Electronic Supplementary Material (ESI) for Analyst.


# Supporting Information

## Multi-Resistive Pulse Sensor Microfluidic Device

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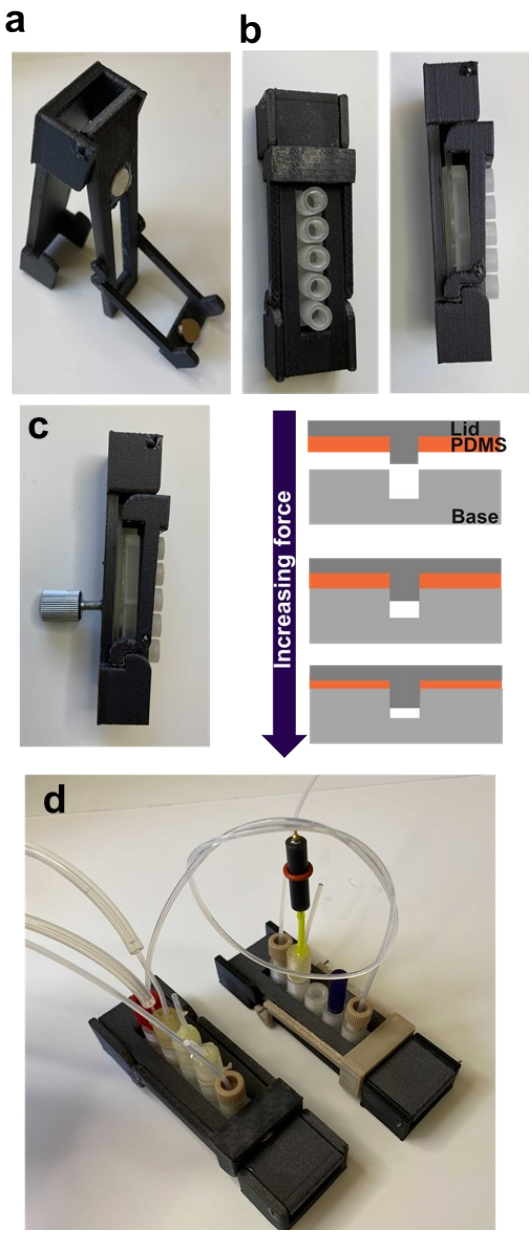


***Figure S1.*** *Examples of the fluidic chip holder a) empty and b) with the fluidic chip. c) Side image of holder with the screw thread; turning the screw compresses the lid and PDMS into the channel. d) The fluidic chips can be coupled in series or to other sensors and devices.*

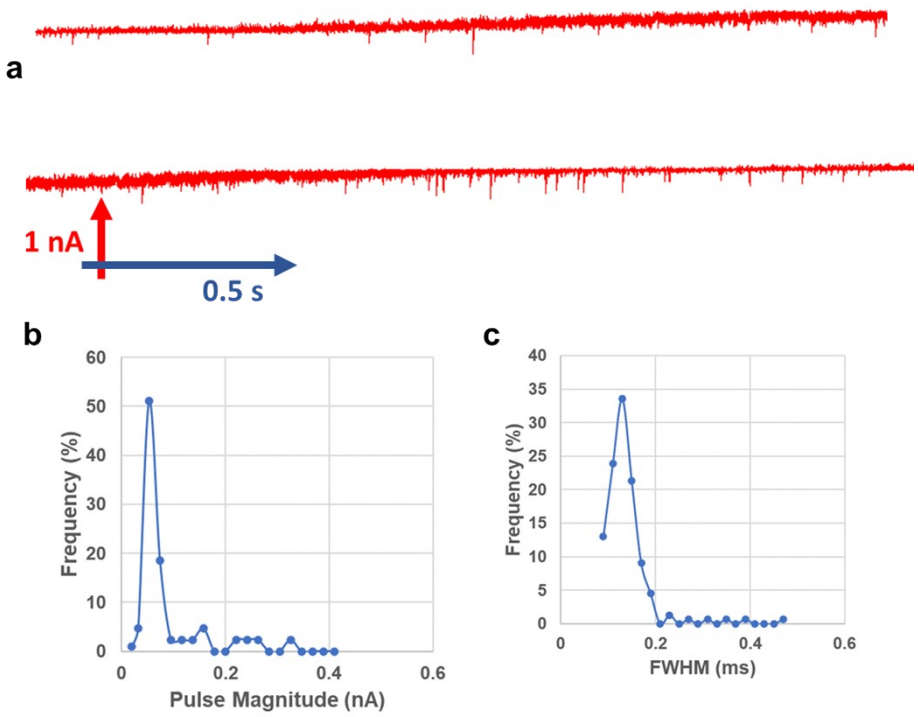


***Figure S2*** *a) Current time trace of sensor 2 1.8V, using a 580 nm pore size in a GNM, b) Distribution of blockade heights from sensor 2. 110 nm particles at 1 x $10^{10}$ particles/ mL. Flow rate of 0.5mL/ min through sensor 1.*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Sensor 1 | | | | | | |
| | | Particle size (μm) | Electrolyte (mM) | Voltage (V) | Average Pulse magnitude (nA) | Particle rate /min | Flow rate through sensor 1 (mL/min) | Particle concentration /mL |
| | Run 1 | 10 | 50 | 0.3 | 1.56 | 482 | 0.5 | 1000 |
| Day 1 | Run 2 | 10 | 50 | 0.3 | 1.48 | 510 | 0.5 | 1000 |
| | Run 3 | 10 | 50 | 0.3 | 1.52 | 496 | 0.5 | 1000 |
| | Run 1 | 10 | 50 | 0.3 | 1.42 | 504 | 0.5 | 1000 |
| Day 2 | Run 2 | 10 | 50 | 0.3 | 1.45 | 501 | 0.5 | 1000 |
| | Run 3 | 10 | 50 | 0.3 | 1.39 | 498 | 0.5 | 1000 |
| | Run 1 | 10 | 50 | 0.3 | 1.62 | 482 | 0.5 | 1000 |
| Day 3 | Run 2 | 10 | 50 | 0.3 | 1.58 | 493 | 0.5 | 1000 |
| | Run 3 | 10 | 50 | 0.3 | 1.54 | 499 | 0.5 | 1000 |
| | | Sensor 2 | | | | | | |
| | | Nominal Pore size | 5000 nm | | | | | |
| | | Particle size (μm) | Electrolyte (mM) | Voltage (V) | Average Pulse magnitude (nA) | Particle rate /min | Flow rate through sensor 1 (mL/min) | Particle concentration /mL |
| | Run 1 | 1 | 50 | 0.8 | 0.809 | 374 | 0.5 | 1.00E+06 |
| Day 1 | Run 2 | 1 | 50 | 0.8 | 0.81 | 368 | 0.5 | 1.00E+06 |
| | Run 3 | 1 | 50 | 0.8 | 0.795 | 371 | 0.5 | 1.00E+06 |
| | Run 1 | 1 | 50 | 0.8 | 0.801 | 373 | 0.5 | 1.00E+06 |
| Day 2 | Run 2 | 1 | 50 | 0.8 | 0.812 | 380 | 0.5 | 1.00E+06 |
| | Run 3 | 1 | 50 | 0.8 | 0.8 | 369 | 0.5 | 1.00E+06 |
| | | Nominal Pore size | 1000 nm | | | | | |
| | | Particle size (μm) | Electrolyte (mM) | Voltage (V) | Average Pulse magnitude (nA) | Particle rate /min | Flow rate through sensor 1 (mL/min) | Particle concentration /mL |
| | Run 1 | 0.4 | 50 | 1.92 | 0.22 | 4393 | 0.5 | 1.00E+09 |
| Day 1 | Run 2 | 0.4 | 50 | 1.92 | 0.22 | 4280 | 0.5 | 1.00E+09 |
| | Run 3 | 0.4 | 50 | 1.92 | 0.21 | 4385 | 0.5 | 1.00E+09 |
| | Run 1 | 0.4 | 50 | 1.92 | 0.23 | 4356 | 0.5 | 1.00E+09 |
| Day 2 | Run 2 | 0.4 | 50 | 1.92 | 0.22 | 4367 | 0.5 | 1.00E+09 |
| | Run 3 | 0.4 | 50 | 1.92 | 0.24 | 4398 | 0.5 | 1.00E+09 |
| | | Nominal Pore size | 780 nm | | | | | |
| | | Particle size (μm) | Electrolyte (mM) | Voltage (V) | Average Pulse magnitude (nA) | Particle rate /min | Flow rate through sensor 1 (mL/min) | Particle concentration /mL |
| | Run 1 | 0.21 | 50 | 1.6 | 0.4 | 262 | 0.5 | 1.00E+08 |
| Day 1 | Run 2 | 0.21 | 50 | 1.6 | 0.39 | 257 | 0.5 | 1.00E+08 |
| | Run 3 | 0.21 | 50 | 1.6 | 0.4 | 281 | 0.5 | 1.00E+08 |
| | Run 1 | 0.21 | 50 | 1.6 | 0.42 | 276 | 0.5 | 1.00E+08 |
| Day 2 | Run 2 | 0.21 | 50 | 1.6 | 0.4 | 256 | 0.5 | 1.00E+08 |
| | Run 3 | 0.21 | 50 | 1.6 | 0.41 | 262 | 0.5 | 1.00E+08 |
| | | Nominal Pore size | 580 nm | | | | | |
| | | Particle size (μm) | Electrolyte (mM) | Voltage (V) | Average Pulse magnitude (nA) | Particle rate /min | Flow rate through sensor 1 (mL/min) | Particle concentration /mL |
| | Run 1 | 0.11 | 50 | 1.8 | 0.53 | 376 | 0.5 | 1.00E+10 |
| Day 1 | Run 2 | 0.11 | 50 | 1.8 | 0.54 | 354 | 0.5 | 1.00E+10 |
| | Run 3 | 0.11 | 50 | 1.8 | 0.53 | 357 | 0.5 | 1.00E+10 |
| | Run 1 | 0.11 | 50 | 1.8 | 0.58 | 381 | 0.5 | 1.00E+10 |
| Day 2 | Run 2 | 0.11 | 50 | 1.8 | 0.6 | 387 | 0.5 | 1.00E+10 |
| | Run 3 | 0.11 | 50 | 1.8 | 0.58 | 382 | 0.5 | 1.00E+10 |

*Table S1. Example data parameters for runs using Sensor 1 and 2. The 5000nm sensor 2 was a pulled glass pipette. The 1000, 780 and 550 nm sensor 2 a GNM.*