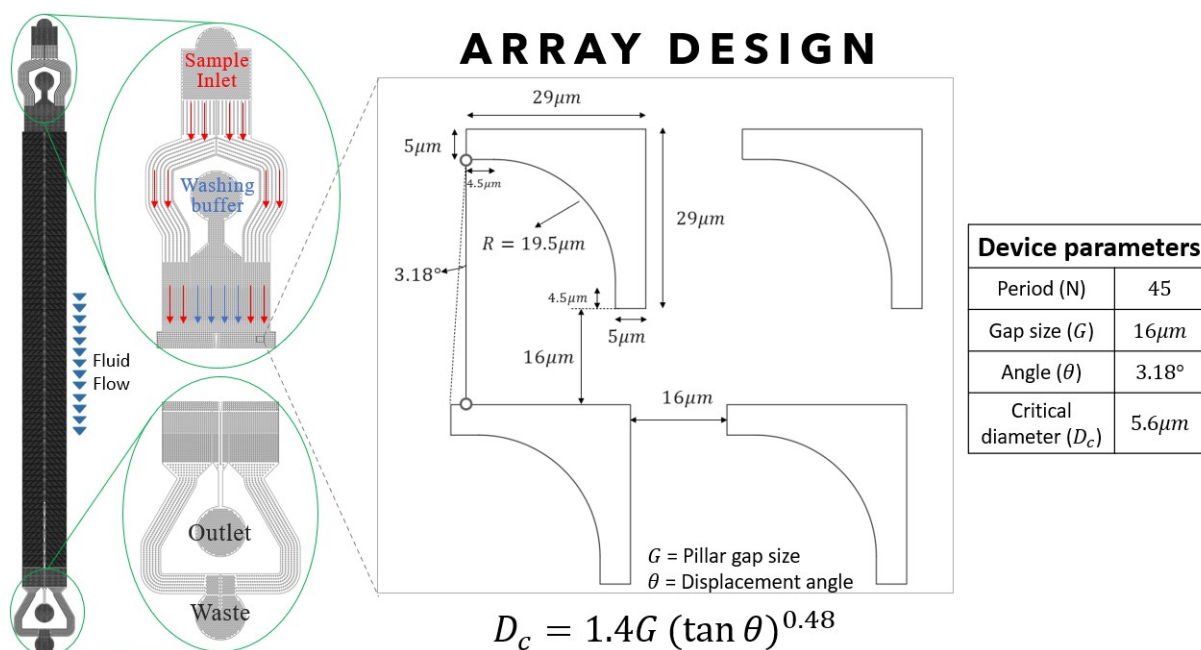
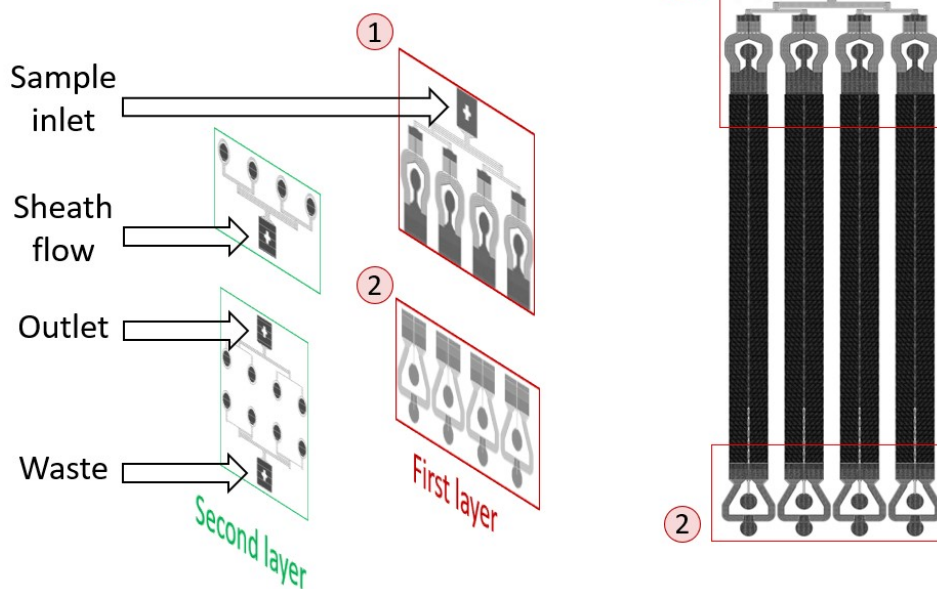


# Supplementary

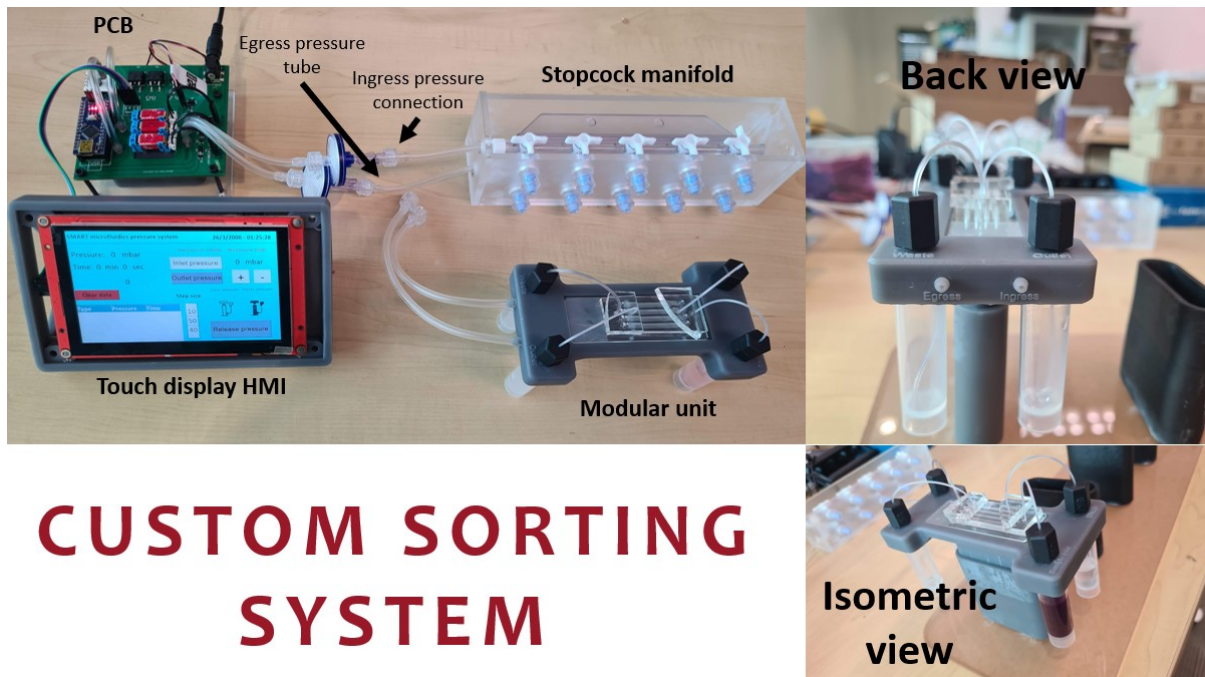


Supplementary figure 1. Specifications of single DLD device.

## ISOMETRIC PROJECTION



Supplementary figure 2. Specifications of multi-device DLD chip.



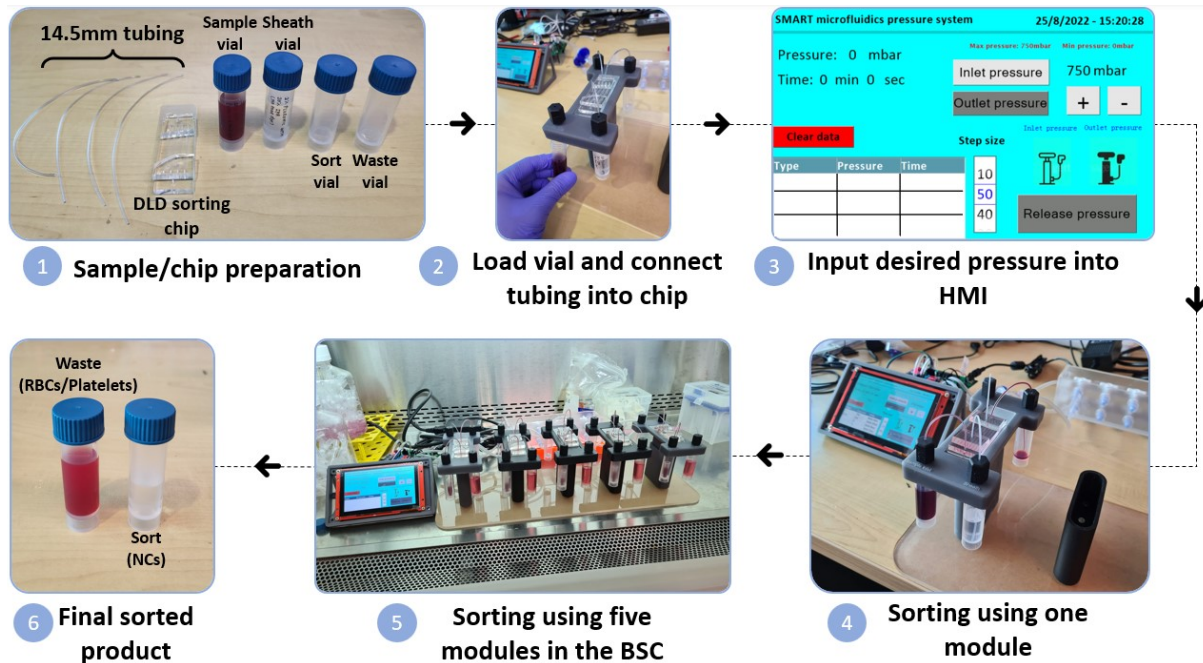
# CUSTOM SORTING SYSTEM

**Supplementary figure 3. Components of the sorting system**

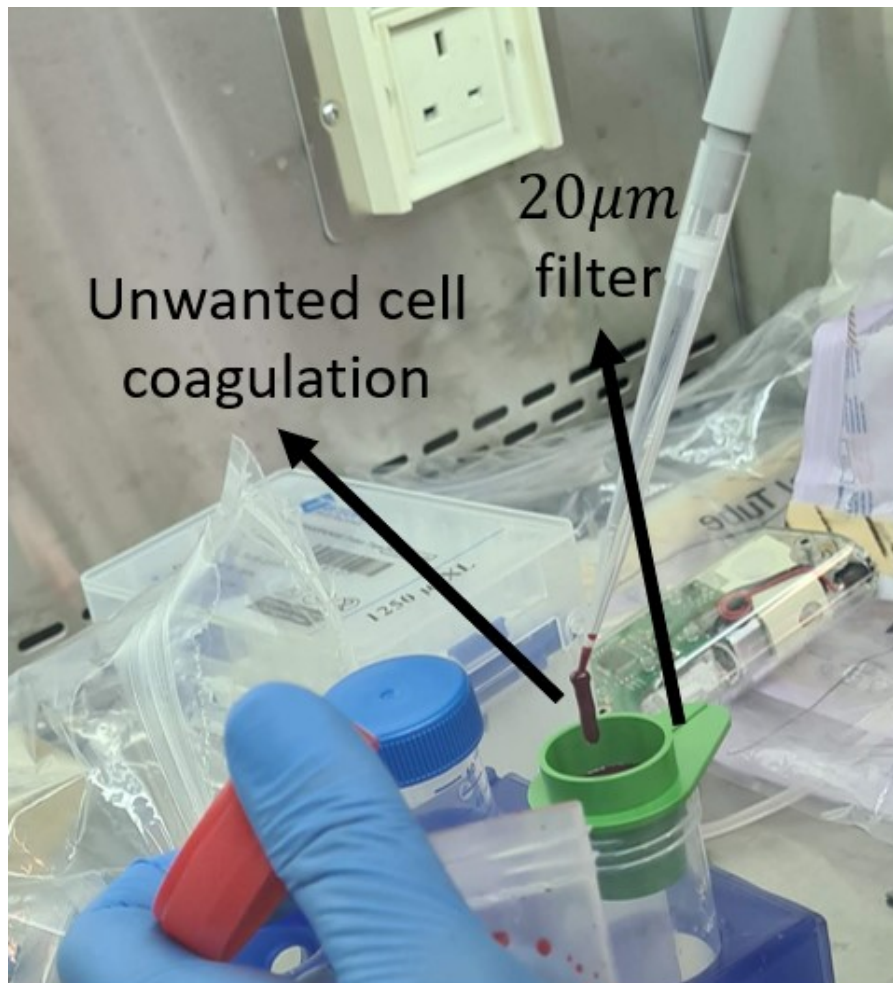
Supplementary table 1. Flow conditions for whole blood sorting

	<b>750mbar</b>	<b>500mbar</b>	<b>250mbar</b>
Blood flowrate ( $\mu\text{L}/\text{min}$ )	$36.71 \pm 3.49$	$23.77 \pm 2.14$	$11.04 \pm 1.23$
Sheath flowrate ( $\mu\text{L}/\text{min}$ )	$72.38 \pm 4.9$	$44.84 \pm 4.03$	$22.27 \pm 3.04$
$Q_{\text{Sheath}}:Q_{\text{Blood}}$	1.96:1	1.89:1	2:1

**Supplementary discussion 1 – Experimental workflow:** Firstly, we connected the tubings from the reservoir vials (sample fluid, sheath buffers, outlet (sort) and waste) to the chip on the modular platform. We then prime the device with the priming agent and wash chips with DPBS before flushing the device with DMEM. To start sorting, we loaded the undiluted BMA into the sample inlet port and entered the desired pressure into the HMI.



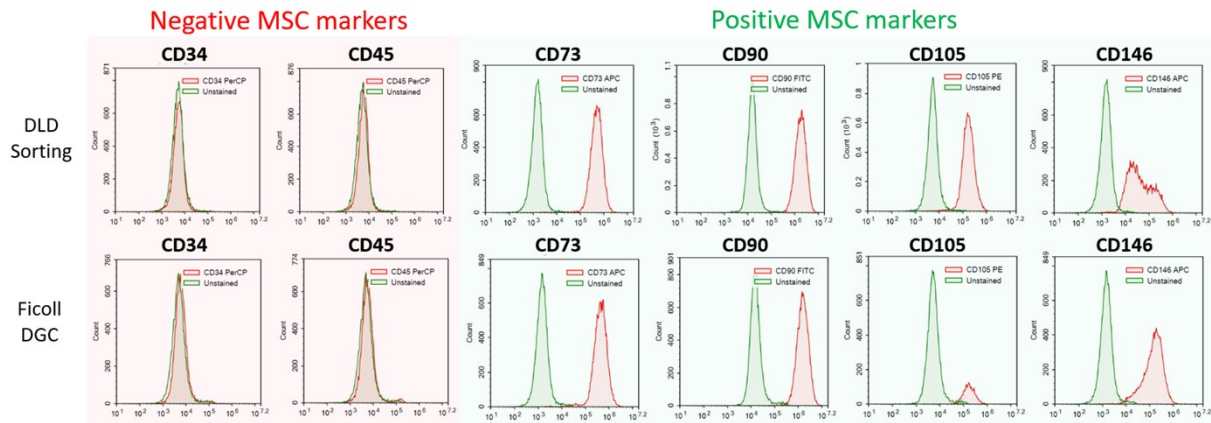
**Supplementary figure 4. Experimental procedure and engineered system for scaled sorting operations of the DLD sorting microfluidic device(s).** Step procedures for high throughput sorting using our in-house microfluidics pressure system with modular platforms. This 5 steps approach will allow for reduced user training and result variability associated with human error present in the Ficoll DGC protocol where the process is highly dependent on the user’s technical knowledge and experience.



*Supplementary figure 5.* Unwanted cell coagulation trapped within the 20µm filter.



# MSC PURITY



**Supplementary figure 6.** Purity of MSC phenotypic cell surface markers on sorted cells using DLD and Ficoll DGC

Supplementary table 2. Percentage values for MSC surface markers

	Negative markers		Positive markers			
	CD34	CD45	CD73	CD90	CD 105	CD 146
DLD sorting	90.33%	87.92%	99.16%	99.68%	99.07%	90.35%
Ficoll DGC	83.28%	84.67%	99.49%	99.83%	99.29%	98.55%

Supplementary table 3. P2 CFU-F efficiency

	Ficoll DGC	DLD sorting
CFU-F efficiency	5.31%	6.39%