Supplementary Information for

An Ink-Jet Printed, Roll-Coated Digital Microfluidic Device for Inexpensive, Miniaturized Diagnostic Assays

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Cost estimates for an ink jet printed and roll-coated digital microfluidic device

Note: "Non-critical" materials are those that are not essential to device operation and can be replaced by much cheaper alternatives when scaled up for mass production.

Bottom Plate

Silver Ink (critical): The cost of the silver ink is US $5/mL (i.e., US $250 for 50 mL from NovaCentrix, Austin, TX). By weighing bare and dry printed substrates and taking into account the silver loading and density of the ink (load = 25% and ρ = 997 g/L respectively) we calculated the cost of the ink per device to be US $0.07.

Bottom Plate Substrate (critical): Bottom plate substrates are Novele IJ-220 inkjet printing media from NovaCentrix. In the NovaCentrix online store, 100 m x 0.15 m rolls are available for US $120, for a cost of US $0.03 for each 75 mm x 50 mm bottom plate substrate.

CEP on Bottom Plate (critical): Cyanoresin CR-S cyanoethyl pullulan can be purchased for US $1.00/g and N,N-dimethylformamide solvent (ρ = 948 g/L) can be purchased for US $0.06/mL. A 20% wt/wt solution has ρ =1025 g/L and thus costs approximately US $0.21/mL. With a Mini Roll Coater (MRC, FOM Technologies, Lyngby, Denmark) flow rate of 2.0 mL/min, drum speed of 0.33 m/min, roll length of 1 m, and 15 devices per roll, the volume of solution used per device is approximately 0.4 mL, a cost of US $0.08.

FluoroPel on Bottom Plate (critical): FluoroPel 1101V has a cost of approximately US $3.53/mL. With a MRC flow rate of 1.0 mL/min, drum speed of 0.67 m/min, roll length of 1 m, and 15 devices per roll, the volume of solution used per device is approximately 0.1 mL for a cost of US $0.35.

Bottom Plate Adhesive (non-critical): Rolls of adhesive transfer tape F9460PC (4.57 m x 0.3 m) can be purchased from digikey.com for $60.78 per roll, a cost of US $0.24 per bottom plate.

Bottom Plate Glass Slide (non-critical): Bottom plate glass slides can be purchased for US $0.50 each (75 mm x 50 mm x 0.7 mm from S.I. Howard Glass Co., Inc. Worcester, MA).

Top Plate

Top Plate Substrate (critical): ITO-PET rolls (100 m x 0.3 m) can be purchased from MEMCON North America for US $540, a cost of US $0.03 for each 75 mm x 25 mm top plate substrate.

FluoroPel on Top Plate (critical): FluoroPel 1101V has a cost of approximately US $3.53/mL. With a MRC flow rate of 1.0 mL/min, drum speed of 0.67 m/min, roll length of 1 m, and 79 top plates per roll, the volume of solution used per top plate is approximately 0.02 mL, a cost of US $0.07.

Top Plate Adhesive (non-critical): Rolls of adhesive transfer tape F9460PC (4.57 m x 0.3 m) can be purchased from digikey.com for US $60.78 per roll, a cost of US $0.12 per bottom plate.

Top Plate Glass Slide (non-critical): Top plate glass slides are made from bottom plate glass slides (cut in half) for a cost of US $0.25 each.

Supplementary Table S1. Cost of Critical Components per Device

Component	Cost (USD)
Silver Ink	$0.07
Substrate (Bottom Plate)	$0.03
CEP	$0.08
FluoroPel (Bottom Plate)	$0.35
Substrate (Top Plate)	$0.03
FluoroPel (Top Plate)	$0.07
Total	$0.63

Supplementary Table S2. Cost of All Components per Device

Component	Cost (USD)
Silver Ink	$0.07
Substrate (Bottom Plate)	$0.03
CEP	$0.08
FluoroPel (Bottom Plate)	$0.35
Adhesive (Bottom Plate; non-critical)	$0.24
Glass Slide (Bottom Plate; non-critical)	$0.50
Substrate (Top Plate)	$0.03
FluoroPel (Top Plate)	$0.07
Adhesive (Top Plate; non-critical)	$0.12
Glass Slide (Top Plate; non-critical)	$0.25
Total	$1.74