Electronic Supplementary Material (ESI) for Lab on a Chip.

Rapid trapping and tagging of microparticles in controlled flow by *in-situ* digital projection lithography

Han Zhang, [a,#] Meiying Lu, [a,#] Zheng Xiong, [b,#] Jing Yang, [c] Mingyue Tan, [a] Long Huang, [a] Xiaojuan Zhu, [c] Zifeng Lu, [a] Zhongzhu Liang [a] and Hua Liu, *[a]

[a.] Center for Advanced Optoelectronic Functional Materials Research, and Key Laboratory for UV Emitting Materials and Technology of Ministry of Education, National Demonstration Center for Experimental Physics Education, Northeast Normal University, 5268 Renmin Street, Changchun 130024, China

[b.] Department of Biomedical Engineering and Chemical Engineering, Department Syracuse University, Syracuse, New York 13244, USA

[c.] Key Laboratory of Molecular Epigenetics Ministry of Education, Institute of Genetics and Cytology, Northeast Normal University, Changchun 130024, China

[#] These authors contributed equally to this work.

* Corresponding author: liuh146@nenu.edu.cn https://orcid.org/0000-0003-1455-8948

Email：liuh146@nenu.edu.cn

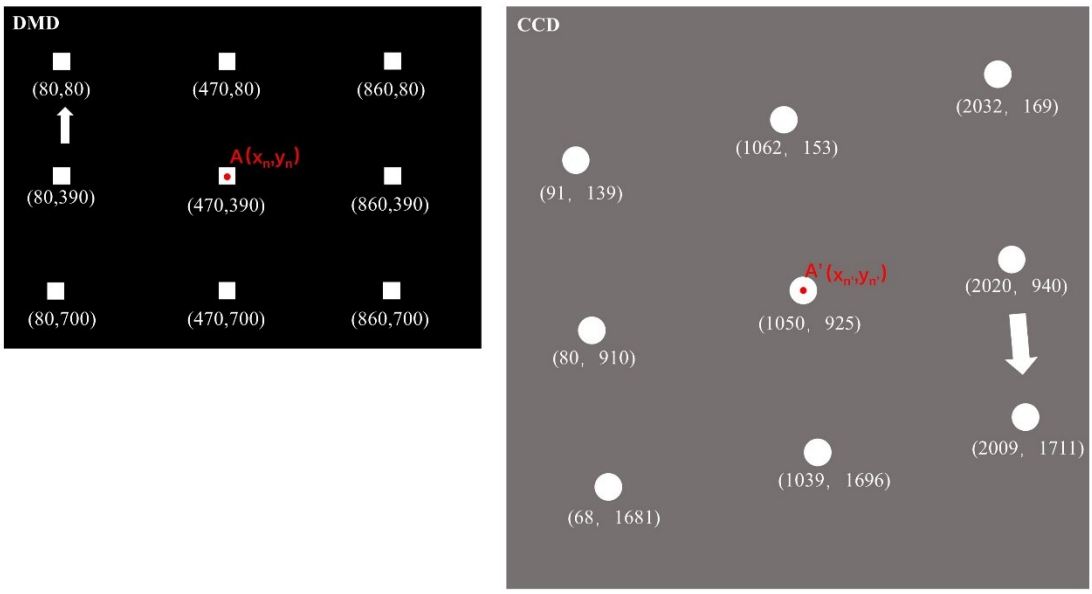

Fig. S1 Calibrate the position mapping relationship and size ratio between DMD and CCD the size ratio between DMD and CCD: b/a=2.5(13.68/5.4)

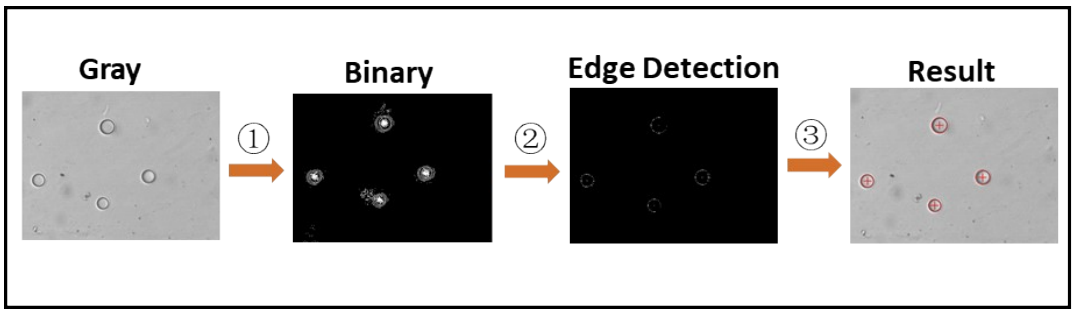

Fig. S2 Circle detection process of CCD actual screen. Firstly, binarize the collected CCD grayscale images. The particles are turned into white and other background colors into black, the subsequent shape recognition technology only deals with white areas. Use the accurate circle detection method to detect the edge of the image, display the particle boundary, and obtain the center position and radius of the target particle.

Exposure time t(ms)	**30**	**50**	**100**	**150**	**200**	**400**
Width（μm）	3.78	6.19	6.87	8.42	8.94	9.8

Tab. S1 Ring width under different exposure times, the laser power is 3.90mW. the Ring width of the microtrap is designed as 8.21 μm. When the exposure time is 150 ms, this size matches well with the designed feature.

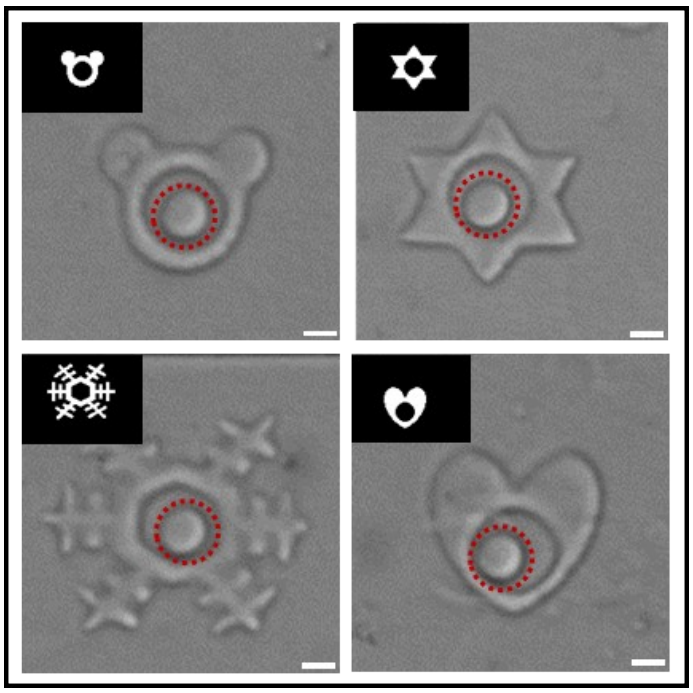

Fig. S3 Microtrap structure of any user-defined shape for trapping, such as Mickey, six-pointed star, snowflake, heart shape microtrap. The mask pattern can be selected from the mask database we have established. Scale bar: 10 μm.

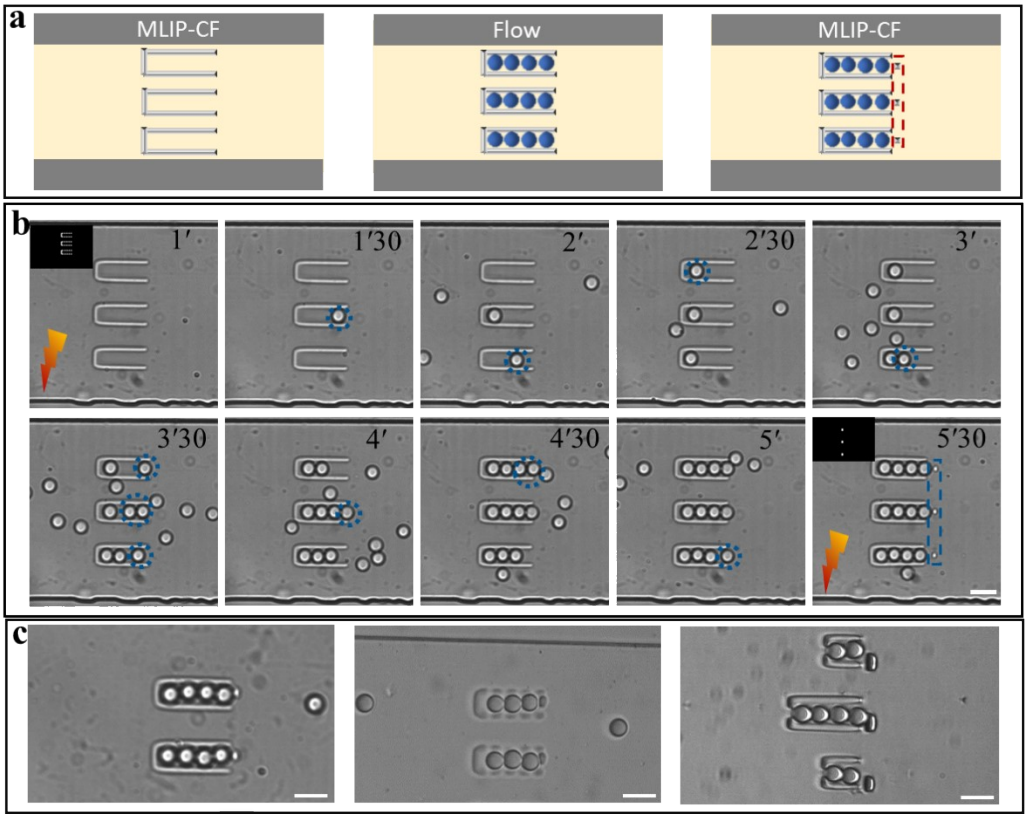

Fig. S4 The capturing of a group of microparticles. (a) Schematic diagram of the processing process. Firstly, expose to generate an array of long trap for capturing particles group, then, photosensitive resin mixing with microparticles flows inside the chip until the trap captures a group of microparticles. The micro-pillar sealing the traps' entrance is fabricated to avoid any leaking out of the micro-particles from these traps at last. (b) Multiple traps enable four particles to be trapped in the same structure, and one image is taken every 30s. (c) Different shapes of microtraps trap a certain number of particles. Scale bar:30μm.

Exposure time t(ms)	**100**	**120**	**140**	**160**	**180**	**200**
Curing Depth （μm）	26	35	43	51	58	66

Tab. S2 Curing depth under different exposure times, the laser power is 3.90mW.