Supporting Information

Extraction of small extracellular vesicles by label-free and biocompatible on-chip magnetic separation

Lin Zeng, a Shi Hu, a Xi Chen, a Pengcheng Zhang, a Guoqiang Gu, a Yuye Wang, a Hongpeng Zhang, b Yi Zhang c and Hui Yang *a d

a Laboratory of Biomedical Microsystems and Nano Devices, Bionic Sensing and Intelligence Center, Institute of Biomedical and Health Engineering, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, 518055 Shenzhen, China. E-mail: hui.yang@siat.ac.cn.

b Marine Engineering College, Dalian Maritime University, 116026 Dalian, China.

c Center for Medical AI, Institute of Biomedical and Health Engineering, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, 518055 Shenzhen, China.

d CAS Key Laboratory of Health Informatics, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, 518055 Shenzhen, China.

Fig. S1 The photography of the microfluidic chip and the separation system. A Photography of the microfluidic chip. B Photography of the separation system.
Fig. S2 The magnetic field distribution obtained from the 3D simulation model.
Fig. S3 Flow cytometry test results using size-calibrated fluorescent particles. A Test results of 1000 nm particles. B Test results of 200 nm particles.
Fig. S4 The original detection results of the flow cytometer for particles separation.
Fig. S5 A The comparison of the cell culture medium and the ferrofluids diluted with cell culture medium (0.003×). B The microscope images of the cell culture medium and the ferrofluids diluted with cell culture medium (0.003×) after 4 h. C Bright field images of the outlets area without ferrofluid and that with ferrofluid (0.003×) during the sEVs separation.
Fig. S6 The viability of BMSCs in the cell culture medium and the ferrofluid of different concentrations.
Fig. S7 The NTA measurement results of the EVs sample collected from outlet A.
**Tab. S1** The parameters used in the numerical simulations

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remanent flus density of the magnets</td>
<td>1.48 T</td>
</tr>
<tr>
<td>Relative permeability of ferrofluid after dilution</td>
<td>1.00069</td>
</tr>
<tr>
<td>Relative permeability of Fe₃O₄ powder¹</td>
<td>4</td>
</tr>
<tr>
<td>Relative permeability of permalloy</td>
<td>80000</td>
</tr>
<tr>
<td>Dynamic viscosity of the ferrofluid after dilution</td>
<td>0.001 Pa·s</td>
</tr>
</tbody>
</table>

REFERENCES