Supporting Information

An optofluidic conveyor for particle transmission based on fiber array and photo thermal convection

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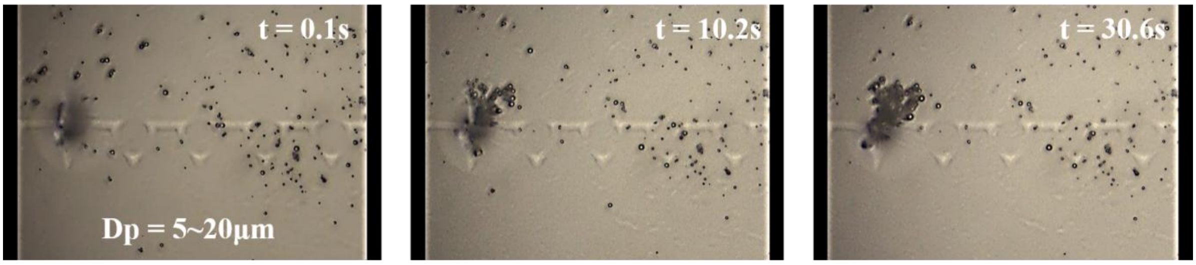

Fig.S1 Process of trapping 2-20 micron silica particles. Most 5-20μm particles can be transmitted and captured at a distance of 750μm, but cannot be transported over 750μm. The light source power is 80mW, and the height of liquid is 700μm.

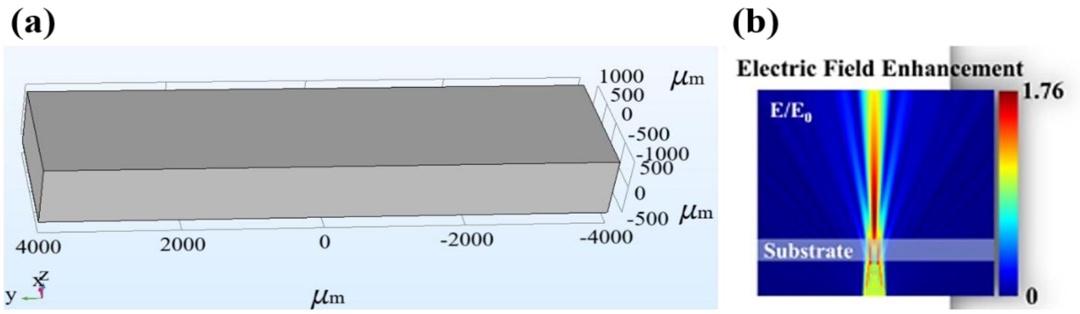

Fig.S2 (a) Schematic of simulation model. The liquid environment is set as a rectangle, and the size (length, width and height) is 4000*1000*700μm. The surrounding boundary conditions are set to perfectly match the room temperature. (b) Electric field distribution near the fiber end.

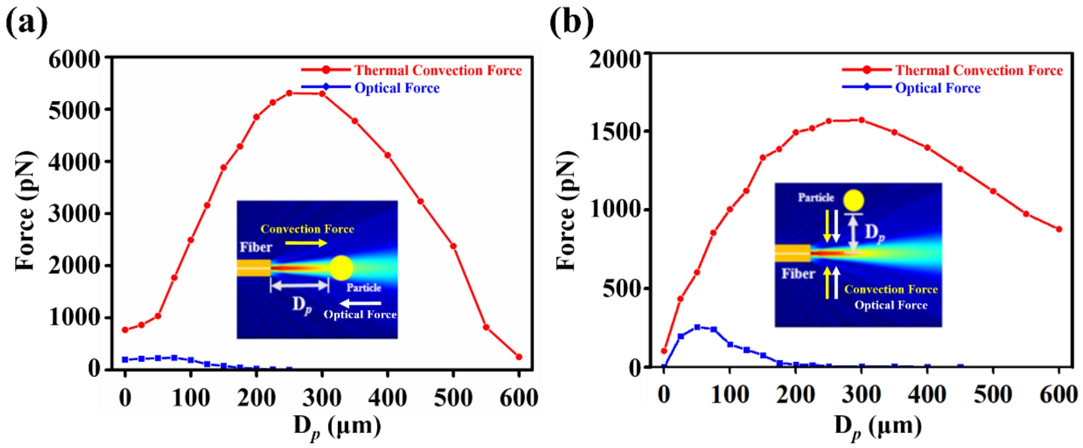

Fig.S3 Estimation of the optical gradient force and thermal convection force exerted on 100μm silica particle near the fiber. Since the particle diameter is much larger than the wavelength of the incident light, geometrical optics approximation algorithm is used to calculate the optical gradient force. The light source power is 80mW (a) The relationship between force and lateral distance of the silica particle from the fiber end face (b) The relationship between force and vertical distance of the silica particle from the fiber end face

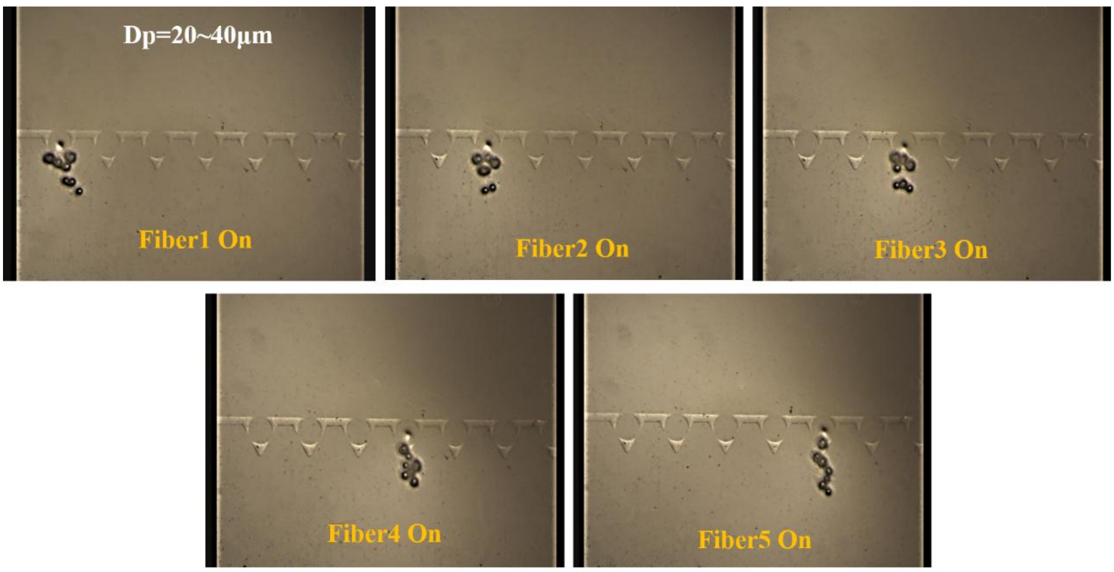

Fig.S4 Process of manipulating 20-40μm silica particles. The light source power is 40mW, and the height level is 700μm.

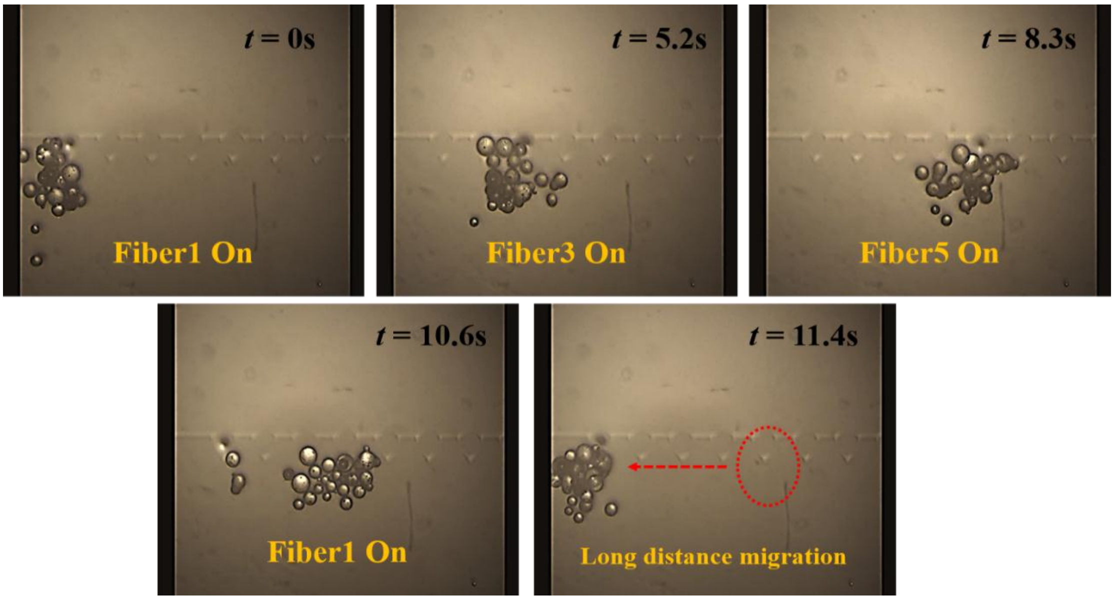

Fig.S5 Process of high-throughput 80-120μm silica particles movement. The light source power is 80mW, and the height level is 700μm.

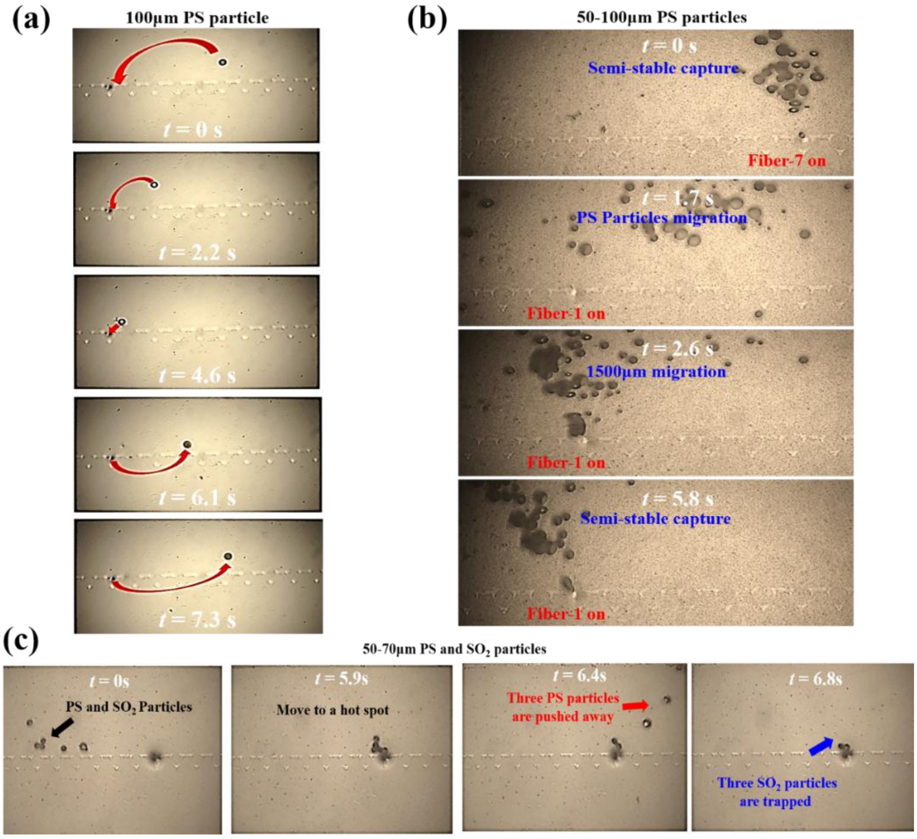

Fig.S6 Experiment results on PS particles trapping, the liquid level is 700μm (a) Trapping experiment of 100μm PS particle. The PS particle can be transmitted to hot spot, then be pushed away from the heat source. The experimental conditions are 80mW light source power and water solution. (b) Semi-capture experiment of high-throughput 50-100μm polystyrene particles, when the experimental conditions are 40mW light source power and alcohol solution. (c) Sorting experiment of SiO_2 and PS particles. Under the experimental conditions of 80mW light source power and 700μm water solution, the mixed PS and SiO_2 particles can be migrated, but only the SiO_2 particles can be stably captured, the PS particles will be ejected away from the hot spot.

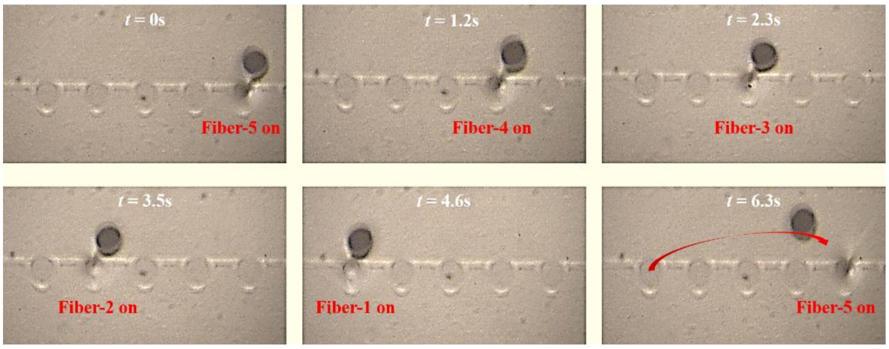

Fig.S7 Process of zirconium dioxide particle manipulation between fibers. The liquid level is 700μm and the light source power is 80 mW.

Video S1: process of periodic cycling of 100μm silica particles between fibers

Video S2: process of 120μm silica particles transport 2250μm, from fiber 10 to fiber 1

Video S3: process of 20μm silica particles transport 1000μm, from fiber 1 to fiber 5

Video S4: the formation of bubbles affects the capture process when the incident light power is 100mW

Video S5: process of silica particles manipulation between fibers at the situation of three optical switch ports

Video S6: particle manipulation at different height level environment. (with×2 speed)