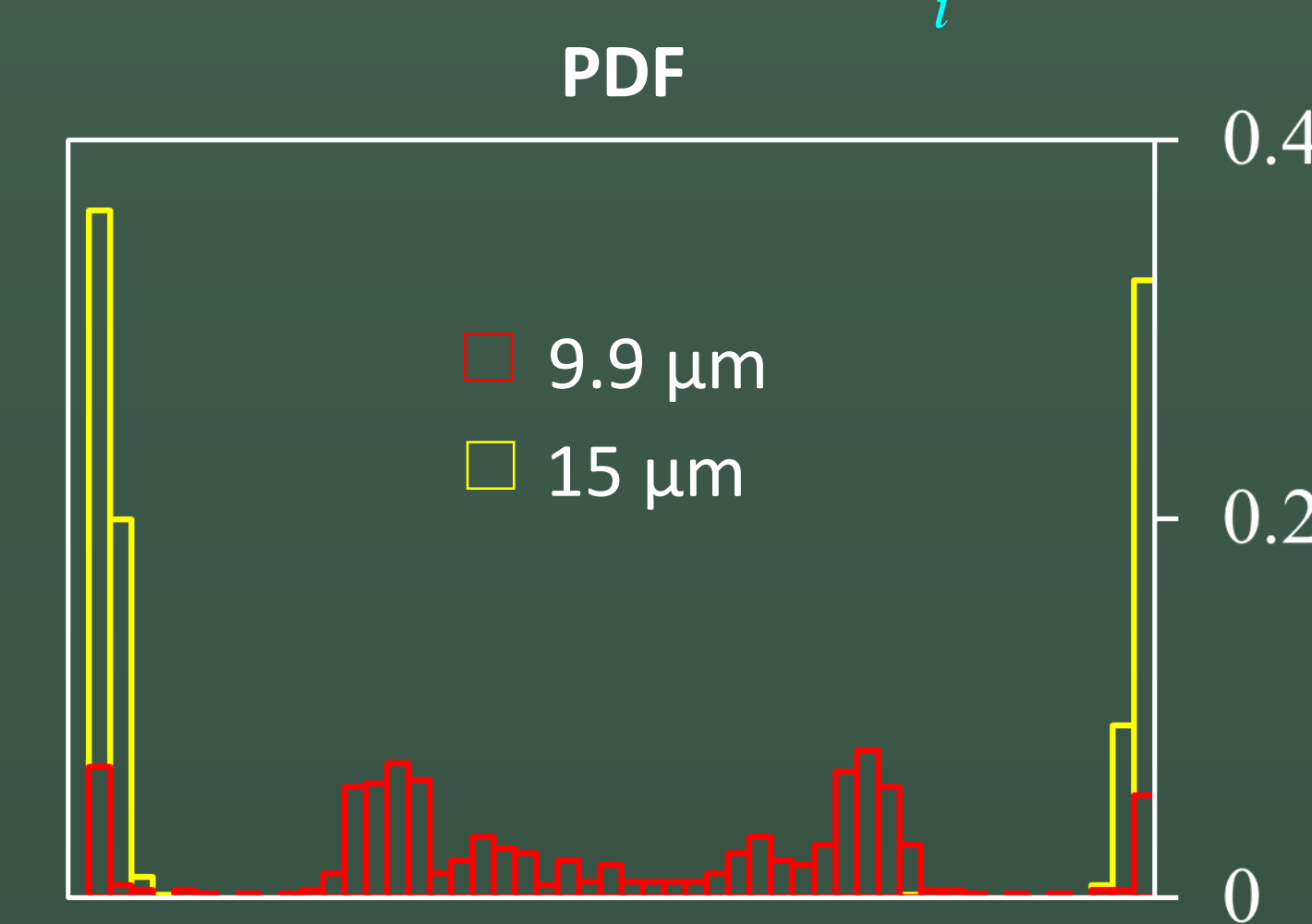
### ➤ Binary particle separation

xanthan 2000 ppm

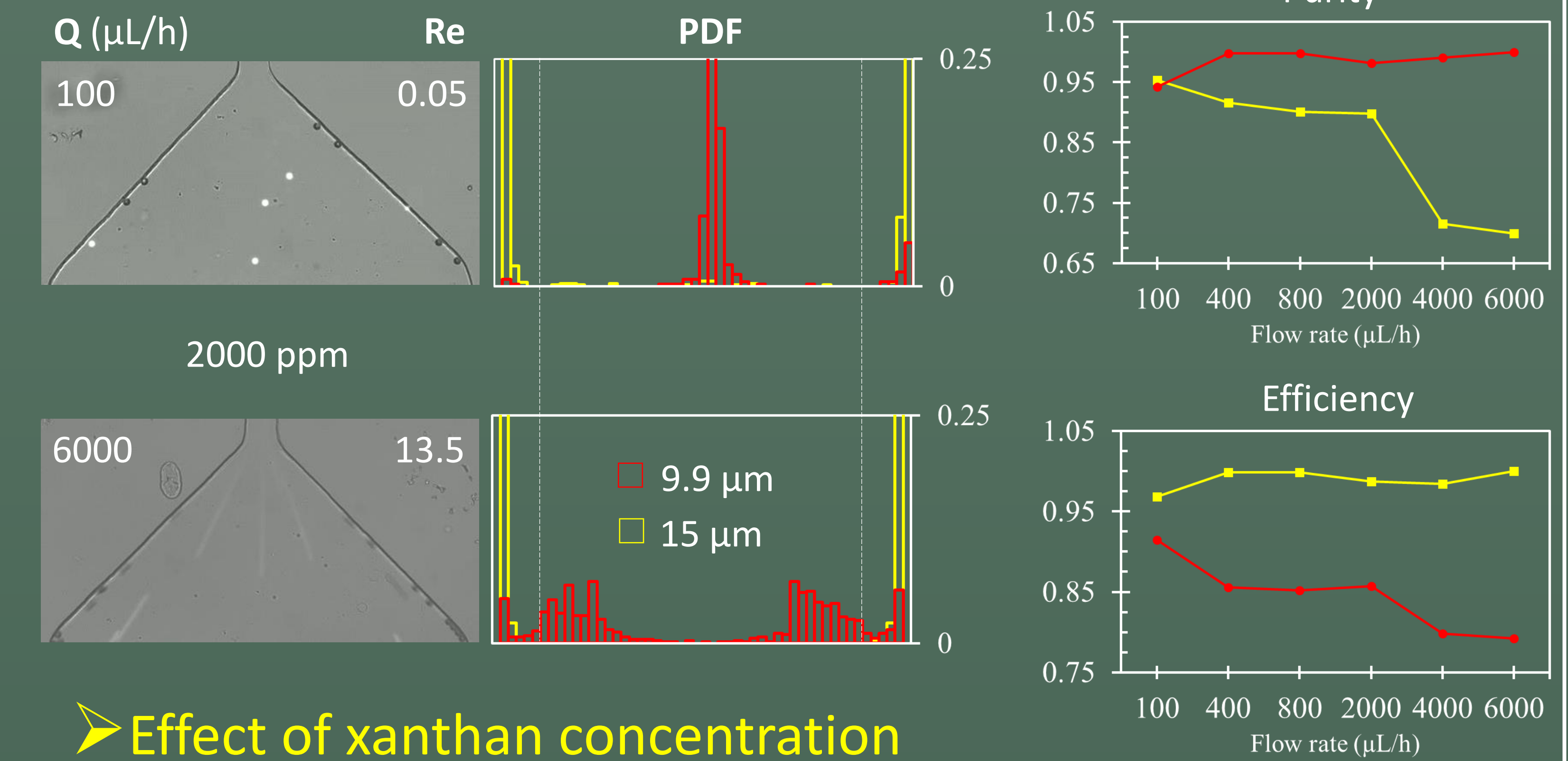


$$purity = \frac{(N_i)_{zone}}{(N_i + N_s)_{zone}}$$

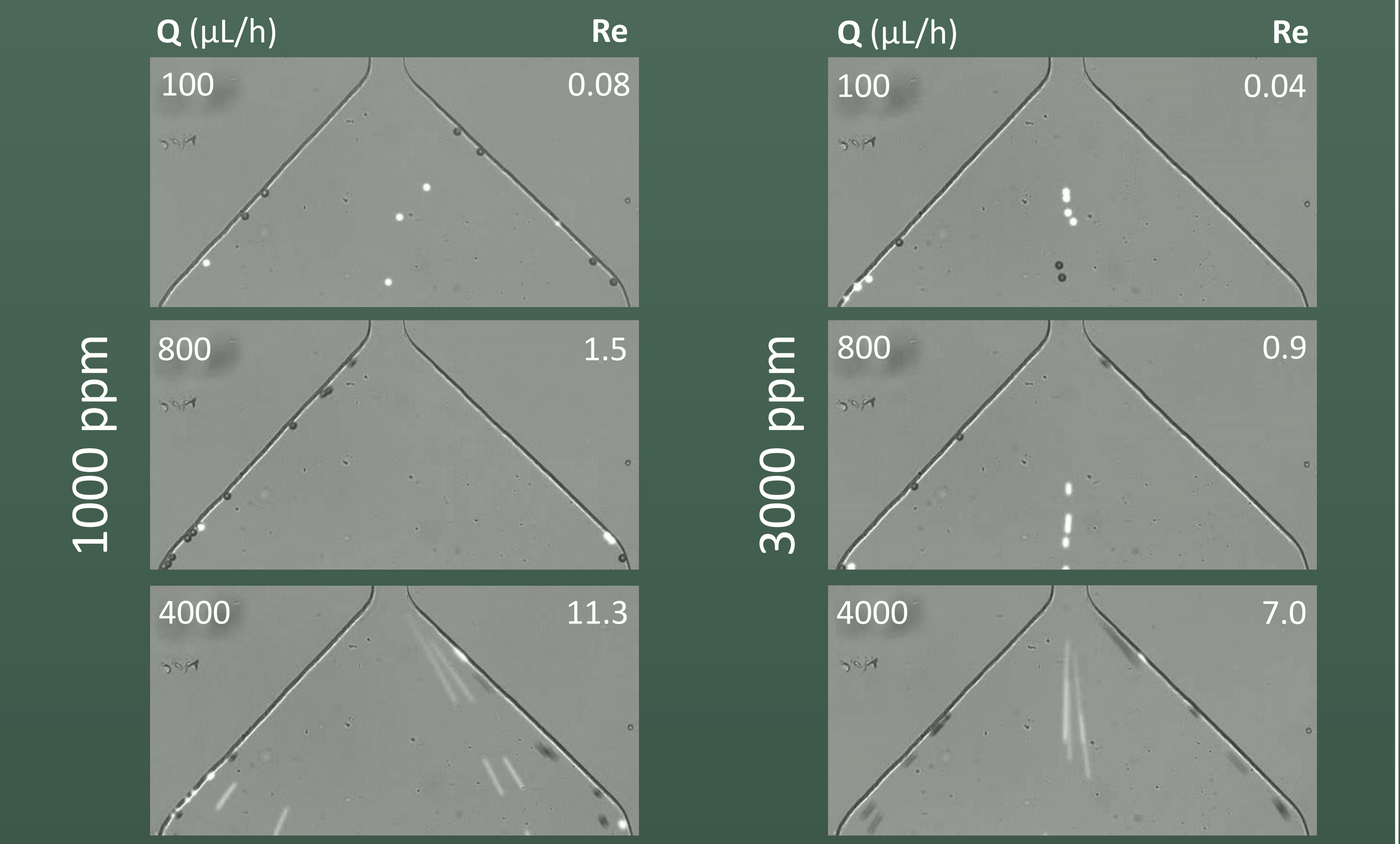
$$efficiency = \frac{(N_i)_{zone}}{N_i}$$



### ➤ Effect of flow rate



### ➤ Effect of xanthan concentration



## 4. Conclusions

Realize the size-based binary particle separation using xanthan gum. Implement a parametric study about the effects of flow rate, xanthan concentration on the separation.