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Rheological property of 1000 ppm PEO solutions

The rheological property of the fluid was measured in a rotational rheometer (Antonpaar MCR 301) that has a parallel plate configuration and a diameter of 20 mm. The experiment was performed at room temperature (24 ± 1°C). Figure S1 shows the viscosity of the 1000 ppm PEO solution as a function of the shear rate. The shear viscosity of the viscoelastic fluid was measured in shear rates ranging from 200 s^{-1} to 10^3 s^{-1}. In this range, the PEO solutions show a slight shear thinning behavior. The estimated viscosity 1000 ppm PEO solution is 3×10^{-3} Pa·s.

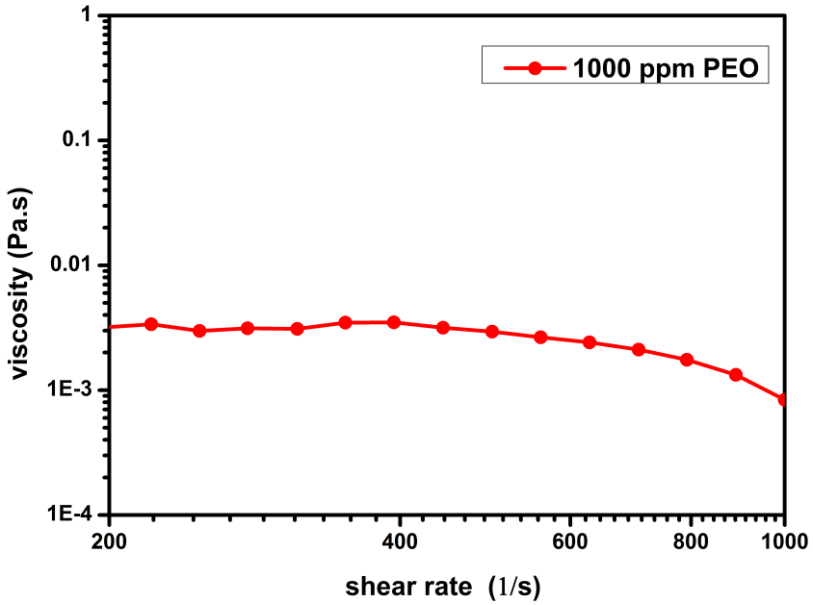

Figure S1: Viscosity of 1000 ppm PEO solution as a function of shear rate

Calculation results of R_c and W_i for 1000 ppm PEO solution from flow rate Q= 5 µl/min to Q = 20 µl/min

Table S1 R_c and W_i for 1000 ppm PEO solution

Q (µl/min)	R_c	W_i
5	0.7	28
10	1.4	56
15	2.1	84

20	2.8	112

Cells' distributions at different channel positions at flow rate *Q* = 20 µl/min

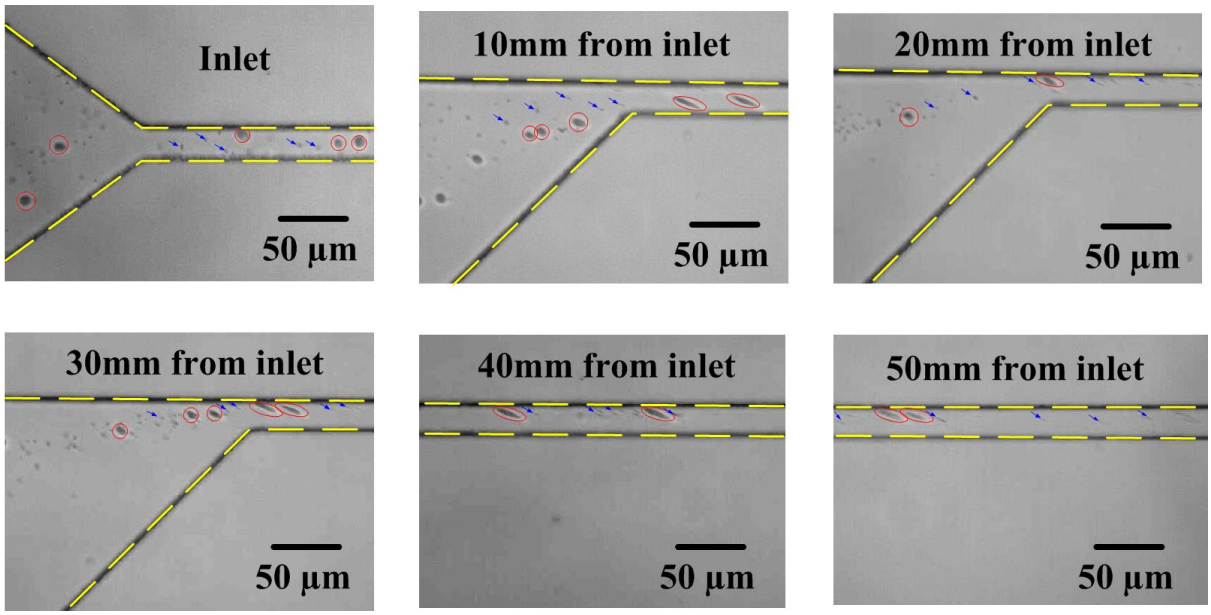

Figure S2: Cells' distributions at different channel positions

Cells have different distributions at different channel positions (Figure S2). The cells within the red circles are Jurkat cells, and the yeast cells are pointed by blue arrows. At the inlet, a mixture of Jurkat and yeast cells are randomly distributed; as the cells flow, they are confined within a narrow band (10 mm from inlet); then the focusing band becomes narrower at 20 mm distance from inlet; at the end of the 1st stage (30 mm from inlet), all cells are focused to a tight stream by the dean-flow-coupled elasto-inertial effects; after cells enter straight channel section, yeast cells migrate to the center of the channel by the elastic force, while Jurkat cells shift to the channel wall (40 mm from inlet) under the blockage ratio effect; at 50 mm from inlet, two different equilibrium positions are formed at outlet and cells with different sizes are separated consequently.