

Supplementary Information

Isolation and analysis of fetal nucleated red blood cells using multifunctional microbeads with a nanostructured coating toward early non-invasive pregnant diagnostics

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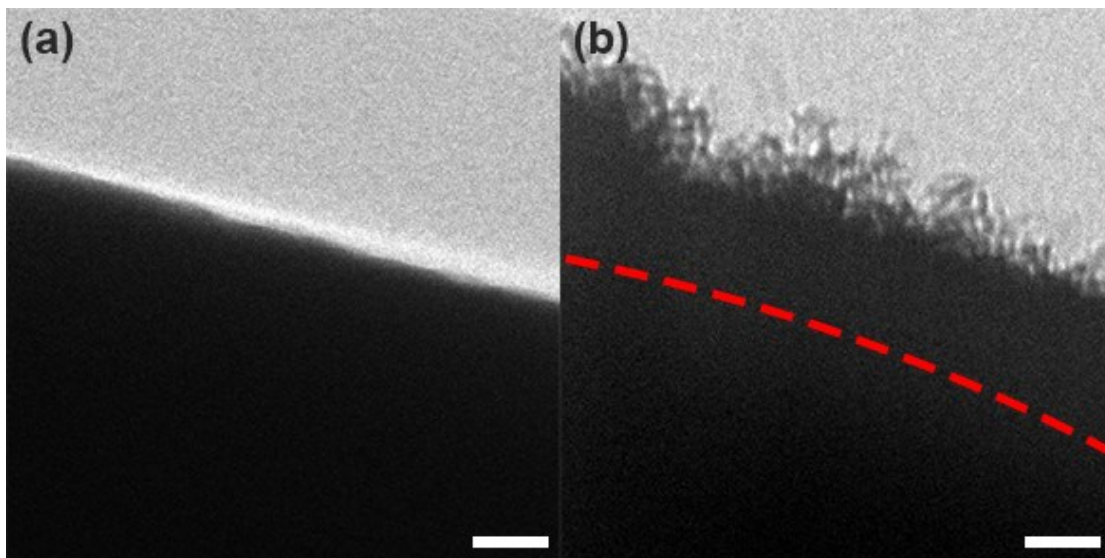


Figure. S1 The TEM characterization of (a) SiO_2 microbeads, and (b) $\text{SiO}_2@ \text{MnO}_2$ microbeads. The scale bars are 200 nm.

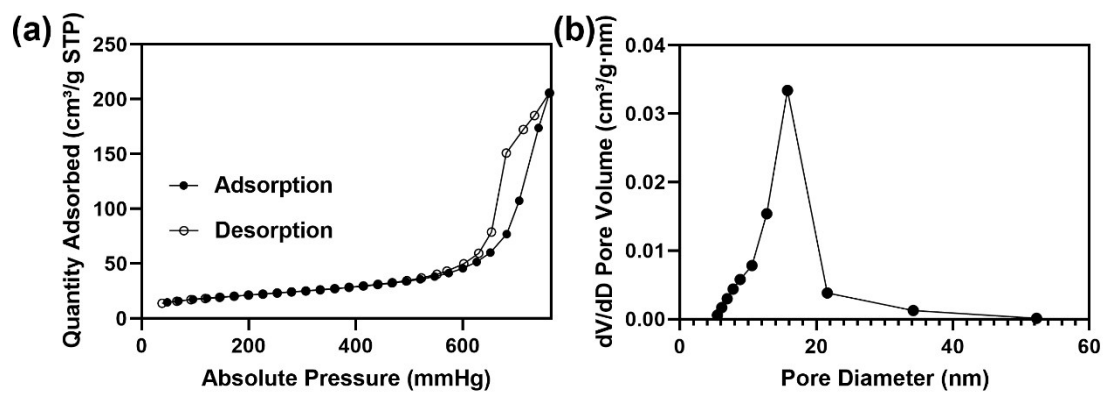


Figure. S2 The N₂ adsorption/desorption isotherms (a) and pore size distributions (b) of SiO₂@MnO₂ microbeads.

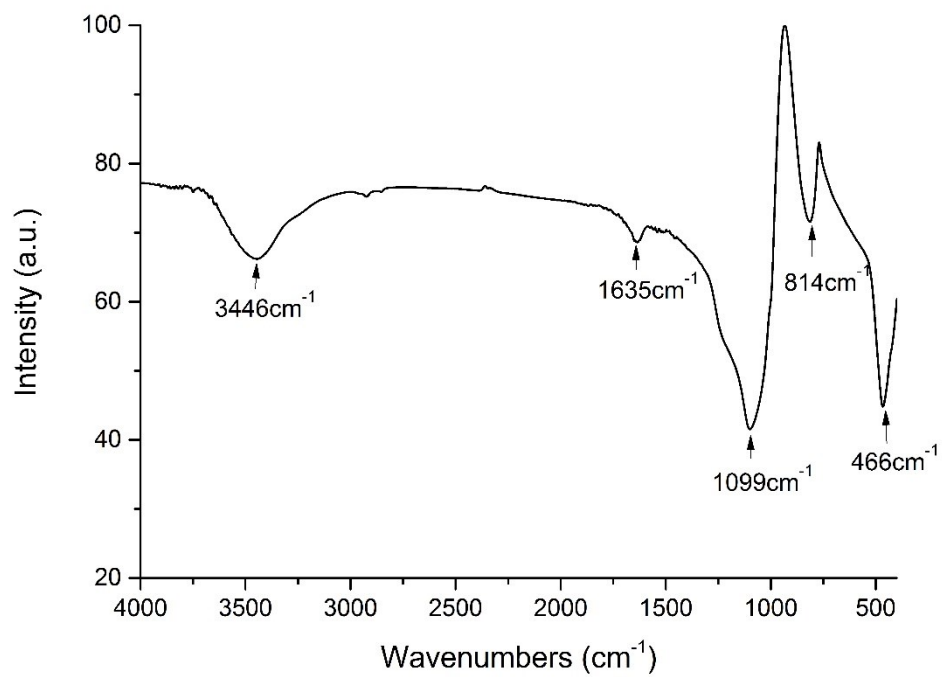


Figure. S3 Fourier Transform Infrared Spectroscopy (FTIR) analysis shown surface groups of SiO₂@MnO₂ microbeads.



Figure. S4 The fluorescence microscopic image of SiO₂@MnO₂ microbeads modified with FITC-labeled streptavidin (scale bar = 20 μm).

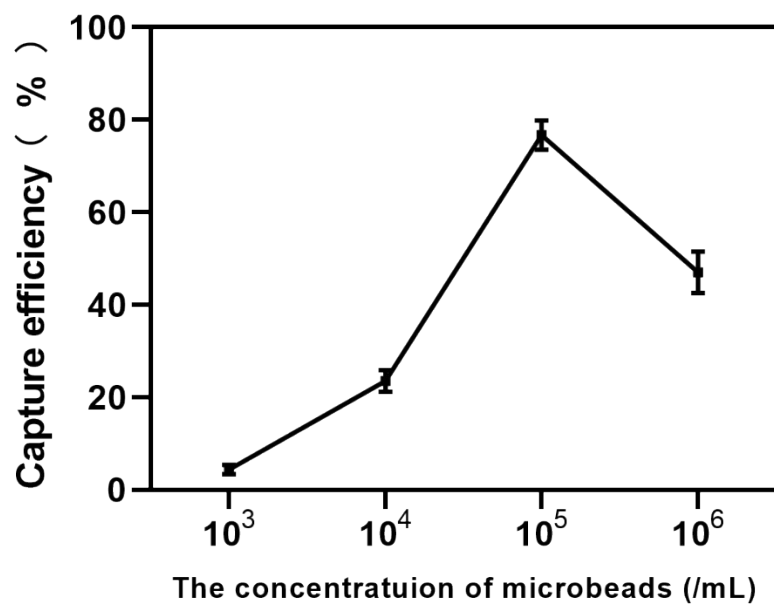


Figure. S5 Capture efficiency affected by the concentration of $\text{SiO}_2\text{@MnO}_2$ MBs (n=3).

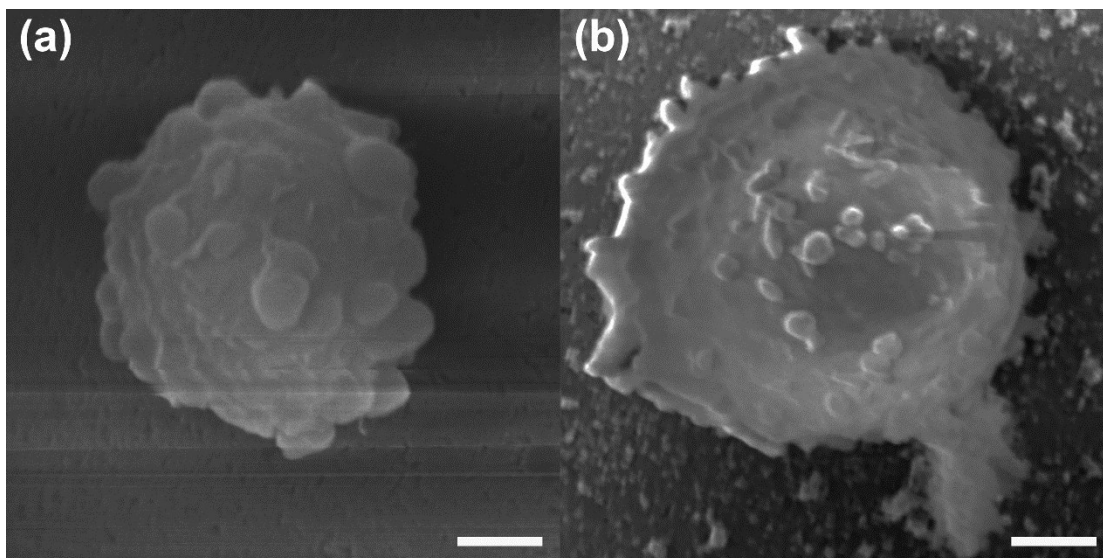


Figure. S6 The images of nanoparticles after collections of cells in situ. (a) Cell captured by SiO_2 microbeads (scale bar = 2 μm). (d) Cell captured by $\text{SiO}_2@\text{MnO}_2$ microbeads (scale bar = 2 μm). The cell presented spread, and a lot of filopodia are attached to the surface.

Table.1 Detailed gestational days and fNRBCs counts for 20 blood samples.

Blood sample (NO.)	Gestational age (day)	fNRBCs counts (/mL)
1	39	9
2	41	10
3	44	6
4	46	10
5	47	10
6	48	15
7	48	13
8	48	10
9	49	11
10	50	14
11	50	9
12	51	9
13	52	14
14	52	12
15	52	5
16	56	10
17	57	15
18	59	12
19	61	11
20	62	7