Supplementary Information

Plastic-based acoustofluidic devices for high-throughput, biocompatible platelet separation

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	Diameter (μm)	Density (kg/m^3)	Compressibility ($\times 10^{-10}$ Pa^{-1})	Contrast factor (blood as medium)
WBC	12-17[1,2]	1060-1090[1,2]	3.59[2,3]	0.2939[2]
RBC	6.2-8.2[1,2]	1090-1100[1,2]	3.2[2,4]	0.3966[2]
Platelet	2-3[1,2]	1040-1060[1,2]	3.3[2,5]	0.2622[2]

Table S1: Parameters of different blood components.[1–5]

	Density (kg/m^3)	Acoustic velocity (m/s)
Blood	1055	1575
PMMA	1180	2730

Table S2: Parameters of different medium.[6]

Variables	Acoustics	Amicus	COM.TEC	Trima
Pre-apheresis Hb (g/dL)	15.2 ± 1.4	15.7 ± 1.2	15.7 ± 1.0	15.6 ± 1.0
Post-apheresis Hb (g/dL)	13.4 ± 1.6 (derived)	14.7 ± 1.3	14.8 ± 1.3	14.9 ± 1.1

Table S3: Pre- and post- platelet separation process hemoglobin level comparison between the acoustic-based device and three commercialized plateletpheresis equipment.[7,8]

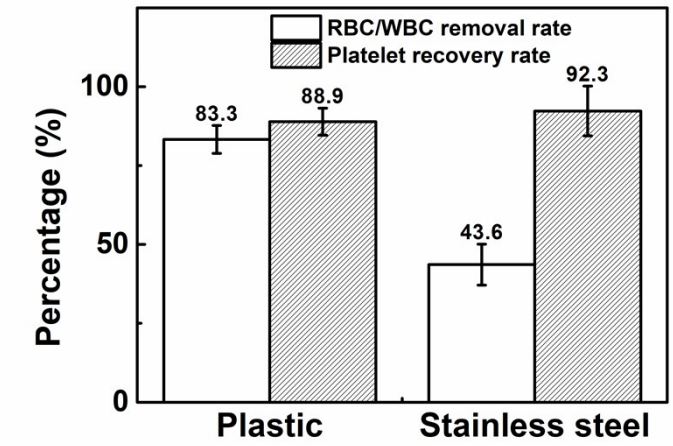

Figure S1: The comparison of RBC/WBC removal rate and platelet recovery rate between our plastic-based acoustic device and the previous stainless-steel device[9] under a 20 mL/min sample flow rate. Data represents average ± standard deviation from three independent experiments ($p < 0.05$).

References:

1 F. Petersson, L. Åberg, A.-M. Swärd-Nilsson and T. Laurell, *Anal. Chem.*, 2007, **79**, 5117–5123.

2 M. Wu, Y. Ouyang, Z. Wang, R. Zhang, P.-H. Huang, C. Chen, H. Li, P. Li, D. Quinn, M. Dao, S. Suresh, Y. Sadovsky and T. J. Huang, *Proc. Natl. Acad. Sci.*, 2017, **114**, 10584–10589.

3 P. Li, Z. Mao, Z. Peng, L. Zhou, Y. Chen, P.-H. Huang, C. I. Truica, J. J. Drabick, W. S. El-Deiry, M. Dao, S. Suresh and T. J. Huang, *Proc. Natl. Acad. Sci.*, 2015, **112**, 4970–4975.

4 D. Hartono, Y. Liu, P. L. Tan, X. Y. S. Then, L.-Y. L. Yung and K.-M. Lim, *Lab Chip*, 2011, **11**, 4072.

5 J. Nam, H. Lim, D. Kim and S. Shin, *Lab Chip*, 2011, **11**, 3361.

6 H. Azhari, *Basics of Biomedical Ultrasound for Engineers*, 2010.

7 A. Tendulkar and S. B. Rajadhyaksha, *Asian J. Transfus. Sci.*, 2009, **3**, 73–7.

8 M. Keklik, B. Eser, L. Kaynar, S. Sivgin, E. Keklik, M. Solmaz, A. Ozturk, R. Buyukoglan, M. Yay and M. Cetin, *J. Clin. Apher.*, 2015, **30**, 171–175.

9 Y. Chen, M. Wu, L. Ren, J. Liu, P. H. Whitley, L. Wang and T. J. Huang, *Lab Chip*, 2016, **16**, 3466–3472.