Electronic Supplementary Information

On-demand liquid microlens arrays by non-contact relocation of inhomogeneous fluids in acoustic fields

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This PDF file includes:
Figs. S1 to S5

Other Supplementary Materials for this manuscript include the following:
Movie S1: The imaging process of this liquid MLAs.
Movie S2: Continuous imaging under dynamic stability.
Movie S3: Continuous zoom imaging by tuning acoustic amplitude from 18 dbm to 24 dbm.
Movie S4: Imaging when acoustic wave is switched on and off repeatedly.

Figures

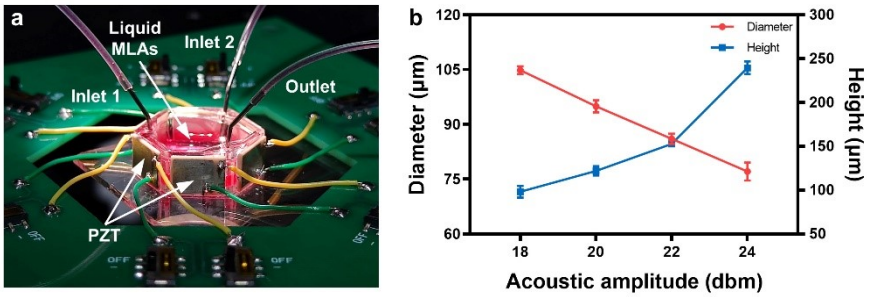

Fig. S1. Acoustic device diagram and lens size parameters. (a) Complete device diagram including liquid MLA and microfluidic platform. (b) The dependence of parameters of geometry on the amplitude of the applied acoustic. The diameter (D) and height (H) are plotted by the red and blue lines, respectively.

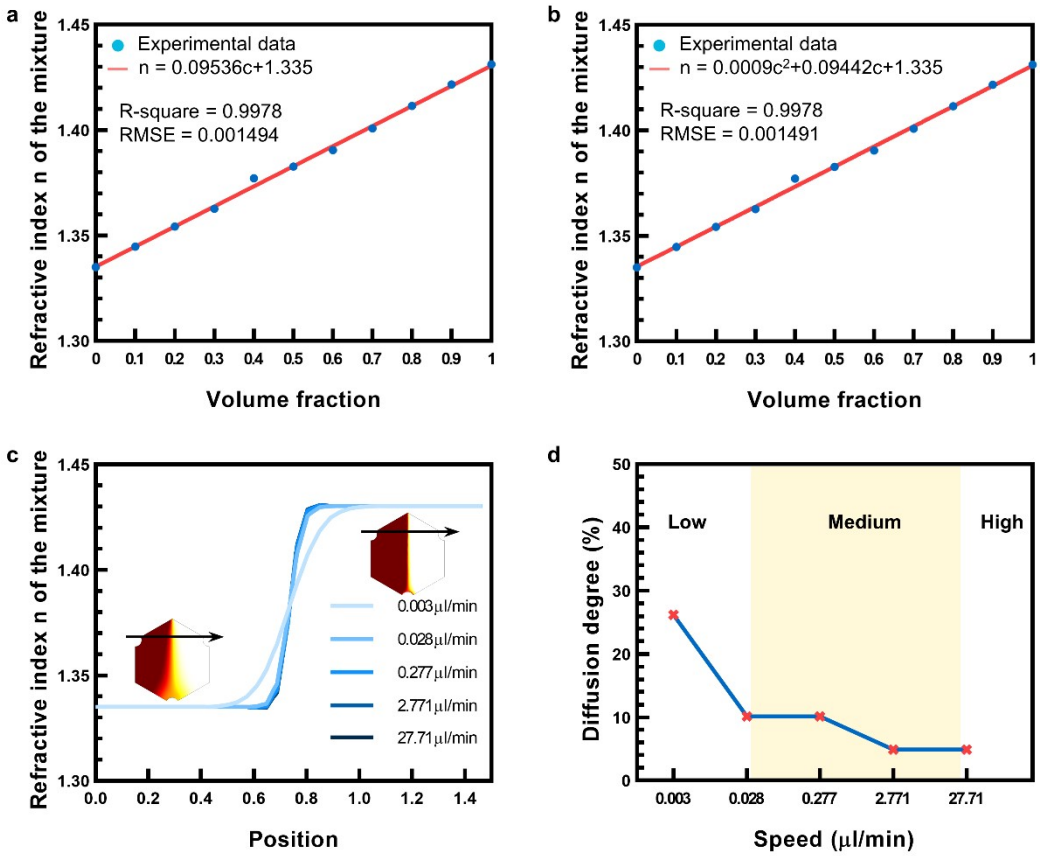

Fig. S2. Convective diffusion in non-homogeneous fluids. (a) Linear fitting of concentration and refractive index according to the experimental data. (b) Square fitting of concentration and refractive index according to the experimental data. (c) Simulation of the refractive index distribution of the mixed liquid along the black arrow in the inset at different flow rates. Insets: Simulation of high and low flow rate, respectively. (d) The degree of diffusion at different flow rates in Fig. S2c. The ratio of the distance between 50% and 95% of the volume fraction of OptiPrep to the distance between 50% and 100% (the inlet) indicates the degree of diffusion at the liquid interface.

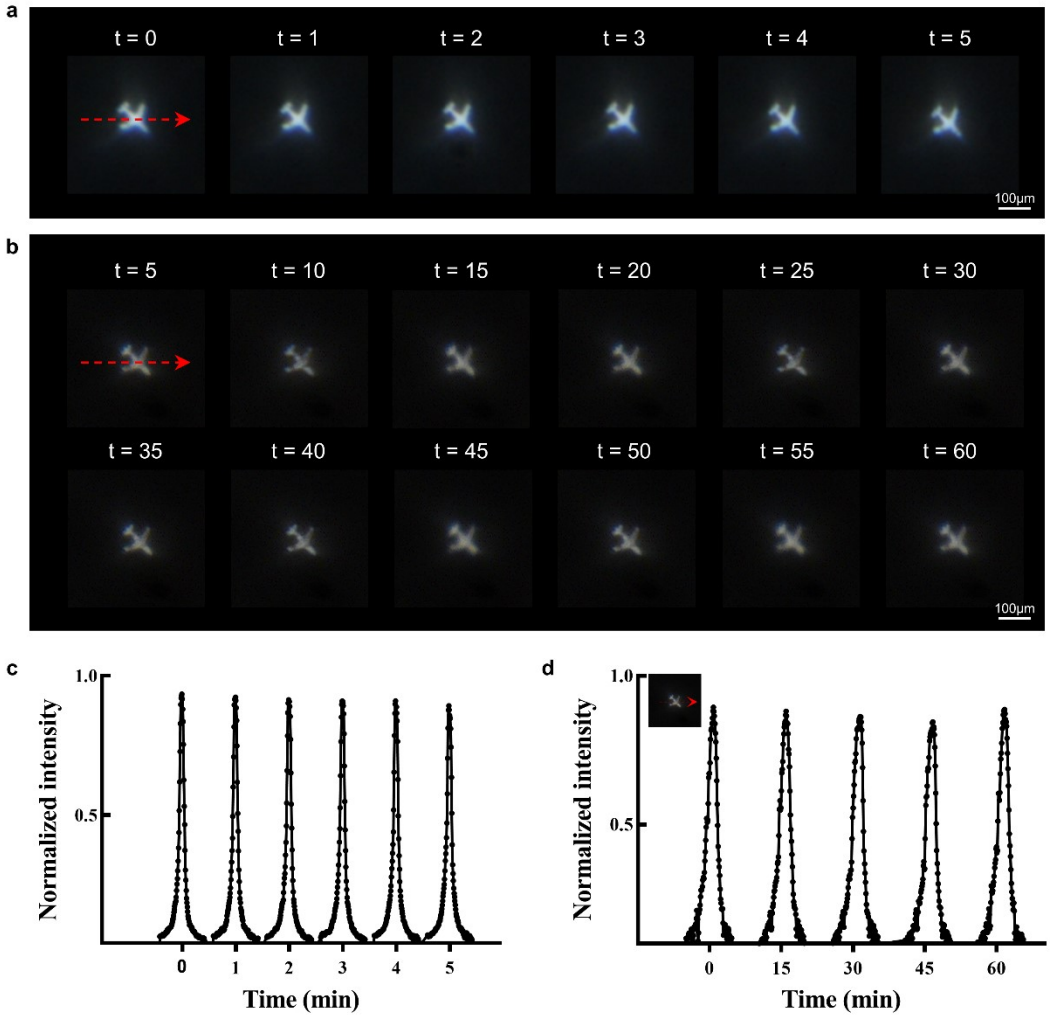

Fig. S3. The stability of the liquid MLAs. (a) Continuous image sequences for 5 minutes in the case of continuous fluid flow. (b) Interval image sequences for 60 minutes in the case of continuous fluid flow. (c and d) The normalized grayscale intensity distribution extracted along the red dotted line in the Fig. S3a and b, respectively. Inset: Image of 0 minute.

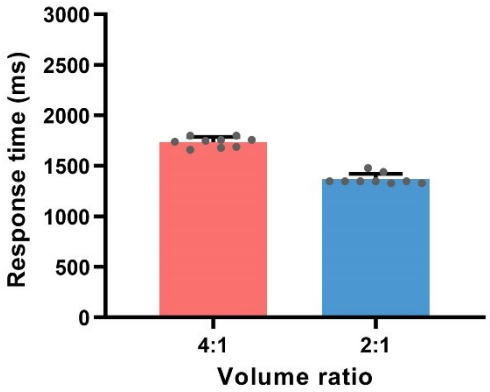

Fig. S4. Response time when the volume ratio of PBS solution and 60% aqueous solutions of iodixanol (OptiPrep) is 4:1 and 2:1, respectively. Acoustic amplitude is set 20 dbm.

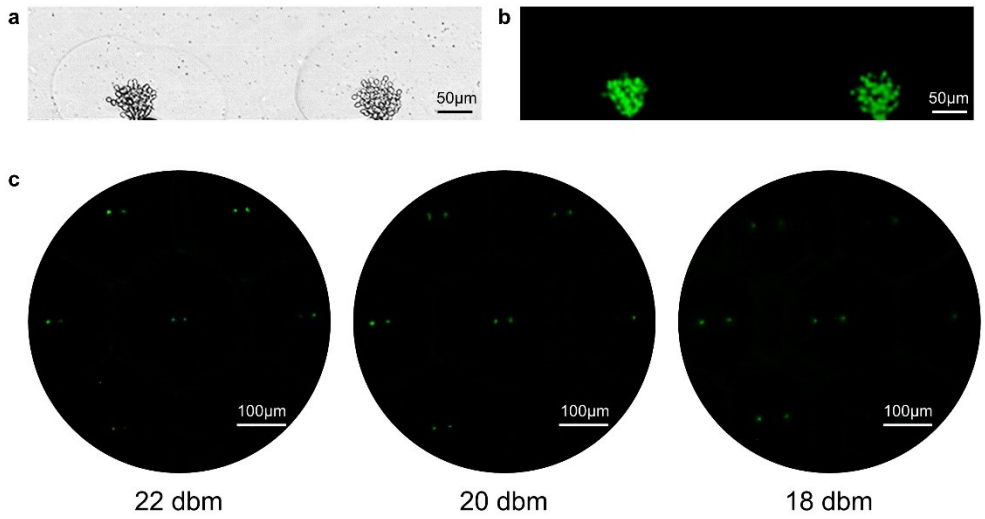

Fig. S5. Rapid cell clusters fluorescence signal detection. (a and b) Bright and fluorescence images of the cell clusters of the microfluidic chip. (c) The images of the liquid MLAs observed cell clusters at different acoustic amplitude.