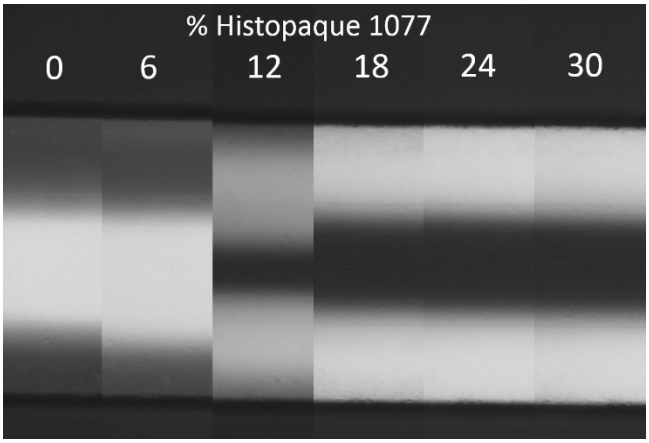
Lab on a Chip

PAPER

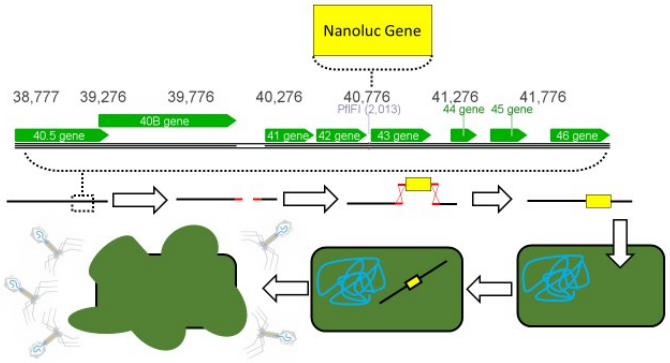
Supplementary Information

Density matching of co-flowing buffer.



Supplemental Figure A. Effect of co-flowing buffer density. Shown is a montage of fluorescent micrographs taken at the downstream end of the channel for each of 6 buffer solutions (dark regions) flowed through the center inlet of the microchannel while dyed plasma (bright regions) flowed through the side inlets. With acoustics off (not shown) and at high concentration of density medium, plasma remains in side streams and density-adjusted buffer remains in the center stream. Below 18% (calculated density of 1.014g/mL) the plasma begins to migrate toward the center stream and displace the buffer toward the sides.

To determine the appropriate quantity of Histopaque to add to the co-flow buffer to prevent gross acoustic forces on the fluid interface, we prepared a cell-free sample solution and a series of test co-flow buffer solutions. To represent the sample medium in the diluted blood samples, we mixed blood plasma diluted to 20% in PBS by with a small fraction of fluorescent albumin (Ca no. A9771, Sigma-Aldrich, St. Louis, MO). For the buffer solutions, we titrated Histopaque into PBS at concentrations from 0—30%. At 50μl/min flow rate of each solution (100μl/min total throughput), the sample solution was pumped into the side inlets and the buffer solution was pumped into the center inlet. The transducer was activated and the downstream end of the microchannel was inspected for displacement of the fluorescent sample solution (Supplement Figure A). Displacement of the sample solution from the sides into the center stream occurred when co-flow buffer density was too low (e.g., at 0 or 6% Histopaque) but not when co-flow density was sufficiently high (e.g., 18% or higher). Near the critical density (e.g., 12%) the stream of sample solution appears broadened and diminished in intensity. This may be because the two fluids are stacked on top of each other in an unstable position as better illustrated in detail by Deshmukh et al. using confocal microscopy.[40]



Supplemental Figure B. Illustration of the cloning scheme that inserts the nanoluc gene into the K1E phage genome. The nanoluc gene is inserted in the intergenic space between gene 42 & 43. The insertion site is at 'TTGTAAAGACG//AGGTCAATCAATA'. Linear DNA was excised at a pflF1 site, and the nanoluc gene was inserted via the NEBuilder system. Resealed DNA is inserted into NEB10B cells via electroporation. The transformed DNA then produces fully assembled phage that carry the nanoluc gene.

Nanoluc Insertion.